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VALUING MATERNITY CARE:

A comparison of stated preference methods with an application to cost-benefit analysis

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Report on research completed and submitted for the degree of Doctor of Philosophy in Health Economics, October 2015.

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GLOSSARY

AIC	Akaike information criteria
AIMS	Association for the improvement of Maternity Services
ASC	Alternative-specific constant
BIC	Bayesian information criteria
CA	Conjoint analysis
CBA	Cost-benefit analysis
CEA	Cost-effectiveness analysis
CEAC	Cost-effectiveness acceptability curve
CGH	Cavan General Hospital
CL	Conditional logit
CLU	Consultant-led unit
CMA	Cost-minimisation analysis
CP	Contraction property test
CS	Caesarean section
CUA	Cost-utility analysis
CUMH	Cork University Maternity Hospital
CV	Compensating variation
CVM	Contingent valuation method
DCE	Discrete choice experiment
DoHC	Department of Health and Children
DOMINO	Domiciliary In and Out of Hospital care
DRC	Dual response choice
EP	Expansion property test
ESRI	Economic and Social Research Institute
ETH	Early Transfer Home Scheme
EV	Equivalent variation
HEV	Heteroscedastic extreme value
HIQA	Health Information and Quality Authority
HSE	Health Service Executive
ICBR	Incremental cost-benefit ratio
ICER	Incremental cost-effectiveness ratio
IIA	Independence of irrelevant alternatives
IID	Independently and identically distributed
INO	Irish Nurses Organisation
IUF	Indirect utility function
MAMS	Maternal Assessment of Maternity Services
MEC	Marginal external cost
MLU	Midwifery-led unit
MNL	Multinomial logit
MPC	Marginal private cost

MRS	Marginal rates of substitution
MSB	Marginal social benefit
MSC	Marginal social cost
MXL	Mixed logit
NBAC	Net-benefit acceptability curve
NICE	National Institute for Health and Clinical Excellence
NL	Nested logit
NMH	National Maternity Hospital
NPEC	National Perinatal Epidemiology Centre
NPRS	National Perinatal Reporting System
OE	Open-ended question
OLOL	Our Lady of Lourdes Hospital, Drogheda
OMEP	Orthogonal main effects plan
PHI	Private health insurance
PPIC	Potential Pareto Improving Criterion
PS	Payment scale question
PSA	Probabilistic sensitivity analysis
QALY	Quality adjusted life year
RP	Revealed preference
RUT	Random utility theory
SP	Stated preference
SWF	Social welfare function
SWO	Social welfare ordering
WHO	World Health Organisation
WTA	Willingness to accept
WTP	Willingness to pay

DECLARATION

I declare that this thesis has not been submitted as an exercise for a degree at this or any other university. The work, upon which this thesis is based, was carried out in collaboration with a team of researchers and supervisors who are duly acknowledged in the text of the thesis. The library may lend or copy this thesis upon request.

Signed: _____ Date: _____

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ABSTRACT

This research investigates whether a reconfiguration of maternity services, which co-locates consultant- and midwifery-led care, reflects demand and value for money in Ireland. Qualitative and quantitative research is undertaken to investigate demand and an economic evaluation is performed to evaluate the costs and benefits of the different models of care.

Qualitative research is undertaken to identify women's motivations when choosing place of delivery. These data are further used to inform two stated preference techniques: a discrete choice experiment (DCE) and contingent valuation method (CVM). These are employed to identify women's strengths of preferences for different features of care (DCE) and estimate women's willingness to pay for maternity care (CVM), which is used to inform a cost-benefit analysis (CBA) on consultant- and midwifery-led care.

The qualitative research suggests women do not have a clear preference for consultant- or midwifery-led care, but rather a hybrid model of care which closely resembles the Domiciliary Care In and Out of Hospital (DOMINO) scheme. Women's primary concern during care is safety, meaning women would only utilise midwifery-led care when co-located with consultant-led care. The DCE also finds women's preferred package of care closely mirrors the DOMINO scheme with 39% of women expected to utilise this service. Consultant- and midwifery-led care would then be utilised by 34% and 27% of women, respectively. The CVM supports this hierarchy of preferences where consultant-led care is consistently valued more than midwifery-led care – women are willing to pay €956.03 for consultant-led care and €808.33 for midwifery-led care.

A package of care for a woman availing of consultant- and midwifery-led care is estimated to cost €1,102.72 and €682.49, respectively. The CBA suggests both models of care are cost-beneficial and should be pursued in Ireland. This reconfiguration of maternity services would maximise women's utility, while fulfilling important objectives of key government policy.

For Una

1 INTRODUCTION

1.1 Introduction

In 2015, the Irish government established a Steering Group to advise on the development of a National Maternity Strategy (DOH 2015). The focus of the Strategy is on maximising patient safety, quality of care, clinical outcomes, and patient choice (DOH 2015). Presently, maternal choice on maternity care is restricted across most geographic regions. There are 21 maternity units in Ireland, comprising 19 consultant-led units (CLUs) and two midwifery-led units (MLUs) (KPMG 2008). The two MLUs are only offered to pregnant women availing of maternity care in the northeast of the country, which caters to a small obstetric population. For women seeking maternity care in all other regions, choice on alternative models of care at hospital level is absent and women must choose consultant-led care if they wish to deliver in a hospital setting.

This lack of choice on maternity care at hospital level contrasts sharply with the UK where, in almost every region, women have the choice of delivering in a CLU or MLU (Schroeder *et al* 2011). Midwifery-led care has a long standing tradition in the UK, although it is a relatively recent development in maternity service provision in Ireland (MidU 2009). The model of care was introduced in 2004 on a trial basis pending the results of a randomised controlled trial (RCT) and cost-effectiveness analysis (CEA). The results were published in 2009 and show that midwifery-led care is safe, efficient, and cost-effective (Begley *et al* 2011; MidU 2009), similar to findings observed in the UK and elsewhere (Rooks *et al* 1992; Waldenstrom *et al* 2001; Waldenstrom *et al* 1997).

There has since been an increased interest among policy makers to expand midwifery-led care in Ireland (DOH 2015; KPMG 2008). The current Minister for Health, Leo Varadkar TD, has repeatedly called for greater maternal choice and an expansion of midwifery-led care in Ireland (Condon 2015; Culliton 2014; RTE 2015). Reforming maternity services in this way supports the government's longer term objective of reforming the Irish health care system. In 2012, the Irish government outlined its strategic framework for reform of the health service (DOH 2012). A major tenet of this reform involves treating patients at the lowest level of complexity. This can be achieved within maternity care where there currently exists an imbalance between provided and required care. According to the National Institute for Health and Clinical Excellence (NICE) guidelines (NICE 2007), the vast majority of pregnancies would be classified as low risk, but occur in settings that are designed to deal with moderate to high risk pregnancies. Treating women at the lowest level of complexity could be achieved by moving the majority of low risk pregnancies away from CLUs to MLUs.

However, very little is known about women's preferences for maternity care, and whether they would utilise midwifery-led care when presented with this option. In order to efficiently organise maternity care in Ireland, there needs to be an increased focus on priority setting where the allocation of resources reflects demand and value for money. The purpose of this research is to investigate demand for alternative models of maternity care in Ireland, and address the question of efficiency with respect to care in a CLU and care in a MLU using economic evaluation methodology. Given the recent establishment of a National Maternity Strategy, coupled with repeated calls by the Minister for Health to improve maternal choice, this research provides timely,

evidence-based data that informs policy makers on the worthwhileness of midwifery-led care in Ireland.

This chapter is set up as follows. An introduction to maternity service provision in Ireland is provided and outlined in section 1.2. The methodologies employed to address the research question are described in section 1.3. The specific aims and objectives of this thesis are presented in section 1.4, and a summary of the key findings arising from the research evidence is presented in section 1.5. The layout of the thesis is described in section 1.6. The chapter concludes in section 1.7.

1.2 Maternity care in Ireland

Under the Maternity and Infant Care Scheme, introduced in the 1970 Health Act, all expectant mothers that are ordinarily resident in Ireland are entitled to free maternity services in any public unit (Health Act 1970; KPMG 2008).[1] The programme of maternity care entitles women to a combination of primary and secondary care, both during and after pregnancy (Health Act 1970). A General Practitioner (GP) provides an initial examination, generally before 12 weeks, with six more antenatal visits provided thereafter, alternated between the GP and hospital obstetrician. The scheme also entitles mothers to free in-patient and out-patient public hospital services. After the delivery of the infant, two further visits to the GP are provided. The first postnatal visit examines the new-born at two weeks, while the second visit examines mother and infant at six weeks. Alternatively, women can bypass the scheme and opt for out-of-pocket private care. Private treatment is provided in public units, with some units offering semi-private treatment which encompasses antenatal care. There is some

[1] Ordinarily resident is defined as currently living in Ireland, or the intention to remain living in Ireland for at least one year.

scope for financial assistance under private health insurance (PHI), with few insurance companies providing limited refunds for antenatal and postnatal care (Carr 2011). However, maternity care is typically excluded from insurance plans due to moral hazard (Morris *et al* 2007).[2]

While women are entitled to choose between having their baby in the public system or the private system, provided they can afford private care, the availability of choice on antenatal and intrapartum care is extremely restricted across most maternity units in Ireland. In many developed countries maternal choice has become an integral feature of maternity care. With falling perinatal and maternal mortality rates, the focus has shifted from safety concerns for the mother and infant to account for other issues such as maternal choice and satisfaction. In the UK, the National Institute for Health and Clinical Excellence (NICE) has published guidelines on maternal choice in which it outlined that pregnant women should be offered the choice of having their baby in a MLU, CLU, or at home (NICE 2007).

Presenting women with a choice on intrapartum care can be problematic due to the inherent information asymmetry between the health care provider and the woman, notwithstanding the public's misunderstanding of medical risk and safety. The NICE guidelines attempt to separate these increasingly entangled concepts through the provision of informative discourse between the health care provider and woman. Such discourse in the presence of maternal choice is acutely necessary in maternity care to

[2] Moral hazard arises in health care for two reasons. The first reason arises when individuals can influence the probability of an insured event, such as planned pregnancy. The second instance of moral hazard arises when it is possible to alter the size of the insured loss, such as over-consumption – this can also be caused by the provider of health care (Morris *et al* 2007). The former example of moral hazard is unlikely to arise for most health care services, but maternity services are exceptional in that a planned pregnancy directly involves influencing the insured event (Morris *et al* 2007).

clearly convey medical risk and safety based on scientific evidence rather than anecdotal findings. (Kennedy 2010; Symon 2006; Devane and Begley 2004). Similar to other Western countries, Ireland has witnessed an increase in operative delivery over the past few decades, with the intertwining of the public and private system likely contributing to the upward trend. Lutomski *et al* (2014) show that intervention during childbirth is higher among private patients than public patients. Women with private coverage are 48 per cent more likely to have an elective Caesarean section than their public counterparts (Lutomski *et al* 2014). The market for private obstetrics is highly lucrative in Ireland, estimated in 2007 to be worth at least €49 million shared among 104 obstetricians (O'Connor 2006).

Maternity care has subsequently remained consultant-driven and hospital-based with childbirth interventions rising annually (NPRS 2013). Over the past decade, there has been a considerable increase in resource use in maternity care. In 2012, there were 71,986 births registered in Ireland (NPRS 2013). This represents a 16.1 per cent increase in births since 2003. The rate of childbirth interventions increased dramatically during this period also. For instance, the rate of caesarean section increased from 24.2 per cent in 2003 to 28.9 per cent in 2012, representing a relative increase of 19.4 per cent in caesarean deliveries in fewer than ten years (NPRS 2013). Instrumental deliveries increased also with delivery by forceps and ventouse (vacuum extraction) rising from 2.9 and 11 per cent in 2003 to 3.9 and 11.3 per cent in 2012, respectively. Spontaneous deliveries fell from 61.2 per cent to 55.6 per cent between 2003 and 2012 for total live births (NPRS 2013).

The majority of pregnant women in Ireland give birth in maternity units. In 2012, over 99 per cent of all births were recorded in maternity units; home births accounted for

just 0.2 per cent of all births (NPRS 2013). Official statistics that separate the total number of births in MLUs from CLUs are currently unavailable in Ireland. However, MLU births are expected to comprise only a small fraction of the total number of births recorded in maternity units as there are only two MLUs in the country, both located in the north-east and catering to a small geographic area. The different models of care are described below, in section 1.2.1.

1.2.1 *Models of care*

The organisation of maternity care has been the subject of widespread discussion in recent years. With the focus of maternity care shifting from safety concerns for mother and infant towards issues concerning maternal choice and satisfaction, there now seems to be a general consensus among policy-makers and health care providers that women should be provided with a range of choices on intrapartum care in Ireland (KPMG 2008; RCPI 2006). This includes offering women the option of having their baby delivered in a CLU, MLU, or at home. In addition, where women opt for care in a maternity unit they can also utilise the early transfer home (ETH) scheme or the Domiciliary Care In and Out of Hospital (DOMINO) Scheme (described below). These models of intrapartum care, which are the primary focus of this project, are introduced and described separately below.

1.2.1.1 *Consultant-led care*

In Ireland, maternity care is largely delivered in consultant-led maternity units. This model of care comprises antenatal, intrapartum, and postnatal care and is provided by a team of midwives and obstetric doctors. Antenatal care is alternated between a GP and medical staff. During intrapartum care, the full range of medical services is

immediately available, including obstetric, anaesthetic, and neonatal care. The type of intrapartum care that is provided in obstetric units is modelled on the 'active management of labour' economic model of care. The active management of labour implies the active involvement of a consultant obstetrician during labour, along with a midwife who provides one-to-one care for the duration of labour.

The active management of labour was first introduced in maternity units following the publication of a seminal paper by O'Driscoll (1972). O'Driscoll maintained that by actively intervening in the labour process using a variety of interventions, such as artificial rupture of membranes and oxytocin for women who are not progressing at one centimetre of cervical dilation per hour, it allowed staff to be "deployed productively", reduced the "bottle neck" of deliveries, and saved money for the maternity unit in the long run (O'Driscoll 1972).

While consultant-led care plays a fundamental role in the delivery of maternity care in Ireland, maternity care for low risk pregnancies can be delivered in an alternative setting, namely a MLU.

1.2.1.2 *Midwifery-led care*

In a MLU, a package of care is similar to consultant-led care, although maternity care is provided solely by midwives and the full range of medical services is not immediately available. For low risk women, a MLU is a suitable setting for birth with many international and domestic studies finding that maternal and neonatal outcomes in MLUs are comparable with outcomes in CLUs (MidU 2009; Rooks *et al* 1992; Waldenstrom *et al* 1997; Waldenstrom *et al* 2001). Similar to a CLU, a MLU provides woman-centred care for the duration of labour (Kennedy 2010; MidU 2009). There

are two MLUs in Ireland. They were established in 2004 following the recommendations of the Report of the Maternity Services Review Group (Kinder 2001). While introduced as a pilot service, the MLUs have been well received with the Independent Review of Maternity and Gynaecology Services in the Greater Dublin Area advocating that MLUs should be integrated with existing obstetric units around the country (KPMG 2008).

1.2.1.3 *Other types of care*

Home birth care (domiciliary births)

In addition to consultant-led care and midwifery-led care, intrapartum care is also provided in the community with independent midwives largely responsible for providing home birth care. Home birth deliveries, known as domiciliary births, have a long standing tradition in maternity care. In the 1950s, approximately one in three births was delivered at home (HSE 2004). However, the popularity of home birth deliveries has diminished rapidly over the course of the second half of the twentieth century through the twenty-first century. In 2009, there were an estimated 148 domiciliary births in Ireland, representing 0.2 per cent of all births (NPRS 2011). While the rate of home birth has dropped considerably over the period, this has to be considered in the context of improved infant mortality rates. For instance, the perinatal mortality rate fell from 8.9 per 1,000 live births in 2000 to 6.9 per 1,000 live births in 2009 (NPRS 2011). The decline in home birth deliveries has likely resulted from increased accessibility to hospital care, among other factors.

At policy level, support for independent midwives has been particularly weak. There is no statutory obligation on maternity units to provide home birth care, leaving

independent midwives largely responsible for community care (MidU 2009). Further, along with having to work independently from maternity units, in 2007 indemnity insurance was withdrawn from independent midwives by the Irish Nurses Organisation (INO) (MidU 2009). However, the Health Service Executive (HSE) has since moved to provide indemnity coverage for self-employed midwives and there now appears to be a renewed interest at policy level for an increased role of domiciliary births in the delivery of intrapartum care in Ireland – the HSE recently established a National Taskforce on Home Births (Byrne *et al* 2010).[3]

The three packages of care described above comprise the three major models of maternity care in Ireland. In recent years, innovations in the packaging of maternity care have emerged; these are described below.

DOMINO scheme and Early Transfer Home (ETH) scheme

A relatively new package of maternity care that is offered to women in Ireland is the Domiciliary Care In and Out of Hospital scheme (DOMINO). Established in 2001 as a pilot service, and expanded thereafter to some of the major maternity units in Ireland, the DOMINO scheme is a new innovation in maternity care (HSE 2004). The scheme provides continuity of care before, during, and after pregnancy. Under the DOMINO scheme a midwife provides antenatal care for the expectant mother in a community setting, accompanies her throughout labour in a CLU, and provides follow-up postnatal care when she returns home (HSE 2004). The scheme allows mothers to return home in as few as three to six hours after giving birth. Since its inception in Ireland, the DOMINO scheme has been well received among policy makers and

[3] The HSE was established in 2004 under the Health Act (2004). The organisation has statutory responsibility for the management and delivery of public health services in Ireland.

women alike. Following the pilot DOMINO scheme, mothers reported in a satisfaction survey that they were very satisfied with the service and would encourage a family member or friend to use it (HSE 2004). They also reported that they would be more likely to use it in the future. At policy level, both the Independent Review of Maternity and Gynaecology Services in the Greater Dublin Area and the Institute of Obstetrics and Gynaecology advocated the adoption of the DOMINO scheme across all maternity units (KPMG 2008; RCPI 2006). The Early Transfer Home scheme (ETH) is another recent innovation in the packaging of intrapartum care; however, it is very similar to traditional consultant-led care. It differs only in that it permits mothers to return home within 24 hours of giving birth.

The following section (1.3) provides an introduction to the specific methodologies employed in this thesis. The specific aims and objectives of this research are outlined subsequently in section 1.4.

1.3 Background to methodology

Given the increased interest among policy makers to expand midwifery-led care in Ireland (Condon 2015; Culliton 2014; DOH 2015; KPMG 2008), this research aims to provide timely, evidence-based data on the worthwhileness of midwifery-led care in Ireland. In particular, this research examines women's preferences for maternity care, and examines whether women would utilise midwifery-led care when presented this option. This research addresses the question of efficiency with respect to the two major models of maternity care: consultant- and midwifery-led care. The specific methodology employed to investigate maternal preferences in this thesis is stated preference (SP) methodology. This technique is developed for use in cost-benefit

analysis (CBA), which provides a comprehensive framework for decision making on the relative efficiency of competing alternatives. These methodologies present an interesting opportunity to investigate demand and evaluate the worthwhileness of consultant- and midwifery-led care in Ireland.

The basis for CBA stems from welfare analysis, which seeks to obtain a social ordering of alternative states of the world (Broadway and Bruce 1984). It assumes that individuals behave in a way that is utility maximising, and these utilities can be used to describe social welfare when aggregated across all individuals. When deciding on an allocation of resources, the role of government or policy makers is to maximise social welfare (McGuire 2001). CBA provides a comprehensive framework for decision making on socially desirable uses of resources (Mishan 1971).

In health care, CBA can be used to guide decision making on competing uses of resources. For instance, it can be used to determine the worthwhileness of a new cardiac or maternity unit, or a new drug. However, price and quantity signals are often unobservable in health care due to market failure, which characteristically arises from risk and uncertainty regarding illness, externalities, information asymmetries between the health care provider and patient, and oligopolies (Donaldson and Gerard 1993). The presence of market failure in health care often requires government intervention. As a consequence, the conditions required to observe price and quantity signals are absent when health care is provided through collectively funded health care systems (McIntosh 2010b). This lack of data, referred to as revealed preference (RP) data, restricts the approach to alternative measures, including the SP method, travel cost method, and hedonic approach. Despite its advantages relative to other economic evaluation methodologies, which rely on non-welfarist arguments (Tsuchiya and

Williams 2001), CBA remains under-utilised in the health economics literature. The difficulty of the approach lies in applying a valid and reliable monetary valuation to health and health care (McGuire 2001).

SP methodology is widely used to elicit monetary valuations of health and health care, although the literature rarely progresses to compare these valuations against costs in a formal CBA (McIntosh 2010b). Two SP techniques are commonly used to value health and health care: a discrete choice experiment (DCE) and contingent valuation method (CVM). A DCE is a survey-based measure which examines expected behaviour (Lancsar and Louviere 2008). Respondents are presented with a set of hypothetical alternatives and asked to select their preferred scenario. The alternatives are described and compared using attributes, which are characteristic of the goods or services on offer (Amaya-Amaya *et al* 2008; Lancsar and Louviere 2008). Value is captured in a DCE through the inclusion of a cost attribute, also referred to as a willingness to pay (WTP) attribute. The CVM is also a survey-based SP technique which examines expected behaviour (McIntosh 2010b). In a contingent valuation study, respondents are presented with an alternative and asked to infer how much they would be willing to pay to experience that particular good or service, for example. The CVM approach differs to the DCE in that it measures value holistically.

This thesis employs both techniques to assess the performance of the different methodology to inform benefit valuations within CBA. First, qualitative research is undertaken to identify the features of maternity care that influence women's decision-making when choosing between consultant- and midwifery-led care. These data are used to inform attribute development for the DCE and CVM. Given the flexibility of the DCE to explore a range of phenomena, the DCE is also used to examine women's

strengths of preferences for consultant- and midwifery-led care and model potential market uptake for the different models of care. The data obtained from the CVM are incorporated into a formal CBA that examines the costs and benefits of care in a CLU and MLU for a low risk woman availing of maternity care.

The data presented throughout this thesis derive from primary data collection. As the SP methodology is survey-based, pregnant women are invited to participate in the DCE and CVM, while the qualitative research also relies on the views of pregnant women to inform attribute development. The qualitative research invites 196 women to participate in the study from one maternity unit. The DCE and CVM are distributed across a number of maternity units in Ireland to provide an all-encompassing view of preferences. Four hundred surveys containing the DCE are distributed across two maternity units, and 1,150 surveys containing the CVM are distributed across five maternity units. The surveys are designed as self-completion postal questionnaires, and women receiving antenatal care are invited at random to participate in the studies. A cost analysis of consultant- and midwifery-led care is undertaken to inform cost estimates for use in the CBA, where the data derive from primary data collection.

The specific research aims and objectives of this thesis are outlined below, in section 1.4.

1.4 Thesis aims and objectives

Aim #1: Conduct qualitative research to investigate women's preferences for consultant- and midwifery-led care and subsequent motivations when choosing place of delivery.

The specific research objectives contained within **Aim #1** are as follows:

a) A key objective of this research is to identify women's motivations when choosing a model of maternity care. Initially, this objective is addressed by collecting primary data via a number of focus groups with expectant mothers and performing a thematic analysis of the data.

b) Provide important information to policy makers on women's preferences for alternative models of maternity care and identify potential barriers to the successful implementation of midwifery-led care in Ireland.

Aim #2: Assess the performance of SP methodology to inform benefit valuations and examine women's strengths of preferences for consultant- and midwifery-led care in Ireland using a DCE and CVM.

The specific research objectives of **Aim #2** are:

a) An important objective of this research is to investigate women's strengths of preferences for different features of consultant- and midwifery-led care in Ireland using a DCE. A number of discrete choice models are explored to examine whether preferences change given changes in underlying assumptions about respondent's choices. For instance, this analysis investigates whether preferences are fixed or vary across respondents.

b) A relatively recent innovation in DCE methodology is incorporated into the study design. A dual response choice (DRC) format is proposed as a solution to minimise information loss arising from the inclusion of an opt-out alternative in a DCE (Brazell *et al* 2006). Whereas a DCE typically offers

respondents one choice from a set of competing alternatives that include an opt-out alternative, the DRC format is set up to capture the preferences of any respondent that initially opts-out of a choice question by asking them to answer a follow-up question where the opt-out alternative is no longer available. The objective of this study is to assess the impact of this approach on choices by comparing choice consistency across the initial and subsequent choice scenarios.

c) The literature suggests that initial endowments of experience and knowledge of a service's availability influence preferences (Cartwright 1979; Hundley and Ryan 2004; Ryan and Ubach 2003; Salkeld *et al* 2000). Another objective of the DCE is to explore whether these factors influence preferences in an Irish context.

d) An important objective of the DCE is to model the potential demand for consultant- and midwifery-led care in Ireland. Potential uptake for DOMINO care is also explored given the flexibility of the DCE to explore different combinations of attributes. These data are then used to calculate women's WTP for maternity care, which is an important objective of this research as the DCE is employed to assess the performance of the approach to benefit valuation.

e) A key objective of this research is to calculate women's WTP for maternity care using the CVM for use in a CBA. Given certain methodological issues associated with the different elicitation formats (Frew 2010a), two approaches are assumed in this analysis and compared to investigate whether framing of

the WTP question affects responses: an open-ended WTP question and a payment scale WTP question. The literature suggests that the open-ended question generates ill-considered valuations due to the absence of a cue (Donaldson *et al* 1995; Frew *et al* 2003), and results in considerably higher WTP valuations relative to the payment scale design which offers respondents a choice of values (Donaldson *et al* 1997b). The objective of this analysis is to test whether these approaches generate different WTP values.

f) Another objective of the CVM involves predicting preferences for consultant-led care. In particular, this research explores the extent that preferences are influenced by previous obstetric experience, knowledge of a service's availability, among other demographic characteristics including income, PHI status, and ethnicity.

g) As this thesis employs two SP techniques to elicit monetary valuations of maternity care, a key objective of this research is to assess the validity of the WTP data. The CVM data in particular are compared and placed in the context of private care in Ireland, which is the only package of care that has a market price.

Aim #3: Perform a CBA on consultant- and midwifery-led care for a low risk woman availing of maternity care in Ireland.

The specific objectives contained within **Aim #3** are as follows:

a) A key objective of this research is to perform a cost analysis of consultant- and midwifery-led care. This involves costing all aspects of maternity care, including antenatal, intrapartum and postnatal care. The cost analysis represents the most up to date information on the cost of a package of care for a low risk woman in Ireland.

b) The final research objective involves comparing the costs and benefits of consultant- and midwifery-led care in Ireland for a low risk woman availing of maternity care within a net benefit framework. This analysis is designed to inform policy makers on the worthwhileness of the two major models of maternity care in Ireland.

The remainder of this chapter is set up as follows. In section 1.5, the structure of the thesis is outlined and the sequence in which the above aims are addressed. Section 1.6 presents a summary of the main findings of this research. The chapter concludes in section 1.7.

1.5 Structure of the thesis

The second chapter presents a critical review of existing literature on the various methodologies employed in this thesis. The chapter is set up with a focus on CBA as the SP methodology is consistent with the underlying theoretical framework of the economic evaluation, namely welfare economics. An empirical review of the literature is also presented in this chapter with a focus on maternity care, where applicable.

Chapters 3-6 present an investigation of maternal preferences for maternity care in Ireland. The qualitative research is presented in Chapter 3 and addresses **Aim #1**. The

methods undertaken to complete the focus groups are outlined in this chapter and the results obtained from the thematic analysis of the data are presented. A discussion of the results is also included in this chapter. Chapter 4 introduces the quantitative exploration of maternal preferences using a DCE and CVM, addressing **Aim #2.** The various stages undertaken to design, implement, and analyse the SP techniques, are outlined in this chapter. Given the range of analyses undertaken within each approach, the results of the DCE and CVM are presented separately. In Chapters 5 and 6, the results of the DCE and CVM are presented, respectively. Both empirical chapters include a discussion of the findings.

The economic evaluation is presented in Chapter 7 and addresses **Aim #3**. The data sources informing the CBA are presented in this chapter along with the results arising from the net benefit analysis. Similar to the other empirical analyses, a discussion of the results is provided in this chapter also.

In Chapter 8, a detailed discussion of the overall findings obtained in this thesis is presented. The limitations of the research are outlined, and the key areas that warrant further research are identified.

Chapter 9 concludes this thesis with a discussion of the key strengths of the research findings. The specific contributions arising from this thesis are presented in this chapter also and include contributions to knowledge and methodology, and policy.

The following section (1.6) presents a summary of the key findings arising from this research.

1.6 Key findings

The key findings of this research are as follows.

- The qualitative research suggests that women do not have a clear preference for consultant- or midwifery-led care. Instead, women's ideal maternity care package comprises features of both consultant- and midwifery-led care. This hybrid model of care closely resembles the DOMINO scheme.

- Women's primary concern during maternity care, in particular intrapartum care (labour), is safety. Women are concerned about having access to essential medical services in the event of a complication. This suggests women would only utilise midwifery-led care when co-located with consultant-led care.

- The DCE shows that women's preferred attribute is continuity of care with the same midwife from antenatal through to intrapartum care. A similar finding is obtained from the focus groups where many participants revealed that they chose private care over public care due to the inability of the public system to provide continuity of care with the same midwife.

- Women have varying preferences for consultant- and midwifery-led care, although preferences are largely driven by previous obstetric experience and geographic location. This finding is supported by the CVM where it is estimated that first-time mothers are 44 per cent less likely to prefer consultant-led care than women with a history of childbirth in a CLU. In addition, women delivering in a region with sole access to consultant-led care are 68 per cent

more likely to prefer this model of care than women delivering in a region with access to both consultant- and midwifery-led care.

- Women's ideal maternity care package comprises features of both consultant- and midwifery-led care, as determined by the DCE. This hybrid model of care closely resembles the DOMINO scheme where women want continuity of care with the same midwife during antenatal care and deliver in a CLU where they have immediate access to medical services in the event of an obstetric complication.

- The DCE shows that women's preferred package of care is DOMINO care with 39 per cent of the low risk obstetric population expected to utilise this service. Consultant-led care would then be utilised by 34 per cent of women, while midwifery-led care would be consumed by 27 per cent of the low risk obstetric population.

- The CVM supports this hierarchy of preferences where consultant-led care is consistently valued more than midwifery-led care. For example, women are willing to pay €956.03 for the welfare gain associated with consultant-led care and €808.33 for midwifery-led care.

- A package of care for a low risk woman availing of consultant-led care in Ireland is estimated to cost €1,102.72. This is based on all costs arising during

antenatal, intrapartum, and postnatal care. For the same package of care in a MLU, the estimated cost is €682.49.

- The economic evaluation suggests that a package of care for a low risk woman in Ireland in a CLU and MLU is cost-beneficial provided the woman receives her preferred package of care. The greatest net benefit is produced by midwifery-led care. Hence, under resource constraints, midwifery-led care should be provided for all low risk women, while consultant-led care should be provided for all high risk pregnancies and emergency care only.

Section 1.7 concludes this chapter.

1.7 Conclusion

This chapter provides an introduction to this research. The research aims and objectives are outlined and the subject of the empirical analysis is presented. Briefly, this thesis aims to contribute to knowledge and methodology, policy, the refinement of the SP techniques to inform benefit valuations and CBA within health care.

The following chapter presents a critical review of the literature on the various methodologies employed in this thesis.

2 LITERATURE REVIEW

2.1 Introduction

This chapter provides a critical review of existing literature on CBA, the DCE, and CVM. A brief history of CBA is provided in the first instance in section 2.2. The intellectual basis of the approach is presented in section 2.3, and covers welfare economics. Section 2.4 describes the application of CBA, focusing on issues specific to the approach. The valuation of health care benefits is discussed in Section 2.5. Section 2.5.2 focuses on the DCE. This section examines the theoretical foundations of the experiment, describing its foundations in Thurstone's (1927) random utility theory (RUT) and its association with Lancaster's (1966) economic theory of value. The various stages involved in designing a DCE are outlined in this section also. Section 2.5.3 introduces the CVM, describing its theoretical foundations in welfare theory, and the various stages involved in designing and conducting a contingent valuation study. Section 2.6 addresses the empirical evidence of CBA, the DCE and CVM. Section 2.7 concludes the chapter.

2.2 Cost-benefit analysis: a brief introduction

An economic evaluation compares the costs and consequences of competing resources and, depending on the exact methods selected, provides decision rules to inform choices on the most suitable allocation of resources. The methodology is grounded in economic theory, underlying, in particular, the concept of economic efficiency (Drummond *et al* 2005; McGuire 2001). It draws on welfarism or non-welfarism to inform resource allocation decisions. CBA is the most comprehensive form of

economic evaluation as it relies on welfare economics to inform decision-making (McIntosh 2010b; Robinson 1993). At its simplest, CBA evaluates the worth of competing alternatives by comparing the costs and benefits of each programme to society. The socially preferred alternative should be implemented if the benefits of that alternative exceed the costs (Broadway and Bruce 1984).

CBA has been used to inform economic and social policy since the second half of the twentieth century. Initially, it was used to inform policy makers, who were elected by society, on the most efficient allocation of public resources (Layard and Glaister 1994). This approach to decision making produced Programme Budgeting, which is widely used by many countries. Programme budgeting rations resources in the public sector through central planning. The decision-making approach allocates resources according to their outputs rather than the inputs required to produce the outputs (Sugden and Williams 1978). These resources are then appraised using the marginal approach where the added (lower) costs and (reduced) benefits are evaluated for a proposed investment (disinvestment).

CBA was also developed within a theoretical framework. The first textbook to treat CBA as fundamentally grounded in economic theory was published by Mishan in 1971. Mishan (1971) regarded CBA as the application of welfare economics, which seeks to obtain a social ordering of alternative states of the world. These states of the world are compared, or ranked, as either ‘better than’, ‘worse than’, or ‘equally as good as’ (Broadway and Bruce 1984). An independent viewpoint on public sector decision-making is assumed where an activity is undertaken if at least one person is made better off without making any one worse off. This approach is referred to as the Paretian approach, and forms the intellectual basis for decision rules in CBA

(McIntosh 2010b). The following section introduces the theoretical framework for CBA.

2.3 Welfare economics

Economic evaluation is prescriptive in nature. It evaluates competing resources with a view to concluding that one alternative represents better value for money than another (Drummond *et al* 2005). It is therefore concerned with making value judgements about the desirability of competing resources. Decision rules exist for different evaluation methodology, although the criteria for decision-making are based on a set of assumptions about some underlying theoretical framework or ideological value system. This type of economic analysis is referred to as normative economics, and is synonymous with welfare economics, or welfarism, which underlies CBA (Broadway and Bruce 1984; Mishan 1971).

Welfare economics may be defined as the 'systematic analysis of the social desirability of any set of arrangements, for example a state of the world or allocation of resources, solely in terms of the utility obtained by individuals' (Morris *et al* 2007). It is inherently normative in its approach as it seeks to consistently rank alternative states of the world in terms of social desirability. This requires value judgements as to how these different states should be logically ranked (Morris *et al* 2007).

While welfare economics is concerned with ranking competing alternatives in terms of social preference, it is informed entirely by analysis of the individual. Individuals (consumers or households) are assumed to behave in a way that is utility maximising (Broadway and Bruce 1984; Mishan 1971). For this reason, individuals provide the best indication as to whether a change in public policy makes them better, worse, or

equally well off. The aggregated utility of each individual provides information on the social desirability of competing alternatives (Broadway and Bruce 1984; Mishan 1971). These utilities are assumed by welfare economics as consequential. They result entirely from the consumption of goods and services, and are indifferent to a market or political process. Since utility is consequential at an individual level, the challenge for welfare economics lies in how utilities can be evaluated or ranked at an aggregated level (Broadway and Bruce 1984).

Assessing the trade-offs between individuals' utilities and ranking social states is inherently normative. The judgement used to assess the social desirability of different states is the Pareto principle.

2.3.1 *The Pareto principle*

Introduced by Vilfredo Pareto in 1906, the Pareto principle involves making value judgements about the social desirability of alternative resources (Businо 1987). It is based on consumer choice theory, which assumes that individuals have stable and consistent preferences (Mishan 1971). If presented with a choice of competing alternatives, individuals would consistently rank each alternative in terms of their derived utility. Paretian analysis is concerned with aggregating these individual utilities to produce a social welfare ordering (SWO) of different alternatives in terms of social desirability (McIntosh 2010b).

Since value judgements are required to rank alternatives, several Paretian concepts are developed to describe changes in social welfare arising from a change in the state of the world. For instance, a change in the state of the world that makes at least one individual better off without making anyone worse off is called a Pareto improvement,

or strong Pareto improvement (McGuire 2001). A weak Pareto improvement describes a change in the state of the world where the utility of each individual affected by the change is increased. When it is impossible to increase the utility of an individual without reducing the utility of another then the current allocation of resources is called Pareto efficient, or Pareto optimal (McGuire 2001).

While the Pareto principle provides a social ranking of states, there are a number of criticisms of the approach to resource allocation. For instance, the approach may be regarded as inequitable, according to Rawlsian and egalitarian perspectives, if an allocation of resources increases the utility of the richest members of society without reducing the utility of the poorest members of society. Similarly, a Pareto improvement cannot be achieved if a change in policy benefits the poor but disadvantages the rich (Hammond 1996). A major criticism of the Pareto principle is that an allocation of resources that is Pareto optimal may be uneven between two groups, and represent large differences in the level of utility experienced by both groups. One group may be allocated disproportionately more resources than another. In addition, the Pareto principle does not allow ranking of these optimal states. It cannot rank non-optimal states against each other or non-optimal states against optimal states.[4] To compare non-optimal states of the world with optimal states of the world, described as Pareto non-comparable, stronger value judgements are required (Johanneson 1996).

[4] A non-optimal state describes a state of the world which involves increasing the utility of at least one person while reducing the utility of another.

2.3.2 *Potential Pareto improvement criterion (PPIC)*

An extension to the Pareto principle was developed independently by Kaldor (1939) and Hicks (1939), called compensation tests. There is a slight difference between both tests, although they follow the same reasoning. According to Hicks (1939), a change in policy that makes one person better off and another person worse off is made possible if some form of monetary transfer between the two parties occurs. For instance, suppose a hospital is about to receive €2 million in government investment, with €1.5 million of this being taken directly from another hospital's budget. An allocation of resources is desirable if the hospital that is about to lose €1.5 million bribes the hospital that is about to gain €2 million by the same monetary amount (€2 million) to avoid the policy change. If the investment is undertaken, the losing hospital would be €1.5 million worse off. By bribing the other hospital to avoid the investment, the potential loss arising from the policy change is reduced (€1.5 million - €2 million = -€0.5 million), while the gaining hospital still receives the same amount as the proposed investment. According to Kaldor (1939), an allocation of resources is socially desirable if the gaining hospital (€2 million) fully compensates the losing hospital by the same monetary amount (€1.5 million) such that they are still better off (€2 million - €1.5 million = €0.5 million) and the other hospital is no worse off.

These compensation tests link utility with money, and assume that monetary transfers are sufficient to compensate losers following a change in policy. For example, according to Hicks (1939), the benefit (loss) arising from a change in policy is the maximum (minimum) amount that would have to be taken away from (given to) an individual to maintain that individual at their original level of utility. A change in policy should only be undertaken if the compensation test makes at least one person

better off and no one worse off, or if the sum of the monetary gains and losses is positive.

Compensation tests are inherently limited. They are hypothetical and used to separate issues of efficiency and equity which dominate public policy decisions (Broadway and Bruce 1984). For instance, compensation tests demonstrate the potential Pareto improvements that may be achieved through monetary transfers; however, compensation is not required to take place. Should compensation actually occur, there are problems with how this wealth should be organised and re-distributed (McGuire 2001). Another problem with compensation tests lies in the link between utility and money, where money is used as a metric to represent a corresponding level of utility. For different groups, the utility of each additional €1 increase in income is likely to generate different levels of utility between high income earners and low income earners due to diminishing marginal utility (McGuire 2001). If a policy change reduces the utility of low income earners and increases the utility of high income earners, the amount of money required to compensate low income earners for their welfare loss would be disproportionately lower than the amount of money required to compensate high income earners to forego the policy change. In spite of this, a compensation test would suggest that the policy is socially desirable.

There is another limitation to compensation tests: they do not allow the ranking of Pareto optimal states against other Pareto optimal states. For this reason, the Pareto criterion provides a restricted ranking of all possible states of the world, or SWO. Stronger value judgements are required, and have been developed within a framework that treats utilities in real numbers rather than through the metric of money. The approach uses a social welfare function (SWF) to represent SWO; however, it is used

for illustrative purposes only and plays no role in applied welfare economics (Mitchell and Carson 1989).

CBA applies welfare economics using a variant of the Pareto criterion by placing monetary values on the gains and losses arising from a change in policy. The net gain or loss arising from the policy change is calculated where the change is potentially Pareto improving if a net gain is observed (Mitchell and Carson 1989). There are three different methodologies to estimate welfare change, which are described shortly (section 2.3.4). First, in order to understand each methodology, a brief theory of preferences is presented in the next section (section 2.3.3).

2.3.3 *A brief theory of preferences*

Welfare economics assumes that individuals are utility maximisers (McIntosh 2010b). This assumption derives from consumer choice theory which states that individuals have stable preferences over different alternatives, or bundles of goods. When presented with the choice of competing alternatives, individuals consistently seek to maximise their overall level of utility, or satisfaction, by choosing the bundle of goods from which they derive the greatest utility (McIntosh 2010b). For this reason, welfare economics assumes that individuals provide the best indication of their own welfare.

Welfare economics assumes that information on individuals' preferences can be obtained by observing their choices among competing alternatives. For instance, when presented with the choice of two alternatives, say Bundle A and Bundle B, an individual consistently chooses Bundle A over Bundle B if the welfare (utility) associated with Bundle A is greater than Bundle B (McIntosh 2010b). When constrained by initial endowments of resources such as time and budget, consumers'

choices demonstrate a clear theory of preferences. In the first instance, it is assumed that an individual can evaluate two competing alternatives and confirm that one is at least as good as the other; for example x is at least as good as y, or xRy (McIntosh 2010b). An individual is indifferent between x and y if xRy and yRx. An individual has reflexive preferences such that if xRy, then xRx. The preferences of an individual are also assumed to be transitive: if xRy and yRz, then xRz. Finally, an individual has complete preferences if xRy or yRx (McIntosh 2010b).

A further assumption about preferences can be assumed to reflect continuity of preferences, giving rise to a real-valued utility function $u(x)$ (McIntosh 2010b). A utility function is useful if $u(x) \geq u(y)$ whenever xRy for any combination of bundles x and y. This concept of continuity (substitutability) is important in determining value as it allows trade-off ratios to be calculated for any two bundles of goods (Freeman 1993).

To represent utilities by a set of indifference curves, two further assumptions are required: non-satiation and strict quasi concavity (McIntosh 2010b). In the first instance, a negative sloping indifference curve is assumed since utility is non-decreasing in any bundle and increasing in at least one bundle. The second assumption relates to decreasing marginal rates of substitution (MRS), which implies that preferences are diverse rather than specialised. Another important consideration is that of strong or additive separability (McIntosh 2010b). This assumes that the MRS between any two bundles of goods is independent of the consumption of any other bundles of goods in any other group. For instance, bundles of goods, or attributes that describe a bundle of goods, can be separated into groups, g = 1,..., G, as represented by the following utility function:

$$U = \sum_{g=1}^{G} \beta^g u^g(x_g) \quad (2.1)$$

where β^g, g = 1,..., G are positive constants and x_g is the weighted sum of the utilities for each bundle of goods or attribute.

The use of a utility function to represent continuity of preferences is an important consideration for analysis of preferences, or welfare, as detailed in section 3.5. How these preferences are measured within welfare economics is determined by the measure of welfare change assumed. Section 2.3.4 introduces three ways in which welfare can be measured.

2.3.4 *Measures of welfare change*

Welfare is measured by obtaining information on utilities and converting this information to monetary values. There are three approaches to measuring welfare change: consumer surplus (CS), compensating variation (CV) and equivalent variation (EV). Each method is a derivation of the traditional demand function (McIntosh 2010b).

CS is derived from Marshallian demand curves (Mishan 1971). It assumes that a consumer's surplus is described by the difference between the maximum amount a consumer would be willing to pay for a bundle of goods and the amount that the consumer actually pays for the bundle of goods. If a consumer surplus exists, the measure of welfare is represented by the difference between the two monetary values. While often used to measure welfare change due to simplicity, Marshallian demand curves are criticised for being too restrictive (Layard and Walters 1978). The underlying demand curve is not income compensated, meaning it cannot reflect the

effect of a change in price on income; multiple price changes; or a simultaneous change in price and income (Layard and Walters 1978).

Income-compensated, or Hicksian, demand functions are generally more appropriate welfare measures since they account for price and income effects, which are important in the context of public policy decision-making (Mishan 1971). Both CV and EV are derived from Hicksian demand functions. CV is defined relative to original levels of utility. For instance, CV describes the amount of money that would have to be given to (taken away from) an individual after a change in policy to return that individual to their original level of utility (Mishan 1971). For a welfare gain, CV is the amount of money an individual would be willing to give up for a change in policy. For a welfare loss, it is the amount of money an individual would be willing to accept as compensation for a change in policy, thus returning them to their original level of utility. EV describes the amount of money that would have to be given up or taken away to avoid a policy change. CV is preferred over EV as it better estimates welfare change by comparing gains and losses to original levels of utility (McIntosh 2010b). Both measures of welfare change are consistent with the stated preference approach to benefit valuation, which is introduced in section 2.5.

The application of CBA is introduced in the next section (section 2.4). This focuses on two important features of the approach: costing methodology and decision rules for CBA.

2.4 Applying a cost-benefit analysis

There are four types of economic evaluation: CBA, cost-effectiveness analysis (CEA), cost-utility analysis (CUA), and cost-minimisation analysis (CMA) (Drummond *et al*

2005). The objective of each evaluation is to compare the costs and consequences of alternative resources, and infer judgement on the alternative that reflects the best value for money. Drummond *et al* (2005) outline eight key stages to economic evaluation, which are comparable across the different methodologies. CBA differs to other economic evaluation with respect to costing methodology, valuation of benefits, and decision rules. The focus of this section is to provide a discussion of the costing methodology specific to CBA (section 2.4.1), and present the decision rules for the approach (section 2.4.2). Section 2.5 then focuses on benefit valuations.

2.4.1 *Costing methodology for cost-benefit analysis*

In general, the approach to costing is similar across each economic evaluation methodology (Drummond *et al* 2005; McIntosh 2010c). Costs are identified in the first instance, then measured and valued. Only costs relevant to the viewpoint are included in the analysis. The perspective assumed in an economic evaluation varies, and may represent a patient, third party, or societal viewpoint (Drummond *et al* 2005; Brouwer *et al* 2001). Choosing the appropriate viewpoint depends on the objectives of the evaluation and underlying methodology. There are two main costing techniques: the "bottom-up" approach, or micro-costing, and the "top-down" approach, or gross- or macro-costing. The approaches differ in terms of the level of disaggregation at which resources are compiled and valued (Brouwer *et al* 2001). A bottom-up approach involves measuring and valuing resources in a disaggregated way such that each resource component used in the production of a service is estimated individually. In contrast, a top-down approach involves using secondary data sources, such as total costs or average costs (Brouwer *et al* 2001). These are typically collected for accounting purposes or to reflect expenses for third party payers. Given the level of

detail associated with the bottom-up approach, this technique is often referred to as the 'gold standard' in economic evaluation (McIntosh 2010c).

There are various guidelines on how to estimate costs. For instance, the Health Information and Quality Authority (HIQA) outline specific guidelines relevant to economic evaluation in Ireland (HIQA 2014). HIQA recommend a discount rate of four per cent to calculate the present value of a project with a lifespan greater than one year. HIQA also advise on the allocation of overheads, and provide guidelines on how to depreciate capital costs: overheads are allocated on a direct cost basis (25 per cent of direct pay is added to total salary costs), while capital costs are depreciated using the straight line method (HIQA 2014).

An important consideration in any economic evaluation is how inputs (costs) are to be measured and valued (Brouwer *et al* 2001; Drummond *et al* 2005). Costs are generally measured and valued in the same way, and based on the notion of opportunity costs (Brouwer *et al* 2001; Drummond *et al* 2005). Opportunity costs are fundamental to cost analysis as the use of resources by one service precludes the use of resources by another service. In a perfect market (undistorted economy), prices are generally representative of opportunity costs (McIntosh 2010c). Cost analysis becomes complex when a market for an input does not exist, such as informal care. When the market does not exist (imperfect market or distorted economy), it is possible to estimate costs by identifying the opportunity cost of an alternative use of resources (McIntosh 2010c). For instance, it may be important to value time spent caring for the elderly in an economic evaluation. While there is no market for the cost of informal care, it is possible to value carer's time against the opportunity cost of work forgone, or leisure time forgone. This method is referred to as shadow pricing (McIntosh 2010c).

2.4.1.1 *Shadow pricing*

Shadow pricing is an important consideration in CBA given its underlying theoretical framework. Consistent with welfare economics, CBA is generally concerned with ranking alternatives in terms of social desirability. The natural perspective then is a social perspective (Mishan 1971). This perspective is all-encompassing, often requiring inclusion of inputs for which there is no market, or market prices are not representative of true social values, or social costs. Shadow pricing is the process of correcting distortions in the market by adjusting existing market prices to reflect social values, or observing alternative uses of resources (McIntosh 2010c). CBAs that do not account for true social values are likely to generate biased cost estimates.

Market distortions bias cost estimates because the social cost, or marginal social cost (MSC), is affected not only by the cost of producing an additional unit of a service, or marginal private cost (MPC), but also by the external cost of producing an extra unit of a service (MEC) (McIntosh 2010c):

$$MSC = MPC + MEC \tag{2.2}$$

For instance, suppose vaccination against a new strain of influenza is administered in schools and workplaces. Anyone that is vaccinated against the viral infection is less likely to contract the virus, along with all others around them. This is referred to as a positive externality where the marginal social benefit (MSB) increases with each additional vaccination. In this instance, the market price for each additional vaccination is an inappropriate representation of the MSC.

Distorted economies arise in health care for a variety of reasons, including externalities, information asymmetries, property rights, and consumer surpluses.

Imperfect markets are also caused by competitive market structures such as oligopolies and monopolies. Shadow pricing is the process of correcting market distortions (Macarthur 1997). Dreze and Stern (1994) outline seven approaches to correct imperfect markets (Dreze and Stern 1994). Many of these approaches are applicable to a health care setting (McIntosh 2010c).

2.4.1.2 *Costing survey-derived benefits*

While the approach to costing is broadly similar across the different economic evaluation methodologies, the development of benefit-assessment methodologies for use in CBA present some important considerations for the approach (McIntosh 2010a). In particular, DCE data can be used to estimate CV for use in a formal CBA framework (McIntosh 2006). A DCE is an attribute-based survey which asks respondents to select their preferred scenario from a set of hypothetical alternatives (Lancsar and Louviere 2008). Despite its flexibility within CBA, the approach remains scarcely applied in health care. McIntosh (2010a) identifies several important considerations for costing DCEs. Since a DCE is an attribute-based survey, it is important that costs are collected to represent the respective benefits (attributes) (McIntosh 2010a). Careful consideration around attribute development is required from the outset to ensure that each attribute describes a quantifiable input. McIntosh (2010a) recommends the use of resource use data to capture attribute costs. These costs may be identified using relevant 'data capture' questionnaires or cost diaries.

Resource use data are often difficult to collect unless the approach is developed within a clinical trial (McIntosh 2010a). There are concerns then about the use of patient level data to inform CBA on the benefit side (Frew 2010b). The CV value of benefits is

likely to differ between the beneficiaries of a service and the benefactors (taxpayers) of that service. This is an important consideration for benefit assessment methodologies. Shackley and Donaldson (2000) identify when it is appropriate to use patient data, rather than general population data, to inform valuations of benefits. The authors recommend using patient data to inform benefit valuations when the good is publicly funded since patients bear the opportunity costs of any related decision (Shackley and Donaldson 2000). This is explored further in section 2.6.3. Section 2.4.2 presents the decision rules for CBA.

2.4.2 *Decision rules for cost-benefit analysis*

An economic evaluation is inherently normative in that it compares competing alternatives with a view to concluding that one alternative represents better value for money. Various decision rules exist to inform these conclusions, and vary across the different economic evaluation methodologies (Drummond *et al* 2005). For CBA, the decision rules are often straightforward. For instance, if the benefits of an activity are greater than the costs, then the activity is deemed socially desirable and should be undertaken. Conversely, if the costs exceed the benefits, then the activity should not be undertaken. If the costs and benefits are the same, then it does not matter whether the activity is undertaken or not on grounds of efficiency. If several activities are evaluated and only one activity can be undertaken, then the socially desirable activity is the one with the largest net benefit (Broadway and Bruce 1984; Mishan 1971).

Net benefit describes the difference between benefits and costs:

$$(Net\ Benefit\ =\ Benefits - Costs) \qquad (2.3)$$

If the difference is positive, then an activity should be undertaken. The relationship can also be expressed as a ratio, or benefit/cost ratio, where an activity is undertaken if the ratio is greater than one. If costs and benefits accrue over time, the relationship is expressed as a net present value (Drummond *et al* 2005).

Since costs and benefits are measured in the same unit, the decision rules for CBA are less complex than other evaluation methodologies, such as CEA and CUA. For CEA, trade-offs are often required if the benefits of an alternative are achieved at a higher cost. The implication then is how the trade-off should be represented, and under what circumstances is an alternative deemed desirable (McIntosh 2006). Three approaches are used to represent the trade-offs and decision rules for CEAs: cost-effectiveness ratios (CERs), the net benefit approach, and the probabilistic approach (McIntosh 2006; Briggs *et al* 2006).

These approaches are specific to CEA. However, McIntosh (2006) proposes extending the methodologies to CBA using DCE data. For instance, McIntosh (2006) adopts the cost-effectiveness plane to plot the net benefit from a CBA. A cost-effectiveness plane plots all possible combinations of costs and effects into four quadrants. Costs are depicted on the north-south axis and effects are represented on the east-west axis. A trade-off is required when costs and effects are plotted in the north-east or south-west quadrant. When costs and effects fall into the north-west or south-east quadrant, the suitability of an alternative is demonstrated and no trade-off is required. An extension of this methodology is the cost-benefit plane, presented in Figure 2.1 and adapted from McIntosh (2006).

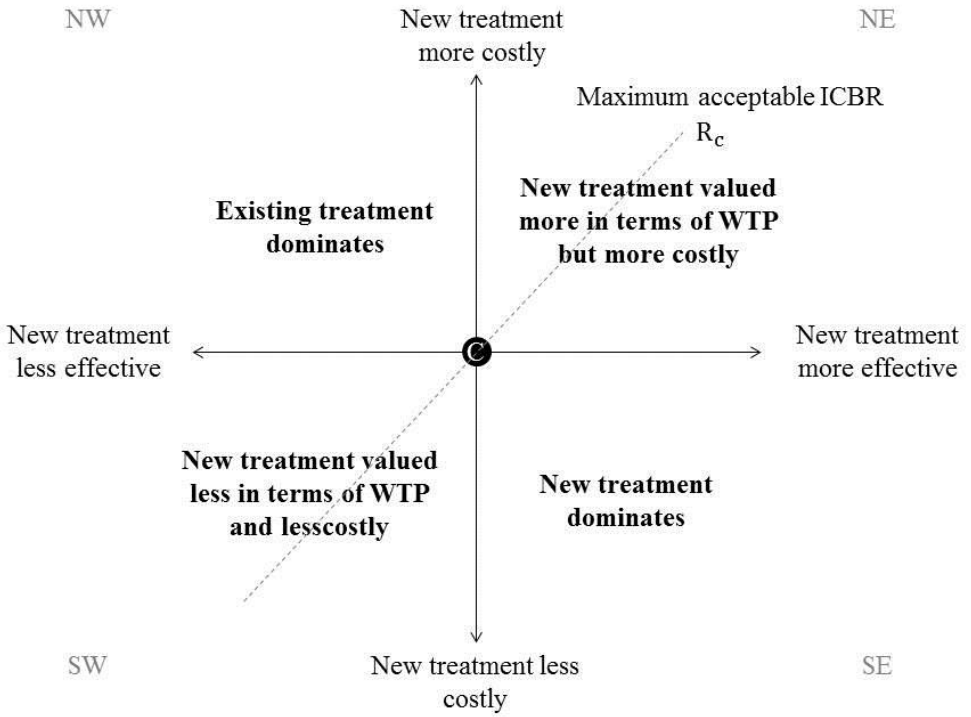


Figure 2.1: Sample cost-benefit plane, adapted from McIntosh (2006).

Notes:
Abbreviations: C, comparator treatment, or status-quo; NE, north-east quadrant; SE, south-east quadrant; SW, south-west quadrant; NW, north-west quadrant; R_c, ceiling ratio; ICBR, incremental cost-benefit ratio; WTP, willingness to pay.

A cost-benefit plane is comparable to the cost-effectiveness plane with the exception that monetary benefits replace effects on the east-west axis. The cost-benefit plane plots the point estimate of the relationship between benefits and costs (net benefit). To characterise any uncertainty in the parameter, McIntosh (2006) proposes use of an ellipse and confidence box, which are useful from a policy perspective to capture any variance in the point-estimate (Figure 2.2). Since the point-estimate describes the difference between costs and benefits, an incremental cost-benefit ratio is described. McIntosh (2006) also recommends using individual-specific coefficients on costs and

benefits, rather than sample means, to calculate the incremental cost-benefit ratio. These values could then be used within a net benefit framework to generate net benefit acceptability curves (NBACs), similar to cost-effectiveness acceptability curves. Figure 2.3 presents a sample net benefit acceptability curve, adapted from McIntosh (2006). Finally, McIntosh (2006) proposes using probabilistic sensitivity analysis (PSA), which is widely used by decision-analytic models, to reflect parameter uncertainty in each of the inputs. PSA propagates each parameter around a pre-defined probability distribution using Monte Carlo simulations. Similar to decision analytic modelling, a relevant probability distribution is assumed for each parameter. For instance, a gamma distribution may be assumed for cost data that are positively skewed (McIntosh 2006).

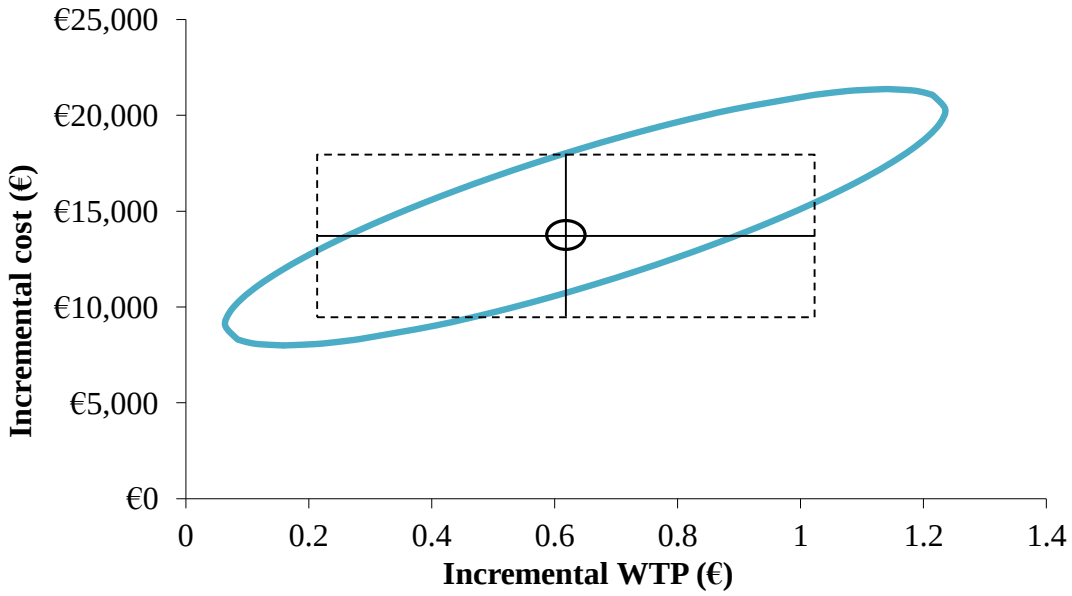


Figure 2.2: Sample cost-benefit plane with ellipse and confidence box, adapted from McIntosh (2006). WTP: willingness to pay.

To date, the above proposals have yet to be applied within a formal CBA framework. McIntosh (2006) notes that further development of the methodology are required.[5] The empirical application of CBA remains scarce within health care, with the majority of these applications using the CVM to infer benefit valuations, rather than DCEs. A review of the empirical literature on CBAs within health care is presented in section 2.6 (with a review of the empirical literature on the CVM and DCE). The following section introduces the various techniques used to value health and health care benefits specific to CBA.

2.5 Valuing benefits

The valuation of health care benefits has a strong tradition in economic evaluation, and more recently CBA. Initially, there were many concerns about how a monetary valuation could be applied to reflect health status, or intangible health states. Numerous techniques have been developed to quantify these so-called intangible health states for use in CBA. There are two broad approaches to benefit valuations: the revealed preference (RP) method and the stated preference (SP) method (Louviere and Lancsar 2009; Viney *et al* 2002).

2.5.1 *Revealed preference method*

The RP technique involves analysing real market behaviour. It elicits preferences from real choices that are made in the everyday world and assumes that these choices reflect actual preferences because they imply a comparison of the benefits of other goods and services (Sugden and Williams 1978). The choices that people make therefore reveal

[5] Some important considerations for development of this methodology is identified in this literature, outlined in Chapter 7, section 7.6.

their preferences. For instance, suppose that the price of a consultation with a General Practitioner (GP) increased from €40 to €50. If an individual was willing to visit the GP when the price was €40, but not at €50, it can be inferred that the value they place on a visit to the GP lies between both bounds. Where the market price for such a service exists, it is possible to determine the average valuation of a GP consultation to society as a whole by aggregating the behaviour of all individuals. RP is subsequently concerned with consumer surplus where the measure of welfare change is estimated from the difference between what people pay and are willing to pay (Sugden and Williams 1978).

However, the valuation of benefits through revealed preference data is often restricted: it relies on the presence of a market demand curve (Lancsar and Louviere 2008). Health care is often highly subsidised or provided free of charge, which means it may

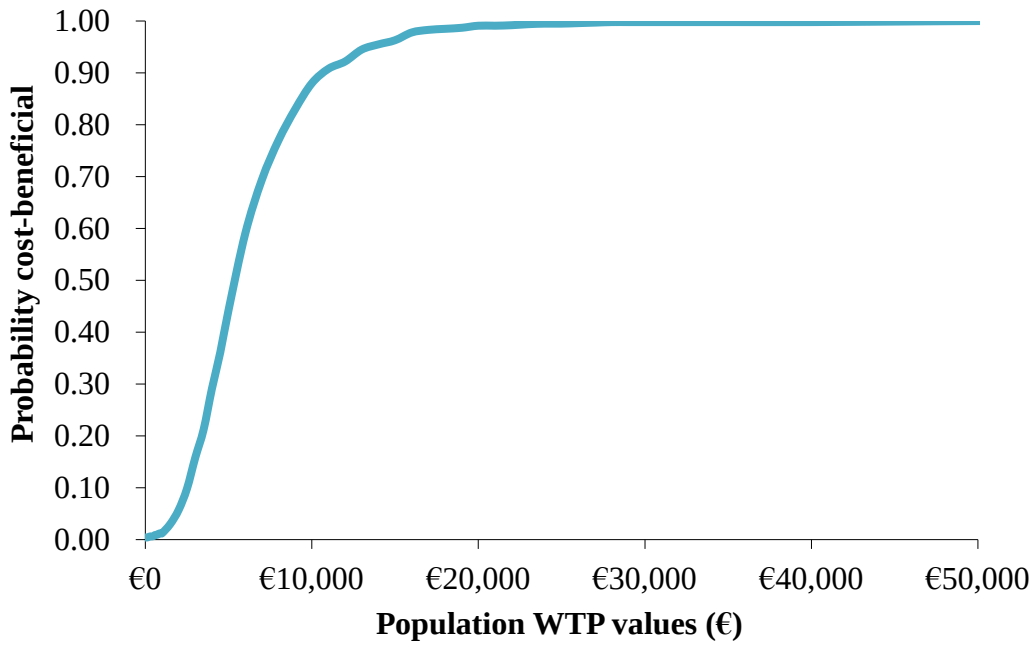


Figure 2.3: Sample net benefit acceptability curve, adapted from McIntosh (2006).

be difficult to estimate a demand curve. In addition, real market behaviour may not reflect the sole preferences of the patient, but rather those of the health care provider: through the agency relationship the health care provider is permitted to exert significant influence on the consumption of health care (Lancsar and Louviere 2008). RP data are further scarce where market data do not exist. For example, it cannot measure the value of health improvements, or changes in health, arising from a new intervention; the market simply does not exist (Lancsar and Louviere 2008).

RP data subsequently rely on indirect measures, such as the valuation of closely related goods where trade-offs are observable and a market demand curve is present (Clarke 2010; Sugden and Williams 1978). With respect to the valuation of health care benefits, for example, suppose that a GP consultation is free. The cost at the point of consumption is absent, but people may still incur monetary outlays which influence their behaviour, such as transport costs, or the opportunity cost of their time. If observable, it may be possible to estimate a demand curve similar to what would be expected if a purchase price were available. With respect to valuing health improvements, it also relies on alternative markets where benefits can be inferred from related behaviour. For example, suppose a study aims to ascertain the value of a life as part of an assessment of the benefits of health care. It may be possible to observe choices by examining labour market behaviour across high-risk and low-risk jobs (Viscusi 2004). For example, if a worker is willing to accept an extra €5,000 to carry out a job that carries an increased probability of 0.001 of death, then it can be inferred that the value of a life is €5,000,000.

Since the RP method is too restrictive, health economists have become increasingly reliant on the SP technique to infer valuations.

2.5.2 *Stated preference method: discrete choice experiment*

SP methods involve analysing expected behaviour, rather than observed behaviour (Lancsar and Louviere 2008). These valuations are invoked through surveys or experiments where respondents are asked to give values directly, or infer them indirectly. There are a number of SP techniques that can be used to elicit values, such as time trade-off, person trade-off, standard gamble, the CVM, and DCE. Unlike the RP approach, which relies on the presence of a market demand curve, the SP technique is based on an income-compensated demand curve (McIntosh 2010b; Sugden and Williams 1978). This affords true measures of welfare change through the CV and EV of welfare economics; the RP approach relies on CS to measure welfare change (McIntosh 2010b; Sugden and Williams 1978).

However, the validity of SP data is sometimes questioned. It relies on the assumption that the choices inferred by respondents in a survey actually reflect the choices that they would make in the real world. The behaviour of individuals may vary considerably from a hypothetical scenario to a real scenario where they are forced to choose between competing alternatives (Cookson 2003). SP methodology is further questioned on its relevance to economic analysis as its theoretical basis is psychological. For example, the Austrian school of economic thought maintains that the only source of information relevant to economic analysis is provided by the market.

As noted, there are a number of SP techniques that can be used to elicit values. A widely recognised technique is the DCE.

The DCE, or some variant of the choice experiment, has been widely used across various academic disciplines since its inception in the 1960s. However, due to varying techniques, there is considerable ambiguity around the name, purpose, and theoretical foundations of the experiment. In the 1960s choice experiments were introduced by psychologists as a means of understanding ordered relations on sets, resulting in the theory of Conjoint Measurement (Luce and Suppes 1965). Psychologists believed that people could reliably and validly rank a set of multi-attribute scenarios, also known as profiles, where additive, multiplicative or dual-distributive models could algebraically represent what psychologists term 'decision rules', and what economists term 'indirect utility functions' (Louviere and Lancsar 2009). However, using specific algebraic forms to examine ordered relations on sets carries significant implications on precision and understanding of SP data. Principally, it fails to capture whether humans differ in monotonic transformations, and whether these differences are generalisable (Louviere and Lancsar 2009).

The choice experiment was adopted by the marketing literature in the 1970s and became known as conjoint analysis (CA) (Green and Rao 1971). In CA, respondents are presented with a series of competing scenarios and asked to rank or rate alternatives. To aid respondents' decision-making, the competing alternatives are described in terms of attributes where each attribute is made up of different levels (Louviere and Lancsar 2009; Ryan 1996). In the 1970s and 1980s the number of published studies using CA increased considerably with an estimated 400 marketing studies published each year in the early 1980s (Wittink and Cattin 1989). CA was commonly associated with two behavioural paradigms during this period: Social Judgment Theory (Brunswick 1955) and Information Integration Theory (Anderson

1981). However, the choice experiment was originally devised on the axiomatic theory of Conjoint Measurement, which is more about the behaviour of numbers rather than humans or, moreover, orders on sets rather than human preferences (Louviere and Lancsar 2009). It maintained that the rankings provided by humans represented utilities, elicited through additive, multiplicative, and dual-distributive algebraic models (Louviere and Lancsar 2009). Implied preferences are represented "as if" humans simply added or multiplied, for example, attribute levels to assign a ranking to each profile, or combination of attribute levels (Louviere *et al* 2010). As a result, the origins of CA stem from statistical theory, rather than behavioural theory, relying on mathematical techniques to represent ordered relations on sets in response to systematic, factorial manipulations of factor levels (attribute levels), known as "factorial designs" (Louviere *et al* 2010).

Because CA has little to do with human preferences, it is argued that it is unsuitable for use as a stated preference technique in applied economics (Louviere *et al* 2010). For instance, it is largely inconsistent with demand theory in that it ignores the traditional constraints which underlie the economic concept, such as budget constraints (Louviere *et al* 2010). It can ask respondents in a survey to rank or rate alternatives that they simply could not afford, rendering the results meaningless. In addition, CA has various logical limitations which distance it from practical application in economic evaluation. The axioms of Conjoint Measurement are only loosely related to utility theory, as illustrated above – CA reveals nothing about human preferences. Further, there is no error theory, statistical or otherwise, associated with the mathematical techniques that underlie Conjoint Measurement (Louviere *et al*

2010). Therefore, it is unable to test differences in statistical models; the error component is merely an afterthought.

The development of alternative choice techniques emerged in the economic literature in the 1980s. The discrete choice experiment, as it is known in its current construct, was pioneered by Louviere and Woodworth (1983) using experimental design theory. For the first time, the authors constructed profiles, or choice sets, that respondents could choose between, rather than rank or rate like CA. They found that the experimental design elicited choices that were consistent with conditional logit models (Louviere and Woodworth 1983). However, the study was interpreted and labelled as another form of CA, termed 'choice-based conjoint analysis'. It is this description that has caused much confusion around the name, purpose, and theoretical foundations of the DCE. The DCE differs from CA for one major reason: the DCE is founded in economic theory, while CA is rooted in statistical theory.

2.5.2.1 *Theoretical foundations of the DCE*

There are various theoretical underpinnings of the DCE. First and foremost, it is strongly rooted in the standard economic theory of consumer behaviour, which assumes that individuals are rational decision makers who consistently seek to maximise a set of stable preferences (Amaya-Amaya *et al* 2008; Lancsar and Louviere 2008). The DCE assumes that respondents, when faced with a choice of competing alternatives, or bundles, assign preferences to each alternative and choose the bundle that satisfies a set of innate preferences. However, the neoclassical consumer evaluates the optimisation problem, or discrete choice, according to the maximum utility that can be derived from the consumption bundle subject to their budget and time

constraints. As a result, the traditional theory of consumer behaviour has three key extensions to the DCE (Amaya-Amaya *et al* 2008).

In the first instance, discrete choice theory assumes that utility is derived from the various attributes of a good, rather than of the good in its entirety; traditional consumer theory assumes that utility is a function of quantities (Amaya-Amaya *et al* 2008). This idea of utility, or demand, is drawn from Lancaster's (1966) economic theory of value. Lancaster (1966) argued that consumers are not influenced by the good itself, but by the properties or attributes that embody the good. Any change in the attributes of the good may cause individuals to switch from one bundle of goods to another, representing a shift towards the bundle of goods with the most beneficial combination of attributes. Secondly, the optimisation problem in a discrete choice experiment subjects respondents to a set of finite and mutually exclusive alternatives (Amaya-Amaya *et al* 2008). Participants in a DCE are subsequently restricted by an additional constraint, whereas with traditional consumer theory, individuals are faced with infinite choices, bound only by time and budget constraints. Lastly, discrete choice theory assumes that the behaviour of individuals is probabilistic, rather than deterministic as assumed by traditional theory (Amaya-Amaya *et al* 2008; Louviere *et al* 2010). Probabilistic discrete choice modelling derives from Thurstone's (1927) theory of paired comparisons, and is called random utility theory (RUT). RUT is a comprehensive behavioural theory which provides an explanation of the behaviour of humans (Louviere *et al* 2010).

2.5.2.2 *Random utility theory*

Random utility theory (RUT) was proposed by Thurstone (1927), introduced into economics by Marschak (1960) and later refined by McFadden (1974) and Manski (1977). RUT proposes that individuals have a latent construct of (indirect) "utilities" in their heads that are unobservable to researchers (Amaya-Amaya *et al* 2008; Louviere *et al* 2010). Because these utilities cannot be "seen" by researchers, RUT assumes that they can be decomposed into two additively separable components: a systematic (explainable) component and a random (unexplainable) component. The systematic component represents the attributes that explain differences in choice alternatives and covariates that explain differences in individuals' choices (Amaya-Amaya *et al* 2008; Louviere *et al* 2010). The random component captures the variation in preferences that are unidentified. This can include differences in choices arising from individual differences in utility, rather than choice options *per se*, measurement errors, or specification errors, along with unobserved or unobservable attributes (Amaya-Amaya *et al* 2008; Louviere *et al* 2010; Viney *et al* 2002). The latent utility can, more formally, be described as:

$$U_{in} = V_{in} + \varepsilon_{in} \qquad (2.4)$$

where U_{in} represents the latent, unobservable utility associated with choice alternative i for individual n, V_{in} is the systematic component of the utility of choice i for individual n, and ε_{in} is the random component associated with choice i and individual n.

Because RUT is probabilistic, it assumes that individual n will choose alternative i if, and only if, its utility is higher than any other option amongst all J alternatives in the choice set C_n:

$$y_{in} = f(U_{in}) = \begin{cases} 1 \text{ if } U_{in} = \text{Max}\{U_{ij}\} \\ 0 \text{ otherwise} \end{cases} \forall j \neq i \in C_n \qquad (2.5)$$

where y_{in} represents the choice indicator equal to 1 if individual n chooses alternative i, or 0 otherwise. According to Eqn. 2.4, alternative i is chosen by individual n if, and only if:

$$(V_{in} + \varepsilon_{in}) > (V_{jn} + \varepsilon_{jn}) \cdot \ \forall j \neq i \in C_n \qquad (2.6)$$

This can be rearranged to place the unobservable and observable components together:

$$(V_{in} - V_{jn}) > (\varepsilon_{in} - \varepsilon_{jn}) \qquad (2.7)$$

Because $(\varepsilon_{in} - \varepsilon_{jn})$ is unobservable, it's not possible to determine exactly if $(V_{in} - V_{jn}) > (\varepsilon_{in} - \varepsilon_{jn})$. As a result, it is only possible to estimate choice outcomes up to a probability of occurrence (McFadden 1974). For instance, the probability that individual n will choose i is the same as the probability that the difference between the error components is less than the difference in the observable component between the chosen alternative i and any other alternative j, amongst all J alternatives in the subset C_n:

$$P_{in} = \Pr(y_{\text{in}} = \frac{1}{X_{in}}, \beta)$$

$$= \Pr\left(U_{in} > U_{jn}\right) \forall j \neq i \in C_n$$

$$= \Pr(V_{in} + \varepsilon_{in} > V_{jn} + \varepsilon_{jn}) \forall j \neq i \in C_n$$

$$= \Pr(\varepsilon_{jn} - \varepsilon_{in} < V_{in} - V_{jn}) \forall j \neq i \in C_n$$

(2.8)

Again, it is not possible to observe $(\varepsilon_{in} - \varepsilon_{jn})$ across the population. RUT subsequently assumes that the distribution relates to the choice probability and the selected distribution or density function; a probability distribution is assumed for the random component (McFadden 1974). There are various probability distributions that can be applied for ε_{in}, resulting in families of probabilistic discrete choice models, such as binary or multiple discrete choice models. (Amaya-Amaya *et al* 2008; Louviere *et al* 2010). The exact probabilistic discrete choice model to apply in a DCE depends on the assumptions about the probability distributions for ε_{in}. For instance, Thurstone (1927) assumed that the random components were distributed as non-independent and non-identical normal random variates. But this assumption restricts RUT in that it can only be applied in dichotomous discrete choice models, or binary choice models, rather than multiple discrete choice models. McFadden (1974) later developed RUT and assumed that the random components were distributed independently and identically with a Gumbel distribution (extreme value type 1). This assumption gave rise to the standard conditional logit (CL) model, or multinomial logit (MNL) model.

The CL model is the easiest and most widely used probabilistic discrete choice model. However, it has received considerable criticism because it relies heavily on restrictive assumptions, such as random taste variation: the CL model can account for systematic (observed) heterogeneity across observed characteristics, such as income or education, but it cannot represent unobserved heterogeneity where some differences in tastes

remain random, regardless of observed characteristics (Amaya-Amaya *et al* 2008). As a result, various new probabilistic discrete choice models have been proposed to better represent human behaviour in choice models, including heteroscedastic models and random parameters or mixed logit models (Amaya-Amaya *et al* 2008). The appropriate model to use depends on a range of issues; most notably, the design of the study. This is discussed in the following section.

2.5.2.3 *From theory to practice: how to conduct a DCE*

There are various stages involved in designing, analysing, and interpreting a DCE. There are also various best-practice guidelines published on how to design and construct a DCE. Ryan (1996) outlined five succinct stages: identification of attributes; identification of levels; experimental design; data collection; and data analysis. Adamowicz *et al* (1998) further refined the key steps to include questionnaire development, sample sizing, and computerised support (Adamowicz *et al* 1998). The design model proposed by Ryan (1996) is typically used in the health economics literature, although this thesis draws on the most recent published guidelines on conducting DCEs, proposed by Lancsar and Louviere (2008), as these guidelines are expansive and particularly useful to novice practitioners. The design model proposed by Ryan (1996) is included in these updated guidelines and expanded upon. Lancsar and Louviere (2008) argue that there are three main components that need to be considered when undertaking a DCE: experimental design, discrete choice analysis, and welfare measures and other policy analyses. These are described separately below

2.5.2.4 *Experimental design: choice survey and data*

The choice process

A DCE requires specific consideration of the choice format, framing of the choice set, and relevance of the choice set to respondents to ensure proper design and implementation (Lancsar and Louviere 2008). Carson *et al* (2000) note that true preferences are most accurately revealed when the discrete choice is incentive compatible (Carson *et al* 2000). There are different choice formats that can be applied in a DCE, such as binary choice (yes/no), dichotomous choice (two alternatives), or multiple choice (three or more alternatives). The appropriate format may depend on the relevance of the goods to the respondent. Often in health care applications, the choice between two comparators is hypothetical. In such cases, dichotomous choice questions are inappropriate as participants are forced to reveal a preference for a consumption bundle that they may never choose in practice. As a result, it is often fitting to include an opt-out option, 'choose neither' option, or status-quo option.

It is also important to consider the impact that labelled (i.e. paracetamol, nurofen) choice sets might have on revealed preferences. A generic description (i.e. drug A, drug B) might be better suited where respondents have already experienced one of the consumption bundles as this reduces the potential bias against any comparator. This is known as status-quo bias (Ryan and Ubach 2003), or the endowment effect (Thaler 1980).[6] A related decision, which is particularly important in health care applications, is how much information should be provided to ensure that respondents are well

[6] The endowment effect is a behavioural economic concept that refutes the standard economic theory of the consumer (Thaler 1980). It asserts that initial endowments of wealth alter individuals' preferences. It is typically used to explain the observed disparity between willingness to pay and willingness to accept, although it has recently been extended to explain how initial endowments of experience can influence preferences in the same way (Ryan and Ubach 2003; Salkeld *et al* 2000).

informed and are less influenced by previous experience/knowledge or assumptions acquired from elsewhere.[7]

Identifying appropriate attributes and levels

The selection of appropriate attributes and attribute levels is crucial in a DCE to capture the systematic component of the utility function. There are various methods that can be used to obtain attributes, such as literature reviews, focus groups, interviews with relevant personnel (including patients, policy makers, and experts), and patient surveys (Coast *et al* 2011; Lancsar and Louviere 2008; Ryan and Hughes 1997).[8] There are two important issues that need to be considered when formulating attributes and levels (Ryan 1996). First, attributes must be meaningful and important to respondents, while also addressing issues relevant to policy makers. Moreover, they must be 'plausible', and respondents should be able to trade across different attribute levels (Ryan 1996). Second, attributes must be comprehensive and measurable, whether they are quantitative (i.e. distance to hospital) or qualitative (i.e. type of provider). In order to be comprehensive, attributes must be meaningful to respondents. Further, attribute levels must clearly depict the attractiveness of the associated attributes (Ryan 1996). To be measurable, it must be reasonable to obtain a probability distribution for an attribute that covers the range of selected attribute levels. It must also be reasonable to identify respondents' preferences using a utility function (Ryan 1996).

[7] For information on the development of the choice process and format within this analysis, see Chapter 4, section 4.2.1.1.

[8] This analysis uses focus groups to develop attributes. The focus groups are presented in Chapter 3. Details on how the focus groups are used to develop attributes are outlined in Chapter 4, section 4.2.1.2.

The number of attributes to use in a DCE is context specific. The general consensus is that it should not exceed eight; however, some studies have included as many as 12 attributes (Hall *et al* 2006; Lancsar and Louviere 2008). By including a large number of attributes in a DCE, the complexity of the experimental design is amplified (Lancsar and Louviere 2008). It is necessary that specific consideration is given to relevant and irrelevant attributes. A relevant attribute is one in which its exclusion would affect the conclusion of the DCE, while an irrelevant attribute is one in which its exclusion would not affect the results of the DCE. It is not always easy to distinguish relevant from irrelevant attributes, especially if attributes that are currently demand-irrelevant become relevant due to an increase in consumer knowledge, for example (Bennett and Blamey 2001). Exclusion of relevant attributes may result in biased estimates, but this needs to be weighed against an increase in task complexity arising from the inclusion of more attributes (Lancsar and Louviere 2008). Lancsar and Louviere (2008) note that in order to get the balance right, iterative piloting may be necessary.

There is no limit on the number of levels that an attribute should contain. Ryan (1999) argues that an attribute level should be plausible, actionable, and tradable. The distance between levels is crucially important to encourage respondents to trade across levels (Lancsar and Louviere 2008). The interval distance should be sufficiently wide, rather than too narrow or too wide, such that respondents can recognise reasonable differences between levels, and are encouraged to trade. This is particularly important for qualitative attributes where the expressed difference between levels can be easily misinterpreted by respondents (Amaya-Amaya *et al* 2008). Interval distances that are too narrow or too wide may be viewed as too insignificant or too significant, respectively, resulting in dominated or dominating levels, or estimated coefficients

that are insignificant or extreme. For quantitative attributes, such as cost attributes, the distance between intervals can be easily interpreted, however, particular care is needed where the aim is to implicitly determine the cost of other attributes using MRS (Amaya-Amaya *et al* 2008; Lancsar and Louviere 2008). Another important consideration concerning attribute levels arises from attribute-effects. An attribute-effect arises when an increase in the number of attribute levels causes an attribute to become more significant relative to attributes with fewer levels. For example, an attribute with five levels will have a more profound impact on the DCE than an attribute with three levels. One way to reduce this bias is to set the number of attribute levels equal to each other for every attribute. However, this is often impractical as most studies include cost attributes, and cost attributes are usually more informative when wide ranges and greater attribute levels are included.

The experimental design

The next step in the design of a DCE involves selecting an experimental design and constructing choice sets. Once all the attributes and associated levels are identified, alternatives or consumption bundles, also called scenarios, profiles, or options, are created using different combinations of attribute levels (Amaya-Amaya *et al* 2008). Depending on the choice format, respondents are presented with competing alternatives and asked to select their preferred option. The process of selecting consumption bundles and placing them into choice sets is known as experimental design (Amaya-Amaya *et al* 2008; Lancsar and Louviere 2008). Experimental design produces an estimation matrix which examines respondents' choices (dependent variable) and socio-demographics (co-variates). Because the matrices are known in advance, the aim of the experimental design is to find statistically efficient ways of

constructing choice sets such that reliable and unbiased estimates can be produced. Statistical efficiency can be defined as the goodness of an experimental design, quantified as the function of the variances and covariances of the parameter estimates, where efficiency is said to be increased when the variance is decreased (Amaya-Amaya *et al* 2008). One way to design a DCE is given by factorial design. This simply provides the factorial enumeration of all possible combinations of attribute levels. There are two factorial design approaches that can be used: full factorial design or fractional factorial design.

A full factorial design, which provides parameter estimates for all possible combinations of attribute levels, is a statistically efficient experimental design (Amaya-Amaya *et al* 2008). In an experiment with five attributes, each with four levels, the full factorial is 4^5, yielding 1,024 possible scenarios. The main advantage of a full factorial design is that it estimates all main effects (effect of each attribute on utility) and interaction effects singularly (effect of interaction between two or more attributes) (Amaya-Amaya *et al* 2008; Lancsar and Louviere 2008). However, a full factorial design is not always feasible as the number of possible scenarios increases exponentially as attributes and levels increase (Amaya-Amaya *et al* 2008). For instance, an experiment with five attributes, two with four corresponding levels and three with five levels, yields 2,000 possible scenarios in the full factorial, usually denoted 4^2*5^3. This would be extremely costly to administer and even more tedious for participants to complete. It is often necessary to reduce the size of the design to manageable levels. This can be done by blocked design or through the use of a fractional factorial design (Lancsar and Louviere 2008).

A fractional factorial design involves using a subset (or fraction) of all possible scenarios. The number of scenarios in a fractional design must be equal to or greater than the degrees of freedom of the model (i.e. the number of parameters to be estimated). A fractional design has the advantage of investigating all effects of interest, including main effects and also few higher-order interaction effects (interaction between two or more attributes) (Lancsar and Louviere 2008). For instance, a resolution design can estimate all main effects singularly, while also examining the degree to which estimated effects are confounded by two-level or three-level interactions (Amaya-Amaya *et al* 2008). The problem with resolution design, however, is that statistical efficiency is often compromised when investigating interaction effects. To estimate lower-order effects, it must be assumed that higher-order effects are zero or negligible. This results in a significant loss of statistical efficiency and, Amaya-Amaya *et al* (2008) note that the big question then is how much loss is acceptable, and how should it be assessed.

For the most part, however, the health economics literature has focused on the estimation of attribute main effects,[9] rather than interaction effects, where it assumes that higher-order effects are insignificant and multicollinearity is absent (Louviere and Lancsar 2009). The experimental design is known as 'orthogonal main-effects plans' (OMEPs). Orthogonal designs are based on orthogonal arrays which possess properties of orthogonality and level balance (De Bekker-Grob *et al* 2012). Orthogonality assumes that attributes are independent of one another while level balance assumes that attribute levels must appear an equal number of times in a DCE

[9] A recent review of DCE literature found that the majority of studies conducted between 2001 and 2008 used main effects fractional factorial design; 100/114 studies (De Bekker-Grob *et al* 2012).

to ensure they are all weighted the same (De Bekker-Grob *et al* 2012). A major weakness with using OMEPs is that they restrict estimation to strictly additive indirect utility functions (IUFs), which often results in high ratios of parameters to observations (Louviere and Lancsar 2009). Moreover, because interaction effects are assumed to be insignificant, which is highly unlikely, main effects may be biased (Lancsar and Louviere 2008). As a result, it is preferential to use full factorial designs as this provides parameter estimates for all possible attribute levels. Lancsar and Louviere (2008) note that a full factorial design is often more practical, and feasible, than a fractional factorial design if the DCE is divided into mutually exclusive and exhaustive blocks/versions, where participants are randomly assigned to blocks.

The construction of profiles and, subsequently, choice sets is a complex task. Profiles can be designed using catalogue designs, constructed by 'hand', or created using software packages, such as SAS, SPSS, NGENE and SPEED (Louviere and Lancsar 2009). The process of optimally assigning profiles into choice sets can then be done in various *ad hoc* ways. Whatever design is followed, Lancsar and Louviere (2008) note that there are two key statistical issues that must be addressed: identification and efficiency. Identification relates to the model effects that can be estimated independently of one another, along with the appropriate forms of IUFs that can be specified, while efficiency concerns the precision with which effects can be estimated (Lancsar and Louviere 2008; Louviere and Lancsar 2009). There are a number of ways to measure statistical efficiency, although the design efficiency criterion, also called D-efficiency, has been favoured in the health economic literature (De Bekker-Grob *et al* 2012; Lancsar and Louviere 2008):

$$D - Efficiency = [\frac{\det(C)}{\det(C_{opt})}]^{1/\rho} \qquad (2.9)$$

where ρ is the number of parameters to be estimated, det is the determinant, and C_{opt} is the largest value of the matrix C. D-efficiency is concerned with the design matrix: it aims to maximise efficiency by minimising the size of the covariance matrix of the estimated parameters (Amaya-Amaya *et al* 2008). Zwerina *et al* (1996) produced a computer generated statistically D-efficient design which maximises (minimises) the D-efficiency (D-error) for a nonlinear multinomial logit model. The authors suggest that the efficiency of the experimental design depends on four key principles: orthogonality, level balance, minimal overlap, and utility balance (Zwerina *et al* 1996). The first two principles are described above. Minimal overlap concerns the number of times an attribute level appears in a choice set; it minimises the probability that an attribute level is repeated in the same choice set, thus ensuring meaningful trade-offs across attribute levels. Utility balance relates to the utility weight associated with each profile. To capture meaningful trade-offs across attribute levels, the utility associated with each profile must be considered equal; profiles must have the same probability of being chosen in a given choice set (Zwerina *et al* 1996). The authors maintain that efficiency is improved if any one principle is improved, holding all others constant. However, Street and Burgess (2007) note that the principles are not necessarily conducive to an efficient design. For instance, the authors note that the estimation of interaction effects is prohibited when satisfying minimal overlap. Further, they note that level balance is unnecessary for an optimal design (Street and Burgess 2007). Viney *et al* (2005) also show that the variance of the error component, which affects the model's ability to capture the systematic component of the utility function, is increased when utility balance is satisfied (Viney *et al* 2005).

Experimental design is perhaps the most important aspect of the DCE. The reliability of the parameter estimates depend entirely on the efficiency of the model. Yet, there is no clear cut method that can be applied to satisfy design efficiency, partly because design efficiency differs for each study. To date, most studies have relied on orthogonal designs to elicit preferences; however, the development of alternative optimal designs in recent years is likely to change the future landscape of the DCE (Amaya-Amaya *et al* 2008).[10]

Pilot tests, sampling, and data collection

Lancsar and Louviere (2008) stress the importance of pilot testing to address a whole host of issues. The authors argue that iterative face-to-face surveys are necessary to assess respondents understanding of attributes and levels, and the subsequent choice process. Pilot testing also provides information on task complexity, length, and timing.

Sampling and sample size also require specific consideration in a DCE. With respect to sampling, Lancsar and Louviere (2008) note that the relevant sample depends on the target population, the opportunity cost of providing the service, and the funding perspective; that is, patients, health care providers, tax payers, policy makers, or insurers. If the cost of providing a service is borne by private users, then it is reasonable to elicit preferences from patients/users as the opportunity cost is the alternative use of the patient's income. On the other hand, if the cost of providing a service is borne by the taxpayer, where the opportunity cost is an alternative use of public finances, then the sample population are taxpayers. The authors also note that if the objective is to reveal preferences *ex post*, then the relevant sample is users of the good. Selecting

[10] An OMEP is employed within this analysis to assign levels to profiles using NGENE software, as outlined in Chapter 4, section 4.2.1.3.

the appropriate sample size is complex. It varies according to the type of discrete choice model and experimental design. For non-linear models, the appropriate sample size depends on the number of estimated parameters in the model, where sample size must be greater than or equal to the degrees of freedom of the model. The experimental design also plays an important role in determining sample size as the number of observations depends on the number of choice sets per respondent and respondents in the sample. Further, sample size is influenced by blocked design. If numerous blocks are created, the appropriate sample size should be similar across each block. Although, Lancsar and Louviere (2008) note that a sample size of 20 per block is sufficient to estimate reliable models.

There are a number of ways to collect DCE data, whether through face-to-face interviews, self-completed questionnaires, postal or online surveys, or mini-labs in which respondents are gathered in central locations. Self-completed postal surveys are commonly used in health care applications; although Ryan and Gerard (2003) note that these often result in poor response rates. Dillman and Bowker (2001), on the other hand, suggest that mini-labs and online surveys are more cost-effective. Lancsar and Louviere (2008) note that the appropriate method depends on study objectives, such as target population and task complexity, which can preclude the use of certain modes of data collection.[11]

2.5.2.5 *Discrete choice analysis*

Discrete choice models

[11] Pilot testing of the DCE used in this analysis is described in Chapter 4, section 4.2.1.4. Details on sampling, data collection, and participant information are outlined in Chapter 4 also (section 4.2.4).

Once the DCE data is collected, responses are analysed within a random utility model framework using a particular discrete choice model. The appropriate model depends on the assumptions about the error term. Because it is only possible to estimate choice outcomes up to a probability of occurrence, where the probability that individual n will choose consumption bundle i over an alternative j is the same as the probability that the systematic attractiveness of i relative to j is greater than the random utility between the alternatives in choice set C_n (Eqn. 2.7), and because it is not possible to observe $(\varepsilon_{in} - \varepsilon_{jn})$, a probability distribution is assumed for the random component.

When respondents are faced with a dichotomous decision (i.e. would you choose Package A: yes/no, or would you choose Package A or Package B), binary choice models are the most suitable model, whether probit or logit specification (Amaya-Amaya *et al* 2008). A probit model is assumed when the random component ε_{in} is distributed according to a standard normal distribution with zero mean and constant variance, while a logit model could be assumed under a logisitic distribution (WHO 1996). A random effects model, or panel specification, may also be used to account for the number of observations arising from each response (Amaya-Amaya *et al* 2008).

However, the most common assumption is that the random component ε_{in} is independently and identically distributed (IID) extreme value type 1, giving rise to a conditional logit (CL) model with mode zero and variance $\mu 2\pi 2/6$, where μ represents a positive scale parameter. The choice probability for individual i is given by:

$$P_{in} = \frac{\exp(\mu V_{in})}{\sum_{j \in C_n} \exp(\mu V_{jn})} \qquad (2.10)$$

As with all discrete choice models, the indirect utility function $V(X_{in}, \beta)$ must be specified in order to relate observed attributes of the alternatives to the utility derived from consumption bundle i. The CL model assumes that the utility function is linear-*in*-parameters:

$$V_{in} = \mathrm{ASC_i} + \beta_1 x_{i1} + \cdots + \beta_k x_{ik} \tag{2.11}$$

where there are K attributes $(k = 1,2,\ldots,k)$ and coefficients β_k across all consumption bundles. ASC_i denotes the alternative-specific constant, and represents the mean effect of the unobserved factors in the random component for each alternative. Because the CL model assumes that the systematic utility function is linear-*in*-parameters, it cannot separate the impact of the scale parameter from individual tastes; thus, it also assumes constant error variance ($\mu \equiv 1$). The CL model produces a likelihood function given by:

$$L = \prod_{n=1}^{N} \prod_{i \in C_n} P_{ni}^{\ y_{in}} \tag{2.12}$$

where N represents the sample size and y_{in} is the choice indicator similar to Eqn. 2.5. Under the above assumptions, the CL model is estimated by identifying the value of the alternatives, β, that maximise the log-likelihood function:

$$LnL = \sum_{n=1}^{N} \sum_{i \in C_n} y_{in}(\ln(P_{in})) = \sum_{n=1}^{N} \sum_{i \in C_n} y_{in}(\beta' X_{in} - ln \sum_{j \in C_n} \exp(\beta' X_{jn})) \tag{2.13}$$

An extension of the CL model is the multinomial logit (MNL) model, which is commonly used in health applications, partly because it appropriately reflects real life decisions within health. Choice alternatives are rarely binary; rather they encompass at least a third alternative. The MNL model provides three or more choice options,

typically including an opt-out or related option. But the CL and MNL model are also popularly used due to their simplicity. They assume independence of irrelevant attributes (IIA) through its IID assumption. This simply implies that, for any individual, the ratio of the choice probabilities of any two alternatives remains the same if a new alternative is introduced or an existing one removed – the alternatives are assumed to have proportional substitutability (Amaya-Amaya *et al* 2008). The IIA property introduces potential parameter estimate biases if the competition between alternatives differs across all alternatives. That is, the assumption of proportional substitutability is inappropriate if certain alternatives compete more closely with each other than they do when paired with other alternatives. Hausman and McFadden (1984), among others, have developed tests to determine whether IIA holds.

With the IIA restriction, there are two other important restrictions associated with the CL and MNL models, including random taste variation and serial correlation with panel data. Progress has been made to relax some or all of these three restrictions, resulting in the development of generalised extreme value models, such as a nested logit (NL) model. The NL model allows correlation among certain alternatives (or nests) (Ben-Akiva 1973). It is similar to the CL and MNL models in that IIA must hold within nests but not across nests.

IIA may be completely relaxed if a flexible discrete choice model is used, such as a random parameters or mixed logit (MXL) model. A MXL model is increasing in popularity within the health economic literature, among other disciplines (Amaya-Amaya *et al* 2008). The specification of MXL is the same as a standard logit model, but the interpretation of the parameters of the observed variables is different and based

on a multivariate distribution of the random parameters, representing individual tastes or another pre-defined distribution (Hensher and Greene 2003).

The appropriate discrete choice model to use in a DCE depends on the assumptions implied in the MNL model and whether the restrictions are violated. Amaya-Amaya *et al* (2008) note that the standard CL model should be used first, and followed by more general models to test assumptions about respondents' choices.[12]

2.5.2.6 *Welfare measures and other policy analyses*

Upon collecting DCE responses and analysing the data, elicited preferences may be used for policy analysis where outcomes can be simulated to predict behaviour and measure welfare change for use in a CBA.

Probability analysis is important for predicting uptake or market outcomes. In the first instance, it is useful for providing additional information on the probability that an individual will choose one alternative over another. Predicting choices at an aggregated level then is useful for policy analysis where the potential utilisation of a new service directly impacts on the cost of producing that service. This is central to priority setting.

Welfare-theoretic measures of value may be derived from DCEs. State-of-the-world models are useful for estimating individual WTP for a combination of attributes which describe a particular health care service or treatment. These WTP estimations may be used to describe the value assigned by individuals to a particular service or treatment.

[12] This analysis begins with a CL model and investigates how preferences change given changes in the underlying assumptions about respondents choices. To this end, a NL model and MXL model are also employed in this analysis. Chapter 4 (section 4.2.2) outlines the various discrete choice models used to investigate preferences.

WTP estimates may be used to measure welfare change across a population. The method of calculating WTP arises from Hicksian's CV. It assumes that the discrete choice process represents a compensatory decision process whereby improvements in one attribute can be expressed as an exact deterioration in another attribute along an indifference curve. The CV method can be used to calculate measures of welfare gain (loss) associated with health care programmes/treatments. It can also provide a monetary estimate for each attribute or a combination of attributes for use in a CBA (McIntosh 2006). [13]

The other SP technique that is popularly used to infer valuations is the CVM.

2.5.3 *Stated preference method: contingent valuation method*

The earliest application of the CVM dates back to 1958, with an application to health care arising in 1976 (Acton 1976; Hanemann 1992). Since then, the number of published contingent valuation studies has increased considerably with almost double the number of studies published in the period from 2005 to 2010 than in the preceding 15 years (Frew 2010a). The CVM is a survey-designed SP approach that estimates welfare gains/losses as appropriate. It measures the value of a programme or intervention holistically, rather than measuring the value of a programme's attributes individually like the DCE. The survey presents respondents with a hypothetical scenario and asks them directly to state how much they would be willing to pay (WTP), for example, to experience a welfare gain associated with a new treatment or programme (Ryan *et al* 2008a). It can also be used to estimate how much people would

[13] Each policy analysis is examined within this analysis. For information on state-of-the-world models, see Chapter 4 (section 4.2.3.1); predicting market uptake (section 4.2.3.2); and measures of welfare change (section 4.2.3.3).

be willing to accept (WTA) in compensation to suffer a welfare loss (Ryan *et al* 2008a).

Despite the rise in contingent valuation studies, there are no formal guidelines on how to approach and design a contingent valuation study within health care (Frew 2010b).[14] Frew (2010b) outlines several key stages involved in designing an appropriate a contingent valuation question specific to health care, as described below.

2.5.3.1 *Scenario description*

First and foremost, the scenario must be described as if the market for the benefits or losses of a particular programme actually exists; the validity of the response, referred to as content validity, is contingent on the description of the hypothetical market (Frew 2010b). Further, the presentation of the scenario should be all-encompassing, describing all relevant information about the product and how it will be paid for (Schulz and Grimes 2005). The choice of the payment vehicle is important as evidence suggests that respondents are sensitive to the payment vehicle (Mitchell and Carson 1989; Stevens *et al* 1997). It may be described as an out-of-pocket expense, charitable donation, an increase in income tax, among other payment formats. The appropriate payment vehicle depends on the survey and survey environment. For instance, in a tax-financed health care system it may be useful to describe the WTP/WTA question in terms of a change in taxation as respondents may be more familiar with paying for health care through taxation (Schulz and Grimes 2005).[15]

[14] Within environmental economics, the National Oceanic Atmospheric Association (NOAA) published a set of guidelines on how to conduct CVM studies (NOAA 1993). These guidelines are often cited in the health economics literature.

[15] The scenario description and payment vehicle used in the CVM within this analysis are outlined in Chapter 4, section 4.3.1.1.

2.5.3.2 *Equivalent and compensating variation / WTP versus WTA*

CV and EV measure the amount of money that is required to keep utility levels constant, referred to as Hicksian (income compensated) measures. As described in section 2.3.4, EV measures changes in utility levels after a change in welfare has occurred, while CV measures changes in utility levels before a change in welfare has occurred. The appropriate direction of measurement (WTP/WTA) depends on whether a welfare gain/loss is, or is at risk of, occurring. Framing of the welfare gain or loss is important as it determines whether CV or EV should be used to measure welfare change. CV is measured when WTP/WTA is elicited before a specific event occurs, as the change in welfare (utility) is yet to take place. This is described as an *ex ante* perspective (Shackley and Donaldson 2000). If the change in welfare has already occurred, EV is measured since WTP/WTA is elicited from the new utility level. This perspective is referred to as *ex post* (Shackley and Donaldson 2000).[16]

2.5.3.3 *Instrumentation technique*

Specific consideration must be given to the instrumentation technique. This may take the form of a face-to-face interview, a telephone interview, or a mail survey. Mail surveys are less costly to administer and can generate relatively large sample sizes (Schulz and Grimes 2005). However, they are limited by what they can elicit, and restricted by what they can assess. In contrast, face-to-face interviews and telephone interviews allow researchers to actively engage with respondents, thereby eliminating any misunderstanding that might arise during elicitation. These techniques are more

[16] This analysis assumes an *ex ante* perspective, eliciting CV through WTP. For more information on the direction of measurement, see Chapter 4, section 4.3.1.2.

costly and time-consuming, and often generate smaller sample sizes than mail surveys. Face-to-face interviews are widely considered the best form of instrumentation.[17]

2.5.3.4 *Elicitation format*

There are a number of ways in which the CVM can elicit values. According to Bateman *et al* (2002), the elicitation format may be open-ended whereby respondents simply infer values according to their preference.[18] A CVM may elicit values using an iterative bidding technique, known as a bidding game (Bateman *et al* 2002). In a bidding game, respondents enter a bargaining process with the interviewer and can either accept or reject pre-determined bids. It is similar to an auction and can be likened to real world "haggling" techniques (Frew 2010a). The elicitation format may also take the form of a payment scale/card (Bateman *et al* 2002; Frew 2010a). This simply provides respondents with a range of values to choose from. A payment card usually has an open-ended option where respondents can identify their real willingness to pay (or accept) if their maximum (minimum) WTP (WTA) is greater (lower) than the highest (lowest) bid (Frew 2010a). Another elicitation format is the dichotomous CVM, also termed closed-ended and referendum CVM, which simply seeks yes/no responses (Bateman *et al* 2002). It simplifies the cognitive challenge faced by respondents and is believed to represent 'real-life' situations as consumers are accustomed to evaluating goods and services at given prices. The dichotomous CVM is similar to the DCE in that it asks respondents to choose between two competing

[17] A self-completion questionnaire is adopted within this analysis to elicit WTP. The survey is presented in Appendix B.3. For more information on the development of the CVM, including sampling, data collection, and participant information, see Chapter 4, section 4.3.3. Information on pilot testing is provided in section 4.3.1.4.

[18] An open-ended WTP question is assumed in this analysis, along with a payment scale WTP question. Both formats are introduced in section 4.3.1.3

alternatives. Alternatively, the CVM can employ a double bounded dichotomous choice to elicit values. This supplements the level of information provided by the dichotomous CVM by simply providing a follow-up question that is related to the respondent's initial response (Bateman *et al* 2002).

2.5.3.5 *Contingent valuation biases*

Since contingent valuation studies rely on the assumption that respondents behave in the same way in hypothetical scenarios as they do in the real world, there are a number of well-known biases inherent in the SP technique. Moreover, without a universally accepted approach to contingent valuation studies, the validity and reliability of the CVM depends on the magnitude of the associated biases. There are a number of inherent biases associated with certain elicitation formats. For instance, starting-point bias might emerge in a 'bidding-game' where respondents 'anchor' their response around the initial bid. The anchoring effect may be minimised if the starting point is randomly generated across respondents (Moher *et al* 2010), or if one-tenth of the sample are randomly assigned to one-tenth of the starting bids (Schulz *et al* 2010). Range bias might arise in a payment scale question design where respondents are influenced by the range of values presented. Similar to the starting point bias it might be useful to design different payment scales and randomly assign respondents to each scale (Schulz and Grimes 2005).

Pearce and Ozdemiroglu (2002) attempted to refine best practice guidelines for conducting contingent valuation studies. The aim of these guidelines is to reduce the extent or existence of inherent biases in the SP technique, such as strategic bias,

justification bias, status-quo bias, availability bias, among other biases (Pearce and Ozdemiroglu 2002).

2.5.3.6 *Quantitative analysis of the CVM*

Once the data are collected, cleaned, and entered into a statistical software package, various analyses can be employed to explore WTP. Various responses exist for the CVM. Some individuals may provide a positive WTP value; others may provide a zero value, while others may protest against the task and offer no WTP value. Given the inherent problems associated with zero and protest responses, initial comparisons across demographics may be investigated (Frew 2010b).[19] Positive WTP responders may be compared against zero WTP responders and non-responders. Summary statistics may be used in the first instance, followed by logistic regression analysis. It is useful to capture how these groups differ in terms of demographics as important WTP information is lost any time a zero or protest response is given.

Positive WTP values are described using CV or EV. Descriptive statistics are used to describe both mean and median WTP values, as well as the distribution of the data (Frew 2010b).[20] This is important for regression analysis where different specifications for the WTP variable may need to be assumed. Various regression techniques may be used to explore WTP values, and depend on the elicitation format (Frew 2010b). Linear regression or Tobit regression may be used for open-ended WTP questions; logistic regression may be used for closed-ended WTP questions; and interval regression may be used for the payment scale. Tobit regression is often

[19] The demographics of zero and protest responders are analysed within the CVM, as outlined in Chapter 4, section 4.3.2.1.
[20] Analysis of positive WTP responses is presented in Chapter 4, section 4.3.2.2

appropriate for open-ended questions where zero WTP values can be censored at the lower bound.[21]

Preferences may also be explored in terms of respondents' preferred alternative. If the marginal approach is assumed, information on respondents preferred alternative is captured and can be explored using a probit model. This information may still be obtained from the direct approach by categorising preferences according to the highest WTP value. If an individual is willing to pay more for one alternative over another, it can be assumed that the alternative with the larger WTP value is the preferred alternative. Analysis of preferences is particularly useful when a considerable amount of noise exists in the WTP values (Frew 2010b). This might arise from small sample size, or wide ranging WTP values.[22]

Similar to the DCE, the CVM may be used in a formal CBA (Frew 2010a). This thesis incorporates the CVM into a CBA of consultant- and midwifery-led care in Ireland. The empirical applications of these different methodologies are presented next in section 2.6.

2.6 Empirical applications of the DCE, CVM, and CBA

This section introduces the various empirical applications of the DCE (section 2.6.1), CVM (section 2.6.2), and CBA (section 2.6.3). Where possible, empirical applications within maternity care are reported.

[21] Section 4.3.2.2 also introduces the various regression analyses employed within this CVM. An OLS, log-linear OLS, and Tobit regression model are employed to analyse the open-ended WTP question, while interval regression is employed to investigate WTP data obtained from the payment scale question.

[22] A probit model is assumed within this analysis to explore the characteristics of women that prefer consultant-led care over midwifery-led care. The model is introduced in section 4.3.2.3.

2.6.1 *Maternity care and the DCE*

The DCE has become a popular instrument in health economics and is commonly used to address wide ranging policy issues and to value outcomes in economic evaluation studies. De Bekker-Grob *et al* (2011) found that the number of published discrete choice studies increased considerably between 1990 and 2008, rising from a mean of three applications in 1990 to a mean of 14 applications in 2008. The DCE has been applied to various fields within health care, including maternity care. In fact, maternity care has received considerable attention with studies examining women's preferences for different aspects of intrapartum care (Hundley *et al* 2001); place of delivery (Longworth *et al* 2001; Pitchforth *et al* 2008); place of delivery in a low income country (Kruk *et al* 2009); different aspects of labour management (Scotland *et al* 2011); and alternative packages of antenatal care (Deverill *et al* 2010). While maternity care is clearly an area of interest to health economists, some of these studies do not relate to intrapartum care or, moreover, discrete choice analysis. Deverill *et al* (2010) examined women's preferences for alternative packages of antenatal care, and subsequently ignored women's preferences for intrapartum care. Longworth *et al* (2001) and Kruk *et al* (2009) conducted studies that aimed to elicit women's preferences for place of delivery (Longworth *et al* 2001) and place of delivery in a low income country (Kruk *et al* 2009). Both studies relate to intrapartum care but they applied a conjoint analysis to elicit women's preferences for place of delivery, rather than a discrete choice analysis. Kruk *et al* (2009) labelled their study a DCE, but the authors actually carried out a hierarchical bayes choice-based conjoint analysis. This illustrates some of the confusion which surround the name, purpose, and theoretical foundation of the DCE.

The studies that relate to intrapartum care and which rigorously applied a discrete choice analysis include Hundley *et al* (2001), Pitchforth *et al* (2007), and Scotland *et al* (2011). In the first of its kind, Hundley *et al* (2001) investigated women's preferences for different aspects of intrapartum care in Scotland. However, the authors were more concerned with assessing the worth of the DCE to maternity care than they were with determining women's preferences *per se*, as the DCE had not previously been applied to maternity services. Pitchforth *et al* (2007) then examined women's preferences for different models of intrapartum care, also in Scotland. In particular, the authors explored women's preferences for midwifery-led care, consultant-led care, or home birth care in remote and rural Scotland. Scotland *et al* (2011), in a somewhat related study to Hundley *et al* (2001), again conducted in Scotland, investigated women's preferences for different aspects of care before and during labour (intrapartum care). These studies are critically appraised below in terms of attribute selection, experimental design, data collection and sample size, and results.

Selecting attributes and levels

As Hundley *et al* (2001) were primarily concerned with assessing the feasibility of the DCE to maternity services, the authors did not carry out extensive qualitative research to develop attributes and attribute levels. Instead the authors carried out a review of existing literature and sought expert advice to identify attributes. They selected only those aspects of care that could be expected to differ according to the type of care provided. The identified attributes largely related to quality of care and type of health care provider, encompassing six attributes in total: midwife, pain relief, monitoring, appearance (homeliness) of the room, medical staff, and decision making. Attribute levels were identified in a similar manner: the authors drew on policy

guidelines, academic studies, and professional recommendations to define levels. Pitchforth *et al* (2007), on the other hand, incorporated qualitative methods to develop attributes and attribute levels. The authors carried out a mixed methods study which combined the DCE with focus groups. However, the purpose of the focus groups was not to define attributes and levels, which is common practice, but rather to refine attributes that were identified from policy and current practices of care. Defining attributes according to policy concerns is widespread practice in health economics, although the assimilation of qualitative research is infrequent (Saunders *et al* 2000). Louviere *et al* (2000) argue that qualitative work is essential to developing appropriate attributes and levels. Scotland *et al* (2011) similarly conducted qualitative research to inform attributes and levels, but used interviews rather than focus groups. The study identified five attributes: number of visits to the hospital before admission to labour ward; time spent in hospital while in labour; pain relief; and type of delivery. In contrast, Pitchforth *et al* (2007) identified just three attributes: type of provider; pain relief; and distance to unit.

How attributes and attribute levels are defined and subsequently reported in empirical studies is usually poor, whether they are defined according to a review of relevant literature or through qualitative research (Coast *et al* 2011). However, each of the three studies sufficiently reports their source of information. Hundley *et al* (2001) identify the relevant literature that was used to inform attributes for their study, Pitchforth *et al* (2007) reported the results of the focus group in an evaluation report of maternity services, while Scotland *et al* (2011) published the results of their interviews in a separate study.

Experimental design, data collection, and discrete choice analysis

Experimental design

Two of the three studies used a fractional factorial design to construct choice sets. Hundley *et al* (2001) used a fractional design because the factorial enumeration of all possible levels was too high, according to the authors. With two attributes with four levels, three attributes with two levels, and one attribute with three levels, the factorial yielded 384 possible scenarios. The authors argued that this was too much to include in a DCE. Instead they reduced the number of scenarios to a more manageable level, yielding just 16 scenarios with 8 choice sets. However, the authors could potentially have used a full factorial design if they divided the DCE into versions/blocks, where respondents were randomly assigned to one of the blocks. With 192 choice sets, the authors could have created 12 blocks, each with 16 choices. To ensure reliable results, the authors would need to ensure that at least twenty people were assigned to each version (Lancsar and Louviere 2008). Studies have had as few as two to five respondents per block where parameter estimates still proved reliable (King *et al* 2007). Moreover, some studies have demonstrated that respondents can handle up to 32 choice sets (Louviere and Engle 2006; Louviere and Meyer 2007). Scotland *et al* (2011) assigned respondents to blocked versions of the DCE, but did not use a full factorial design. The total number of possible scenarios produced in their study was 512 ($4^4 * 2 = 512$). The authors reduced this to a more manageable number (160 scenarios), compressing the number of choice sets to 80. Similarly, the authors could potentially have used a full factorial design using 16 blocks with 16 choice sets.

Pitchforth *et al* (2007), on the other hand, used a full factorial design. The total number of scenarios produced in their study given two attributes with two levels and one attribute with four levels was 16 scenarios ($2^2 * 4 = 16$). With such a small number of

scenarios the authors did not have to reduce the number to a manageable level as 16 scenarios implied just 8 choice sets. However, Pitchforth *et al* (2007), similar to Hundley *et al* (2001) and Scotland *et al* (2011), assumed that the interaction between attributes was insignificant. Accordingly, the DCE investigated main effects only. However, while Hundley *et al* and Scotland *et al* assumed an orthogonal design, Pitchforth *et al* applied a fold-over design – fold-over design simply involves constructing choice sets based on the mirror image of the original design (De Bekker-Grob 2009).

Data collection

Varying recruitment methodology was employed by each study. Hundley *et al* (2001), who sought to investigate women's preferences for different aspects of intrapartum care, recruited women at the first antenatal booking visit in three areas in Scotland. The authors only invited women who were considered to be at low risk of obstetric complications to participate in the DCE. It was designed as a self-completion survey which was to be completed by women in their own time and returned using a free post envelope provided. To minimise the potential for status-quo bias, the authors excluded women who completed the DCE after the birth of their baby.

Pitchforth *et al* (2007), who were concerned with assessing women's preferences for midwifery-led care, consultant-led care, and home birth care in remote and rural Scotland, also used self-complete questionnaires. However, the authors employed slightly different recruitment methodology. First, the study selected a stratified sample of eight maternity units from an eligible 12 units to identify potential respondents. Women who had given birth in, or had been referred to, one of the maternity units

were identified prospectively from a computer database. In sharp contrast to Hundley *et* al (2001) who directly sought to minimise the endowment effect by recruiting women at the antenatal visit, Pitchforth *et al* (2001) recruited women postnatally, allowing the effect of experience to potentially bias women's responses. The authors distributed the DCE by post and attached a free post envelope to encourage women to respond. They excluded women who experienced a stillbirth, neonatal death, or who had an infant admitted to neonatal intensive care.

The recruitment methodology employed by Scotland *et al* (2011) differed again. However, the DCE comprised merely a component of a larger, broader randomised controlled trial (RCT), which sought to investigate women's preferences for different aspects of labour management. Several hospitals in Scotland were selected and women were identified prospectively by trained midwives. Women were randomised to one of two groups which received different forms of intrapartum care. Similar to Pitchforth *et al* (2007), women received a self-complete questionnaire in the post after they had given birth. The authors recruited only those women who were considered low risk of obstetric complications.

Data analysis: discrete choice modelling

None of the three studies used the same discrete choice model to analyse DCE responses. Hundley *et al* (2001) used random effect probit regression, indicating that it was the necessary model as multiple observations were obtained from each respondent. In dichotomous choice models, or 'forced' choice models, logit or probit models are often used to capture random effects, or panel specification (De Bekker-Grob 2009). Hundley *et al* included just two options in the DCE which forced

respondents to choose between alternatives that they may not prefer. The authors noted upon collecting data that some women did not give an answer for all scenarios, explaining that they were unable to choose between the two alternatives, or that they would prefer a mixture of both. Scotland *et al* (2011) included two alternatives in their DCE and similarly applied a random effects model, but employed logistic regression rather than probit regression. In contrast, Pitchforth *et al* (2007) applied a multinomial logit model as the DCE incorporated a third option, home birth. The MNL model allowed the authors to investigate multiple choices.

Results

Hundley *et al* (2001) found that the DCE was a useful tool in assessing women's preferences for different aspects of intrapartum care. The DCE reported that women preferred maternity units that provided continuity of carer throughout labour and delivery, more methods of pain relief, continuous foetal heart rate monitoring, homeliness of the room, involvement of medical staff, and greater involvement for the women in decision-making. Pitchforth *et al* (2007) found that women preferred to give birth in a maternity unit with consultant-led care preferred above midwifery-led care because it provided women with an increased sense of safety. Home birth care was favoured the least with women indicating that they were willing to travel up to 133 minutes to give birth in a consultant-led unit and 117 minutes to give birth in a midwifery-led unit, rather than give birth at home. Accordingly, women were willing to travel an additional 16 minutes to give birth in a consultant-led unit than in a midwifery-led unit. Scotland *et al* (2011) found that women prefer fewer visits to the maternity unit before being accepted onto the ward. However, extra visits before

admission are worth the trouble if it implies less time on the labour ward and is associated with fewer interventions during childbirth.

2.6.2 *Maternity care and the CVM*

Despite the popularity of the CVM in assessing preferences in health care settings, it has been scarcely applied to the area of maternity care. One study in particular examined women's preferences for midwifery-led care compared with consultant-led care in Scotland (Donaldson *et al* 1998). Donaldson *et al* (1998) examined the feasibility of the WTP technique as a measure of the benefits of alternative models of intrapartum care. The authors adopted an open-ended marginal WTP approach in their analysis and asked women to consider the maximum amount they would be willing to give up in order to experience their preferred model of care rather than their less preferred model of care. 115 low risk women from the Grampian region of the north-east of Scotland were invited to participate in a mail survey. The authors surveyed women during antenatal care to minimise any potential bias arising from experience (endowment effect). Since the dependent variable (WTP) did not have a standard normal distribution due to the open-ended nature of the question, a Tobit regression analysis was employed to estimate respondents' WTP. With a 75 per cent response rate, the authors found that 55 per cent of women preferred care in a MLU than care in a CLU. The mean WTP for care in a MLU instead of care in a CLU was estimated at £263.95, with a median of £100, while the mean WTP for care in a CLU rather than a MLU was estimated at £621.25, with a median value of £150. The authors also found that age, income, social class, and preference were significant in influencing WTP, with age being significant at the one per cent level, and the remaining variables being significant at the five per cent level. Interestingly, women in the lower social

classes were willing to pay more than those in the higher income classes, while women with a preference for care in a MLU were also willing to pay more (controlling for age, income and social class).

Importantly, the authors found no statistically significant difference between women preferring care in a MLU than a CLU with respect to social class and income. That is, preferences were relatively uniform across income and social class groups, indicating that ability to pay did not unduly influence willingness to pay. However, Donaldson *et al* (1998) acknowledge that the results of the study should be treated with caution given the study's relatively small sample size.

2.6.3 *Application of CBA*

Despite its theoretically rigorous approach to resource allocation decision-making, the application of CBA to the health sector remains limited. Initial applications examined resource savings or productivity gains as measures of benefit valuations (Mushkin 1978). However, neither approach was consistent with welfare economics, which seeks to rank social states of the world in terms of social preference, or utility. Recent developments in applied welfare economics increased the number of applied CBA studies, with the majority of these applications employing a variant of the CVM. According to a review of the contingent valuation literature between 1984 and 1996, there were 48 applications of the CVM in the health sector, and 42 of these studies roughly compared the data with the costs of the programme in the context of a CBA (Diener *et al* 1998). The authors note that very few of these studies were complete CBAs; the majority of studies informally compared the costs of the programme with elicited WTP values. Since 1996, the number of contingent valuation studies increased

considerably, although few studies progressed to CBA (Borghi 2008). The application of DCEs is increasing in the health sector also, although its inclusion in CBA is limited (De Bekker-Grob *et al* 2012). To the best of the authors' knowledge, the DCE has been used within a CBA on one occasion (van der Pol *et al* 2010).

Of the few CBAs that have been applied within the health sector, the approach differs across each study. For instance, despite its theoretical grounding in welfare economics, the majority of CBAs have assumed a perspective other than the natural social perspective. Approximately 86 per cent of CBAs undertaken between 1984 and 1996 assumed a private market perspective (Diener *et al* 1998). This trend has continued, despite the inherent benefit associated with broadening the perspective to reflect social preferences (Borghi 2008; Haefeli *et al* 2008; van der Pol *et al* 2010). This raises an important consideration for benefit valuations, and whether user or non-user values should be sought to infer valuations. Patients are the best judge of their own welfare, and often easier to survey than the general population. However, if the general population is affected by resource allocation decisions, then these values may be more representative (Frew 2010b). This is the viewpoint assumed by NICE for CEAs (NICE 2004; NICE 2013). For CBAs, inclusion of both viewpoints is ideal as all possible externalities are captured in the analysis (Frew 2010a). Ortega et al (1998) used both perspectives in a CVM where two different WTP questions were developed to fit the different perspectives. However, the authors did not compare the benefit estimates with cost estimates in a formal CBA.

Shackley and Donaldson (2000) outline when it is appropriate to elicit patient values, opposed to general population values. The authors recommend eliciting monetary valuations from patients when the programme under evaluation is publicly funded as

patients bear the opportunity cost of any resource allocation decisions. That is, if only one alternative under evaluation can be undertaken, then those patients that prefer the foregone alternative bear the opportunity cost of the decision. Much of the CBA literature uses patients to elicit monetary valuations, regardless of the viewpoint assumed in the analysis (Borghi 2008; Diener *et al* 1998; Frew 2010b; Haefeli *et al* 2008; van der Pol *et al* 2010).

Discounting is an important consideration in any economic evaluation (Cairns 2001). This is the process of adjusting costs and consequences which accrue over time to present values. Since the majority of CBAs are incomplete, the benefit-cost comparison over time is poorly evaluated in the literature. The majority of applications implicitly assume that benefits and costs accrue immediately. Smith (2003) argues that this a weakness of the CVM in general where WTP questions are often poorly designed to capture benefits that accrue over time but do not account for respondents budget constraint which is changeable over time. Borghi (2008) collected WTP values over the life time of a programme that evaluated mother and new-born health, and investigated how monetary valuations changed over the course of the programme. The contingent valuation study was conducted over 33 months where costs and benefits accruing during this timeframe were captured in the analysis and discounted accordingly (Borghi 2008).

Many CBAs examine the worthwhileness of new programmes, or service configurations, but do not provide clear information on whether the introduction of a new service reflects value for money over time. For instance, van der Pol (2009) investigated potential utilisation of a community prenatal care programme using data obtained from a DCE, and incorporated the results into a CBA. The authors assumed

a short time horizon, although their analysis could have been expanded to adjust for costs and benefits accruing over time, which is an important consideration for public policy decision-making. This is a weakness of most CBAs which are experimental in nature.

The flexibility of DCE data to inform measures of welfare change within CBA is not new. However, the approach is yet to be incorporated into a formal CBA. Van der Pol (2008) assessed how the approach can be used within CBA. The authors assumed a provider perspective, rather than a social perspective, to investigate alternative models of perinatal care. The study estimated women's WTP for various configurations of community prenatal care, but did not estimate the CV of WTP, despite the authors' search for an optimal package of care. Costs were estimated in line with attributes, as recommended by McIntosh (2006), although the net benefit analysis focussed on costs and benefits which accrued immediately, rather than over time. Application of a cost-benefit plane, net benefit framework, and PSA within CBA, as proposed by McIntosh (2006), remain to be explored empirically.

As mentioned earlier, a major advantage of CBA arises from its theoretical grounding in welfare economics. However, CBA is often overlooked in the health sector given the complexity of the task. There are concerns about the ethical implications associated with assigning a monetary valuation to human life (House 2000); the validity of the data obtained through stated preference techniques (Kahneman and Knetsch 1992; Diamond and Hausman 1994); and the difficulty of welfare economics to rank social states (McIntosh 2010b). To date, applications of the approach have focussed on testing the feasibility of CBAs in health care, and the use of stated preference techniques to value health and health care (Borghi 2008). While the majority of these

studies have assessed the worth of CBA, the literature is no clearer on how best to adapt the approach to the health sector. Further application is recommended to address issues such as the elicitation perspective, direction of measurement, measure of welfare change, framing of the hypothetical market/SP technique, and selecting an appropriate time horizon (Frew 2010a; Haefeli *et al* 2008; McIntosh 2006).

2.7 Conclusion

The DCE and the CVM are proven tools for eliciting SP data (Lancsar and Louviere 2008; McIntosh 2010b). Both are widely used across various disciplines, with health care applications rising in popularity in recent years. The DCE is strongly rooted in economic theory, and its flexibility ensures that it can be applied within economic evaluation methodology. In order to use a DCE in a CBA, however, the attributes included in the DCE must correspond to quantifiable cost inputs. This may be achieved using clinical trials, where patient level data are collected for costs and benefits and compared directly in a formal CBA (McIntosh 2006). The CVM is also underpinned by welfare theory and can be used within a CBA.

The two SP techniques are assumed in this thesis. The DCE is used to identify women's strengths of preferences for different features of consultant- and midwifery-led care. Market uptake for alternative models of maternity care is predicted and welfare measures are calculated using this approach. While the data cannot be included in the CBA, a CVM is employed to compare the costs and benefits of both models of care in Ireland.

The remainder of the thesis is structured as follows. The qualitative exploration of maternal preferences is presented in Chapter 3. The data collection techniques used to

conduct the DCE and CVM are presented in the following chapter (Chapter 4). Chapters 5 and 6, respectively, present the results of the DCE and CVM. The economic evaluation is presented in Chapter 7. The data sources are outlined in this chapter, along with the methods followed to complete the economic evaluation and results obtained from the net benefit analysis. A discussion of the results found throughout this thesis is presented in Chapter 8. The thesis is concluded in Chapter 9 with an outline of the specific contributions arising from this research.

A qualitative investigation of maternal preferences is undertaken in the first instance to explore women's motivations when choosing place of delivery. The following chapter presents the qualitative study.

3 A QUALITATIVE INVESTIGATION OF MATERNAL PREFERENCES

3.1 Introduction

As noted in Chapter 2, very little is known about women's preferences for maternity care and whether they would utilise a midwifery-led service over a consultant-led service. This chapter examines maternal preferences for both models of care and the factors that influence women's decision-making when choosing place of delivery. Qualitative research is undertaken to address the research question and a series of focus groups are employed. Section 3.2 describes the materials and methods used to conduct the qualitative research. The results of the focus groups are presented in section 3.3, and a summary of the study's findings is outlined in section 3.4. The final section, section 3.5, concludes this chapter.[23] The results are also used to inform the DCE and CVM, as described in Chapter 4.

3.2 Materials and methods

The aim of the focus groups was to investigate the features of maternity care that influence pregnant women's decision-making when presented with the choice of delivering in a CLU or MLU. A focus group approach was taken rather than individual interviews to ensure wide ranging ideas emerged, and debate among participants ensued. Group settings are known to have a synergistic effect over one-to-one interview settings (Stewart and Shandasani 1990).

[23] An abridged version of this chapter has been submitted to Health Policy, January 2015.

The criteria for inclusion in the focus groups were restricted to women who were considered to be at low risk of obstetric complications, and who were currently pregnant. Low risk was defined according to the National Institute for Health and Clinical Excellence (NICE) guidelines (NICE 2007), and describes women between 18 and 39 years of age with no history of obstetric complications or Caesarean section and no contraindications of morbidities at the time of pregnancy. Women who are considered high risk were excluded from the sample as this group does not have the luxury of choosing to deliver in a maternity care setting where the full range of medical services is not immediately available. The study aims to capture the views and opinions of a range of women and invited women who had never given birth before; women who had given birth one or more times; women who were receiving their care publicly; and women who were receiving their care privately to participate in the focus groups.

A sample group of women who recently had their 20 week scan (over a two week period during May, 2012) and who booked to deliver in a large, teaching maternity hospital in Ireland (CUMH) were invited to participate in the focus groups. 196 low risk women were identified from the hospital's antenatal database records. This group comprises 138 women (70.4 per cent) who were receiving their care publicly and 58 women (29.6 per cent) who were receiving their care privately. An invitation letter, accompanied by an information leaflet, was distributed to the full sample. Women were informed that they can return an opt-out consent form in a pre-paid envelope provided if they do not wish to participate in the study. Alternatively, if they were interested in participating in the study they were informed that they would be contacted by telephone and arrangements would be made to attend a focus group.

Four focus groups were arranged with participants in CUMH in May 2012, where each session was audio recorded and women gave written consent to participate in the study.[24] Each focus group was facilitated by two researchers.[25]

A topic guide that described a list of features of maternity care which might influence women's decision-making when choosing place of delivery was used during the focus groups.[26] The topic guide derived from a review of existing literature, along with an analysis of policy-relevant issues, as described in Chapters 2 and 3. For instance, access to pain relief was highlighted in the literature as an important feature of maternity care (Byrne *et al* 2010; Hundley *et al* 2001; Pitchforth *et al* 2008). In the focus groups, women were asked how important access to pain relief was to them, and whether they would choose to deliver in a unit where they would have restricted access to epidural anaesthesia compared with a unit that offers full access. The topic guide served as a prompt, or cue, in the focus groups where women were asked to consider each aspect of care and its influence on their decision-making when presented with the choice of delivering in a CLU or MLU. Women were also given the opportunity to stray from the topic guide in order to capture other aspects of maternity care that were not anticipated during the development of the topic guide.

A thematic analysis was undertaken to evaluate the different aspects of maternity care that drive women's decision-making when choosing place of delivery. This analysis is considered a useful and flexible approach for qualitative research (Braun and Clarke 2006). Other analyses were deemed inappropriate given the objective of the study,

[24] Transcripts of the four focus groups are presented in Appendix A.2.
[25] The author led each focus group, and was accompanied by another researcher, consistent with best practice guidelines.
[26] The topic guide is presented in Appendix A.1.

such as grounded theory which is concerned with developing theories and concepts using a collection of qualitative data (Strauss and Corbin 1990). The thematic analysis followed five key stages to identify themes in the data (Braun and Clarke 2006).

Firstly, iterative reading of the transcripts and individual transcripts was undertaken. Secondly, codes were generated to describe salient and relevant themes. The relevant data items were collated in the third stage using mind maps and tables. The candidate themes were continuously refined during the fourth stage to ensure that an appropriate and coherent pattern was evident. This involves further coding and the generation of new themes through the amalgamation and removal of certain data items. The emerging themes and subthemes were defined during the fifth stage (Braun and Clarke 2006). The results from the thematic analysis are reported in the following section (section 3.3).

Ethical approval for this study was granted by the Clinical Research Ethics Committee (ECM4 06/03/12) and the Division of Obstetrics and Gynaecology in CUMH.

3.3 Results of the qualitative research

Information on participant characteristics is reported in section 3.3.1. The thematic analysis is described in section 3.3.2 and presents the results from the focus groups.

3.3.1 *Participant information*

Of the 196 women invited to participate in the study, contact was made with 168 women (85.7 per cent).[27] Thirty-seven women (22.0 per cent) agreed to participate in the focus groups; however, 19 women (11.3 per cent) were available during the

[27] Twenty-eight women either changed address or incorrectly specified their telephone number.

Table 3.1: Characteristics of focus group participants

Mean age in years (range)	32.3 (25-38)
Median number of births	1
Parity	
Nulliparous	9
Multiparous	11
Nationality	
Irish	14
Non-Irish	5
Coverage	
Public	11
Private	8
Sample size (*n*)	19

scheduled focus group sessions. Between three and seven women participated in each focus group. Participant characteristics are outlined in Table 3.1. Each group session lasted approximately one hour and thirty minutes.

3.3.2 *Thematic analysis*

During the course of the focus groups, participants described their preferences for various features of maternity care. Five themes were identified during the early stage of the analysis: health care provider (type of carer), fear of obstetric complications, fear of pain associated with childbirth, fear around timely access to vital services, and women's involvement in decision-making during labour. Through iterative refinements, the candidate set of themes were reduced from five themes to three, with three themes (fear of obstetric complications, fear of pain during labour, fears around access to vital services) collapsing into one single theme: fears around childbirth (Figure 3.1). Other themes were refined, while several subthemes are combined to represent emerging patterns within each theme. The three main themes identified in

this analysis were continuity of care (with either a doctor or midwife) from antenatal to intrapartum care; fears around childbirth; and freedom to exercise choice (Figure 3.2). These themes are reported separately in the following sub-sections.

3.3.2.1 *Continuity of care from antenatal to intrapartum care*

The first theme describes women's preferred health care provider and the importance of continuity of care from antenatal to intrapartum care.

Role of the midwife and obstetric doctor

Participants were asked about the role of the midwife and obstetrician during antenatal and intrapartum care. There were some differing views around participant's preferred health care provider; however, continuity of carer, provided by either a midwife or obstetrician, emerged in each area of discussion. Women who preferred midwife-led care felt that the midwife played an essential role during antenatal care and care during labour.

> *I think the midwife is very important, I mean they run the show really.*
>
> **Participant 3, multiparous, public.**

The importance and role of obstetric doctors during antenatal and intrapartum care varied between women with public coverage versus private coverage. Women with public coverage felt that there was a limited role for the obstetric doctor during antenatal and intrapartum care. These women had full confidence in the abilities of midwives and associated the obstetric doctor with adverse outcomes. Private participants, on the other hand, largely associated the obstetric doctor with positive outcomes, even in the absence of an adverse event. These women considered the role

of the obstetric doctor superior to the midwife. Continuity of care with their obstetric doctor during antenatal care provided these women with an added sense of security during labour.

> *I would say [the obstetrician is] crucial. And that's not taking from the role that the midwife has, when I was in [with my last delivery], the midwife that I had for the actual labour was fantastic. But all the time I was thinking 'when is he coming', you know, 'I hope he gets here before because', you know, I felt there was an added sense of safety, or re-assurance. Because he was the person that I had seen, you know, he knew me and I felt that, although that's the training that the midwife does, and again I'm not trying to take from that, but for me, if I'm to be honest, I was much more relaxed once I knew he was there.* **Participant 9, multiparous, private.**

Continuity of care with the midwife/obstetric doctor

Women who preferred a midwife to an obstetric doctor revealed a strong preference for continuity of care with the midwife from antenatal to intrapartum care. Many felt that having the same midwife care for them during antenatal and intrapartum care provided a sense of familiarity and reassurance. Those who were concerned about potential complications emphasised that having the same care provider alleviated their concerns since they were not required to repeat their obstetric history at every antenatal visit:

> *When I start to go to hospital in the first few weeks I prefer to [have the same midwife] to go into labour with. If I have a choice I prefer no change*

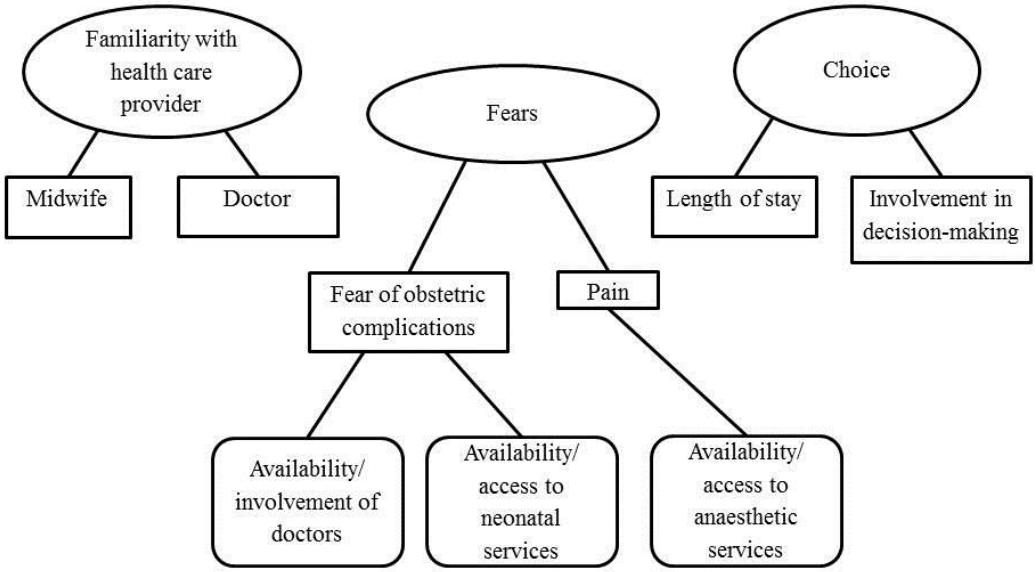


Figure 3.1: Refined thematic map depicting three main themes

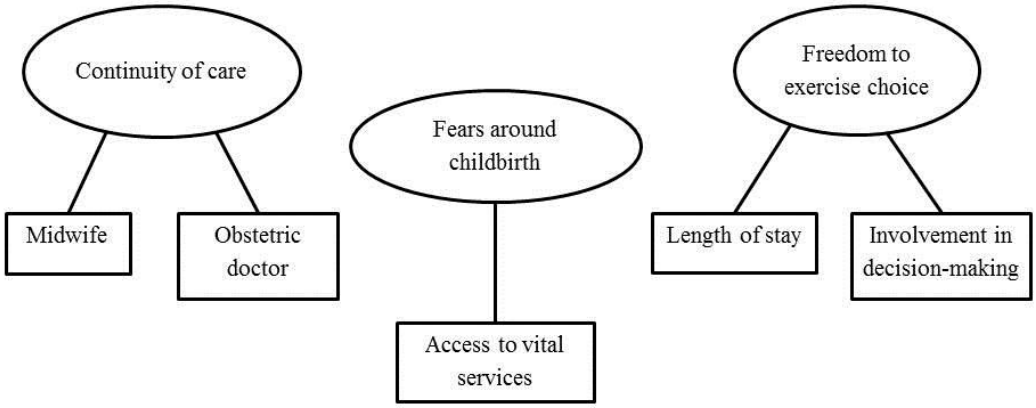


Figure 3.2: Final thematic map depicting three main themes

because it's more comfortable…I don't feel comfortable [with a new midwife each time] because I have to explain everything again. **Participant 8, nulliparous, public.**

Some private participants also revealed a preference for continuity of care with a midwife. However, they cited the inability of the public system to provide a sole midwife for the duration of their antenatal care as a major determinant in choosing private care.

I went privately for that reason. Because I felt I didn't want to be going in every week to see somebody else, somebody different. **Participant 9, multiparous, private.**

The second theme relates to fears around childbirth, and is presented below.

3.3.2.2 *Fears around childbirth*

Fears around childbirth dominated most sessions, and were a major determinant for many women when choosing place of delivery. Women were primarily concerned about timely access to vital services. Three sub-themes were identified: availability and involvement of obstetric doctors during labour, access to neonatal services, and access to pain relief. These sub-themes are explored separately below.

Involvement of obstetrics doctors during labour (fear of obstetric complication)

Many participants felt that the presence of obstetric doctors during labour provided a sense of relief, or safety. Some participants regarded the obstetric doctor as *"an insurance policy"*, *"safe hands"*, or *"most experienced"*. In many other cases

participants associated the presence of the obstetric doctor during labour with obstetric complications:

> *If he's called in then it's kind of like something…might need to be double-checked, like the heartbeat of the baby.* **Participant 12, nulliparous, public.**

> *A doctor coming into the room when you're in labour is the last thing you want to see. It's almost like seeing a grave digger coming.* **Participant 18, multiparous, private.**

This latter view was shared by some private participants, despite the fact that they were directly paying for their obstetric doctor to be actively involved in their intrapartum care.

> *It is the one time you hope you don't ever get value for money.* **Participant 18, multiparous, private.**

When asked whether they would be interested in delivering in a MLU where care is provided solely by midwives and no obstetric doctors are present, participants gave mixed responses. Some women simply expressed an aversion to MLUs due to a fear of obstetric complications and the subsequent need to be transferred to an obstetric unit in the event of a complication. The following comment highlighted timing as a main concern:

> *I'd be nervous about transit time if I had to be transferred, because when things go wrong they can go very wrong, very fast.* **Participant 3, multiparous, public.**

When they were informed that the transit time would be minimal as the obstetric unit was attached to the MLU through a connecting corridor, participants were somewhat reassured:

> *I wouldn't mind if it was a different location within the hospital.* **Participant 3, multiparous, public.**

Another participant said she would have no problem with that, remarking on its close resemblance with the current public system:

> *It is actually like that now. I mean unless there is a problem the doctor won't show up. So it's only the midwife, and the doctor is somewhere in the building on call.* **Participant 13, multiparous, public.**

Some private participants were averse to the idea of delivering in a MLU. Having spent a considerable amount of money on their care, some women felt they should have immediate and regular contact with their obstetric doctor during intrapartum care.

Availability of neonatal services (fear of neonatal complication)

Access to a paediatrician and a neonatal unit were cited as important determinants in choosing place of delivery. Two participants remarked that they chose to deliver in a large, tertiary maternity hospital outside their catchment area instead of their local maternity unit because of the hospital's wide ranging neonatal services, along with its reputation for care.

Participants were informed that neonatal services are typically provided in obstetric units; however, if they were delivering in an alongside MLU they would have to travel

slightly further to access these services. They agreed that once the services were on-site it would not discourage them from delivering in a MLU.

> *It's so important that people are there when you need them in an emergency…and if your baby has to go to the neonatal unit, then you're not in separate hospitals, that you can just come in and see them.* **Participant 3, multiparous, public.**

Access to pain relief (fear of pain)

Fear of the pain associated with labour and childbirth emerged in each focus group, as best summarised in the following comment:

> *My biggest fear is not getting the epidural on time. I've heard horrific stories of people not getting it in time and then they're at nine, ten centimetres and they're told they can't get it now, so that is my biggest fear. And I've heard people say that as soon as you come in start screaming for the epidural, which I am going to do.* **Participant 12, nulliparous, public.**

Almost universally, women feared pain; however, there appeared to be a heightened sense of fear among nulliparous women, most likely arising from their lack of experience.

> *I'm just really terrified about the idea of pain.* **Participant 12, nulliparous, public.**

Most women felt very strongly about delivering in a unit that had the epidural anaesthesia. This was a major feature of maternity care that influenced women's

decision-making when choosing place of delivery. One participant commented that she did not want to deliver without the epidural:

> *I just can't imagine going without it…please god, just let me have access.*
>
> **Participant 2, nulliparous, private.**

One nulliparous woman was averse to the epidural given her preference for a quick recovery time and dislike of needles.

> *I'd love not to have the epidural because I'm all about the recovery time.*
>
> *And I don't like the needle that goes into your back, I'm a bit squeamish.*
>
> **Participant 16, nulliparous, private.**

When presented with the option of delivering in a MLU, where they would have full access to all methods of pain relief except the epidural and they'd have to be transferred to an adjoined obstetric unit to receive the injection if it became necessary, most women expressed a preference for CLUs:

> *Labour isn't anyone's finest hour and if one had to be transferred…going on a lift and through a public area in the throes of labour…no.*
>
> **Participant 7, multiparous, public.**

Other participants felt that once the MLU was alongside the CLU they would have no problem with it.

> *If I had to walk through mines I would have done it if it meant that there was going to be light at the other end of the tunnel.* **Participant 9, multiparous, private**

I think you'd go to the edge of the world if you're in enough pain for the epidural. **Participant 4, multiparous, public.**

One woman who was on her third pregnancy and whom had received an epidural in each of her previous deliveries declared an interest in midwifery-led care for her upcoming delivery. The participant believed that reliance on epidural would be minimised in a MLU:

I think I could [deliver in a MLU with restricted access to the epidural]. Not for my first baby, definitely not for my second baby, but at this stage yeah I'd be interested in giving it a go. Because I think the midwives can give you a huge level of support. I think they'd go all in and I think that you would have a better chance of getting through it without an epidural. **Participant 18, multiparous, private.**

The final theme then relates to maternal choice, as introduced below.

3.3.2.3 *Freedom to exercise choice*

The freedom to exercise choice during intrapartum and postpartum care was important to all participants. Two sub-themes were identified within this theme and describe women's preferred role in the decision-making around their labour, and women's preferred length of stay in hospital after the birth of their baby. Both sub-themes are described separately below.

Involvement in decision-making during labour

All participants acknowledged that certain decisions require medical expertise, such as the decision to have an emergency Caesarean section. Participants were happy to

leave these decisions in the hands of their health care provider given their lack of medical expertise, but some expected to be kept informed at every stage of the process. Few participants did not want to be kept informed. The youngest participant revealed a preference to remain ignorant throughout her entire labour. Her lack of medical knowledge and abiding trust in the medical staff provided her with enough assurance that she did not need to be informed or involved in decision-making.

> *I think they kind of know what's best though...at the end of the day they're not going to do something for no reason, they're going to do what's right for the baby, or they're going to do what's right for you.* **Participant 4, multiparous, public.**

The majority of participants felt that they should be involved in the decision-making around other aspects of their labour, such as pain relief.

> *I think it's important to make those decisions yourself because you're the person that's going through the pain.* **Participant 7, multiparous, public.**

Length of stay in hospital after birth

Having the option to choose the duration of their stay in hospital after the birth of their baby was an important issue for many participants. The preferred length of stay differed across all women, ranging from six hours to three days. Previous obstetric experience often dictated women's preferences, with those who had given birth before revealing a preference for shorter stays in hospital. One participant who is expecting her fourth child said she would prefer to return home in as few as three to six hours after giving birth *"provided everything is ok."* Expectant first-time mothers revealed

a preference for extended durations of stay, citing inexperience and/or concerns about breastfeeding as the main factors behind their preference.

The following section (3.4) provides a discussion of the qualitative findings

3.4 A discussion of the qualitative findings

To the best of the author's knowledge, this is the first qualitative study to explore women's preferences for alternative models of maternity care in Ireland. Three themes emerged from the data: continuity of care; fears around childbirth; and freedom to exercise choice during intrapartum and postnatal care. Consistent with previous literature, continuity of care is identified as an important feature of maternity care irrespective of midwifery- or consultant-led care (Byrne *et al* 2010; Hundley and Ryan 2004). In this study, many participants revealed a willingness to pay for private care to avoid the public system where continuity of care is not guaranteed. Fears around childbirth, in particular fears around timely access to obstetric doctors, pain relief, and neonatal services, dominated all four focus groups and emerged in each session without prompt by the facilitator. Such safety concerns have been previously identified as major influences on women's decision-making when choosing between midwifery- and consultant-led care (Byrne *et al* 2010; Hundley and Ryan 2004; Shahoei *et al* 2014).

These different themes reveal a considerable amount about women's preferences for care in Ireland and the trade-offs women face when choosing place of delivery. For instance, continuity of care and fears around timely access to medical services are important to most participants. In a MLU, continuity of care with the same midwife is assured whereas it may occur unintentionally in a CLU. When presented with the

choice between delivering in a MLU or a CLU, women have to weigh up the benefit of assured continuity of care in a MLU against the cost of reduced access to medical services such as an obstetrician or epidural anaesthesia, which are immediately available in a CLU.

Informative discourse between the health care provider and woman in the presence of maternal choice is important in maternity care. Fears around timely access to vital services are a dominant theme in each focus group. These fears could be addressed with informative dialogue between the health care provider and pregnant woman about the risks associated with delivering in a MLU, and the length of transit time from the MLU to a CLU. For instance, a randomised controlled trial found that there was no significant difference between adverse outcomes in a MLU and CLU in Ireland and average transit time from the MLU to the CLU took 0-15 minutes (Begley *et al* 2011; MidU 2009). Although 17 per cent of women delivering in the MLU were transferred to the adjoined CLU, these included minor indications, such as temporary transfer for an epidural upon maternal request (Begley *et al* 2011; MidU 2009). When women in the focus groups were informed that essential medical services would still be available on-site, their reservations about midwifery-led care relaxed with some participants declaring a preference to deliver in a MLU.

The policy implications arising from these results are immense. Whether women choose to deliver in a CLU or MLU, their greatest concern involves minimising risk. This suggests that women may prefer MLUs when co-located with existing CLUs. While safety concerns largely influence women's preferences, the results also suggest that women do not have a clear preference for either model of care, but rather a hybrid model of care which encompasses features of both consultant- and midwifery-led care.

Women expressed a preference for continuity of care with a midwife with many women opting for private care given the public system's inability to assure continuity of care. Women then want to deliver in a maternity care setting where the full range of medical services is immediately available or available on-site. This suggests that the DOMINO scheme may be preferred by maternity users as it closely resembles the preferences presented here (Murphy 2012).

3.5 Conclusion

This chapter presents the results from the qualitative exploration of maternal preferences, and provides a brief interpretation of the study's findings. A broader discussion of the results is presented in Chapter 8. The data are subsequently used to inform the quantitative analysis of maternal preferences through the DCE and CVM. The following chapter describes the various stages involved in designing, analysing, and interpreting the DCE and CVM.

4 A QUANTITATIVE INVESTIGATION OF MATERNAL PREFERENCES

4.1 Introduction

In the absence of a market demand curve, SP techniques are used to observe expected market behaviour. Invoked through surveys or experiments, consumer behaviour is analysed by presenting respondents with a hypothetical scenario and asking them to infer their expected market behaviour as if the market actually exists. Chapter 3 critically reviewed two SP techniques: the DCE and the CVM. Both SP techniques are employed in this analysis to investigate women's preferences for maternity care in Ireland, and infer a monetary valuation of consultant- and midwifery-led care. The CVM data are then incorporated into a formal CBA. This chapter describes the various stages undertaken to conduct the DCE and CVM. The various stages undertaken to design and analyse the DCE are presented in section 4.2. The CVM is reported in section 4.3 and focuses on the design and analysis of the SP technique. Each section describes the sample obtained for analysis. In section 4.4, these samples are compared with the focus group participants and general obstetric population to describe the representativeness of the data. Section 4.4 concludes this chapter.

4.2 Discrete Choice Experiment

Lancsar and Louviere (2008) outline three stages involved in designing, analysing, and interpreting a DCE: experimental design (4.2.1), discrete choice analysis (4.2.2), and welfare measures and other policy analyses (4.2.3). These stages are described separately below.

4.2.1 *Experimental design*

This section reports the different stages involved in designing the DCE. Specific consideration is given to the choice process (4.2.1.1), the identification of attributes and levels (4.2.1.2), the selection of an appropriate experimental design (4.2.1.3), and pilot testing (4.2.1.4).

4.2.1.1 *The choice process and format*

In order to reveal true preferences, the discrete choice must be incentive compatible (Carson *et al* 2000). That is, the choice format must accurately reflect the choices faced by respondents in the real world. At hospital level women may choose between care in a CLU and care in a MLU. In a CLU the full range of medical services including obstetric, neonatal, and anaesthetic care is available. Access to medical services is restricted in an alongside (adjoined) MLU. In the event of an obstetric complication, which requires medical attention, women are transferred to an adjoined CLU. Under the Maternity and Infant Care Act 1970, women may receive their maternity care free of charge in a public setting. Alternatively women may opt for private care, where they pay an out-of-pocket payment to a consultant, thereby receiving their care in a CLU. Ultimately, if women wish to receive their care in a secondary setting they may choose between two models of care; where one model includes two different care paths: public and private. Therefore, women have a choice between three different maternity care services: care in a MLU, care in a CLU, or private care in a CLU.

This study is concerned with the public system as midwifery-led care is only provided publicly. The inclusion of private care in the DCE distorts the comparison between midwifery- and consultant-led care because private care offers advantages not

provided in the public system, such as continuity of care with an obstetrician. Private care is excluded from this analysis.[28] Home birth care is also excluded from the choice format as this study focuses on women's strengths of preferences for care at hospital level.

The choice format assumed in this analysis is similar to that faced by women in the real world. Women are presented with two competing alternatives, with an opt-out, or 'Neither', alternative included. The opt-out option does not describe an alternative model of care such as home birth care or private care, but rather 'keep on shopping'. The benefits of including an opt-out option in a DCE are well defined: consumers' choices are often more accurately described, design efficiency is improved, and market uptake may be measured in the context of the entire market (Anderson and Wiley 1992; Louviere and Woodworth 1983). However, information on the relative attractiveness of the available alternatives in a choice set is lost when this alternative is selected. A solution to this information loss lies in the dual response choice (DRC) format (Brazell *et al* 2006). The DRC is a relatively new feature in DCEs, and has only recently been applied in the health economics literature (Pedersen *et al* 2012). Using a two-stage approach, the DRC first presents respondents with an unforced choice scenario, or a choice set that includes an opt-out alternative. If the opt-out alternative is selected respondents are subsequently asked to evaluate the original alternatives in a forced choice scenario (i.e. without an opt-out alternative). This ensures that any information loss arising from the inclusion of the opt-out alternative

[28] The decision to exclude private care was made after iterative pilot testing showed that its inclusion distorted the DCE. For more information see section 4.2.1.4.

is captured in a follow-up question. The DRC is applied in the DCE undertaken in this analysis.

Since the goal of the DCE is to measure women's strengths of preferences for the different attributes, the alternatives are assigned generic descriptions (Maternity Service A and B, respectively). This approach minimises inherent biases associated with labelling alternatives (i.e. the endowment effect), which is found elsewhere in the maternity care literature (Ryan and Ubach 2003; Salkeld *et al* 2000). The opt-out option is described as 'Neither A nor B'.

4.2.1.2 *Identifying attributes and levels*

A major theoretical foundation of the DCE is Lancaster's (1966) economic theory of value. Lancaster (1966) argued that consumers do not demand a good based on its holistic value, but instead are influenced by the various properties, or attributes, that define the good. Since the systematic component of the utility function is directly influenced by attributes on offer, the merit of a DCE hinges on the identification of appropriate attributes and levels (Lancsar and Louviere 2008; Ryan 1996).

There are a number of ways to develop and define attributes and levels. They may be defined by reviewing existing literature, or conducting interviews, focus groups, or patient surveys (Coast *et al* 2011). Reviewing existing literature and developing *ad hoc* attributes may lead to biased and unreliable results. Surveying consumers about the factors that directly influence their decision-making is expected to generate more robust results. The gold standard approach is to use qualitative research to inform attribute development (Coast *et al* 2011). This study adopts this approach and

undertakes focus groups. The results of the qualitative research are presented in Chapter 3.

Three main themes were identified in the qualitative analysis: *continuity of care from antenatal to intrapartum care*, *fears around childbirth*, and *freedom to exercise choice*. The thematic analysis generated five attributes (Table 4.1). The first theme describes one attribute: continuity of care with the same midwife from antenatal care to care during labour. Two attributes are captured in *fears around childbirth*: involvement of obstetric doctors during labour and types of pain relief immediately available.[29] The final theme, *freedom to exercise choice*, encapsulates two attributes: women's role in decision-making during labour and women's preferred length of stay in hospital after delivery. A price proxy is also incorporated into the DCE to calculate women's marginal WTP for maternity care.

The levels for each attribute are defined by current practice, informed by the focus groups, or instructed by expert opinion. Two levels are identified for the attribute 'guaranteed continuity of care with the midwife'. In both a CLU and MLU one-to-one care is provided by a midwife for the duration of antenatal and intrapartum care. In a MLU, women are typically guaranteed continuity of care with the same midwife (MidU 2009). This cannot be guaranteed in a CLU, but may occur unintentionally. Two levels are defined for the second attribute and describe care in a CLU and MLU, respectively. In a CLU obstetric doctors are involved in women's care in the event of a complication. Since care in a MLU is provided solely by midwives, obstetric doctors cannot be involved during intrapartum care but are available on-site in the event of an

[29] A fear around access to neonatal services was identified in the focus groups, however, neonatal services are provided on-site in both a CLU and MLU. Since this feature of care does not vary across either model of care it is excluded from this analysis.

obstetric complication, requiring a short distance transfer to an alongside CLU. 'Types of pain relief available' has two levels which derive from current practice where the provision of epidural anaesthesia describes care in a CLU and a birthing pool describes care in a MLU.

Evidence from the focus groups suggests that women have varying preferences about their role in the decision-making around their labour. Participants identified two levels: to be kept informed and actively involved in decision-making; to be kept informed with all decision-making devolved to staff. A small number of participants revealed a preference to remain ignorant; however, current practice encourages medical staff to keep women informed, therefore this level was not included. Women's preferred length of stay in hospital varied according to parity, with experienced maternity users preferring shorter stays, ranging from six hours to one day. First-time mothers indicated a preference for extended stays in hospital. Four levels are assigned to this attribute, and describe a 6, 24, 48 and 72 hour postnatal stay.

Finally, the WTP attribute contains four levels. Since maternity care is free in Ireland, there are no established prices for care in a CLU or MLU. Price levels are available for private care, but these prices represent a superior level of care. This analysis employed an iterative approach to defining price levels using focus groups and pilot testing. The levels assigned to the attribute include €100, €500, €1,000, and €1,500. These values repeatedly emerged during the focus groups and pilot testing. Given women's familiarity with assigning a price level to private care, the WTP attribute is described in terms of an out-of-pocket expense.

Table 4.1: Attributes and levels

Theme	Variable	Attribute	Levels	Hypothesis
Continuity of care from antenatal care to intrapartum care	*continuity*	Guaranteed continuity of care with the same midwife from antenatal care to care during labour	Yes (coded +1) No (coded -1)	+
Fears around childbirth	*obdocs*	Involvement of obstetric doctors during labour	Yes (coded +1) No (coded -1)	+
Fears around childbirth	*painrlf*	Types of pain relief immediately available	Gas and air, Pethidine, and Epidural (coded +1) Gas and air, Pethidine, and Birthing Pool (coded -1)	+
Freedom to exercise choice	*decmak*	Your role in decision-making during labour	You are informed and involved in decisions (coded +1) You are informed, but not involved in decisions (coded -1)	+
Freedom to exercise choice	*los*	Length of stay in hospital after birth	6 hours 24 hours 2 days 3 days	+/-
Included to calculate WTP	*cost*	Cost of care (out-of-your-pocket)	€100 €500 €1,000 €1,500	-

Notes:
Abbreviations: WTP, willingness to pay.

4.2.1.3 *Experimental design*

The process of combining attribute levels to describe different hypothetical profiles, or alternatives, is known as experimental design (Amaya-Amaya *et al* 2008). There are a number of ways to construct profiles and assign them to choice sets. It can be done using catalogue design, software packages such as SAS, SPSS, SPEED, or NGENE, or by 'hand' (manually). This analysis constructs profiles and arranges them into choice sets using NGENE software (ChoiceMetrics 2012).

The DCE has six attributes, four with two levels and two with four levels. There are a total of 256 profiles arising from the complete factorial design ($2^4 \times 4^2 = 256$). As this is too many scenarios to use in an empirical study, an orthogonal fractional design, or simply orthogonal design, is used. A subset of 32 profiles is generated using an orthogonal main effects design in NGENE. This design estimates main effects only between attributes, with interactions assumed negligible. The total number of choice sets is 16. The choice sets are paired using a generic design that maximises D-efficiency through orthogonality, level balance, and minimal overlap (Zwerina *et al* 1996; Kuhfeld 2003). NGENE generates a design with 97% D-Efficiency, and includes no dominating alternatives or replicated sets. Women are given the following excerpt and asked to reveal their preferred option in each of the next 16 scenarios:

> *You are due to have a baby. Where and how you would like to have your baby is up to you.*
>
> *For the purposes of this questionnaire, you are asked to choose between different hypothetical packages of maternity care in each of the following 16 scenarios. Please note that these are hypothetical packages of care. They describe maternity care using important features of antenatal care, postnatal care, and care during labour. In each of the next 16 scenarios, these maternity care packages are somewhat varied. In each scenario, please indicate your preferred maternity care package (i.e. A, B, or neither).*
>
> *We are also asking you to consider how much you would be willing to pay for each package of care. Please note that maternity care is free, and will remain free. What we are trying to find out is how much value you place on maternity care. One way to find out how much you value maternity care is to ask you how much would you be willing to give up of your own money to receive a particular maternity care service.*
>
> *Please indicate your preferred maternity care service in each choice scenario.*

A sample choice set is presented in Figure 4.1. To aid women's understanding of the different attributes and levels, a definition of each is provided alongside the choice sets, as presented in Appendix B.3.

4.2.1.4 *Pilot testing the DCE*

Four pilot studies of the DCE were undertaken to assess the appropriateness of attributes and levels, validity, experimental design, response rate and length of time taken to complete the survey, among other aspects of the survey, such as layout and presentation. Over the course of the pilot studies, the DCE was revised and a number of changes were made to the layout and presentation, among other aspects of the DCE. The language used to describe the different scenarios was made more user-friendly and neutral, while the survey was converted from an A4 staple copy to an A5 booklet with a cover design. A memorable acronym was developed to emphasise the importance and professional nature of the study: Maternal Assessment of Maternity Services in Ireland, or MAMS. Table 4.2 describes the lessons learned over the course of the four pilot studies and subsequent changes made to the DCE to improve the realism of the task to respondents and validity of the experiment. The DCE and CVM are included in the same survey and share similar pilot studies. Information on the pilot studies of the CVM are presented in section 4.3.

In the first two pilot studies, a random sample of 50 women, who recently had their first scan (12 weeks), were invited to participate in the study. The response rate from the first pilot study was 30 per cent with one reminder, which is considerably less than

Which maternity care service do you prefer (A, B, or Neither A nor B)?

	Maternity Care Service A	**Maternity Care Service B**
Guaranteed continuity of care with midwife	Yes	No
Involvement of obstetric doctors during labour	No	Yes
Types of pain relief immediately available	Gas and Air, Pethidine, and Epidural	Gas and Air, Pethidine, and Birthing Pool
Your role in decision-making during labour	You are informed, but not involved in decisions	You are informed and involved in decisions
Length of stay in hospital after birth	6 hours	2 days
Cost of care (out-of-your-pocket)	€1,000	€500

Which service do you prefer (A, B, or Neither A nor B)?

(Please tick <u>one</u> box) **A** ☐ **B** ☐ **Neither A nor B** ☐

[Answer only if you selected 'Neither A nor B']

If you could only choose between A or B, which one would you choose?

(Please tick <u>one</u> box) **A** ☐ **B** ☐

Figure 4.1: Sample DCE choice set

other DCE postal surveys (Wagner 2001; Institute 2011). The pilot compared three packages of maternity care where private care was included as a fixed alternative, or opt-out alternative, in each of the choice sets. It was expected that women would rarely, if ever, choose this package of care as the price attached to private care was

Table 4.2: Description of lessons learned during pilot studies of the DCE

Pilot	Location	Distribution method	Number of surveys distributed	Response rate	Lessons learned/changes made
Pilot 1	CUMH	Postal	50	15 (30%)	o Language not user friendly o Poor presentation o Problems with private care alternative o Poor representation of midwifery-led care
Pilot 2	CUMH	Postal	50	30 (60%)	o Language made more user friendly o Presentation improved o Price of private care increased o Two surveys developed (one with private care and another without) o Two additional attributes included, developed from literature and focus groups o Internal validity test employed
Pilot 3*	CUMH, OLOL, CGH, UHG, St.Luke's	Postal	750	255 (43%)^	o Private care excluded due to problem with superiority over public care o DRC format explored o Problems with collinearity encountered o Presence of irrelevant attributes
Pilot 4†	CUMH	Self-completion	50	37 (74%)	o Number of attributes reduced due to insignificance o Experimental design with reduced number of attributes tested o Problems with collinearity and significance tested and resolved

Notes:

* This pilot study was distributed with the main CVM study.

^ This response rate is based on a distribution of 600 surveys: UHG were removed from the study due to a sampling error; local investigators mistakenly distributed the survey to women who had already given birth.

† 50 surveys were distributed to 50 women waiting for antenatal appointment in the antenatal clinic in CUMH;

Abbreviations: MAMS, Maternal Assessment of Maternity Services; DRC, dual response choice; CUMH, Cork University Maternity Hospital; OLOL, Our Lady of Lourdes Hospital Drogheda; CGH, Cavan General Hospital; UHG, University Hospital Galway; NMH, the National Maternity Hospital, Dublin.

considerably high (€3,000). Moreover, women had already revealed a preference for public care; only women delivering in the public system were invited to participate in the study. However, since private care is superior to public care the majority of respondents indicated a preference for this package of care in almost all scenarios.

A second pilot was undertaken to address these problems. Two additional attributes were incorporated into the DCE to better represent midwifery-led care: average waiting times at each antenatal visit and homeliness of the delivery room. While the inclusion of private care in the original pilot study distorted the aim of the DCE, a decision was made to design two DCEs and compare the results: one with private care and one without. The price of the private package of care was also increased to €3,500, which is more illustrative of the price of private care in Ireland. The results from the DCE that included the private package of care improved considerably, although many respondents continued to select private care as their preferred scenario. In the other DCE, women engaged with each choice set and judged each package of care on the merit of its combined levels.

The response rate from the second pilot was 60 per cent, with a higher response rate among the group that received the DCE without private care (64 per cent). The opt-out response rate in the first pilot was 10 per cent, compared with no opt-outs in the second pilot. Women received three reminders over the course of two months.

Based on the results of the second pilot a decision was made to exclude private care. Its inclusion distorted the DCE where the overarching aim was to investigate women's preferences for care in the public system.

A third pilot study was undertaken to assess preferences under forced and unforced choice scenarios. While private care was excluded from the DCE, an opt-out option, or 'Neither' option, was included using the DRC. The pilot study was distributed to 750 women across five maternity units as part of the main study of the CVM. The results from the third pilot study were analysed using Stata v.12 (StataCorps 2011b), and the number of attributes in the DCE was subsequently reduced due to insignificance and complications with collinearity.[30]

A fourth pilot study was undertaken to assess the empirical properties of the new experimental design which contained fewer attributes. The survey was distributed to a sample of 50 women who were waiting at an antenatal clinic in CUMH. Thirty-seven responses (74 per cent) were collected at the end of the clinic. The data were analysed using Stata v.12 (StataCorps 2011b) where each of the attributes was found to be statistically significant, and problems with collinearity were resolved. Participants reported that it took 15-20 minutes to complete the survey.

The pilot studies were also used to assess the validity of the DCE (Amaya-Amaya *et al* 2008). This analysis employed Sen's (1993) rational choice tests which examine the internal consistency of respondents' choices. Sen (1993) outlined two rationality tests: contraction property (CP) test and expansion property (EP) test. The CP test involved asking respondents to choose between a set of three alternatives (A, B, or C). The test included one dominant alternative, which had better levels for at least one attribute and no worse levels for any attribute. This scenario was reduced to two alternatives in a non-consecutive choice set. The test was satisfied if the respondent

[30] Initially, it was hoped that this round of data collection would comprise the main study, but due to iteration of pilot issues discussed above, it was clear further testing was required.

selected the dominant alternative, which in this case was Maternity Care Package A, in the first test and did not choose Maternity Care Package B in the contracted test. The EP test was designed similarly. Reassuringly, respondents satisfied each of the rationality sets in all but one case. One respondent failed the EP test in the DCE that contained private care (second pilot study). However, fatigue may have played a contributory role as the EP test was included as the 16th and final choice set. Since the rationality tests suggest that women were rationally engaging with the DCE, the tests were removed from the main study.

4.2.2 *Discrete choice analysis*

A DCE has a number of uses. It may be used to explore strengths of preferences, trade-offs, and MRS. There are various discrete choice models that can be employed to analyse preferences, as described in Chapter 2 (section 2.5.2.5). The DCE undertaken in this study has a number of objectives, as outlined below.

4.2.2.1 *Search for best specification of preferences on the unforced choice*

Different discrete choice models are employed to analyse women's preferences for maternity care. A standard conditional logit (CL) model is used initially to analyse preferences. The individual choice probability for the CL model is given by the logit specification, described in Chapter 2 (Eqn. 2.10). The CL model is used as a 'benchmark' model to investigate how preferences change given changes in assumptions about respondents' choices. In the first instance, two separate CL models are estimated to identify the best specification of the quantitative attributes (cost and length of stay). These models test the linearity of the quantitative variables by first estimating a model where the attributes are treated continuously, with a separate model

estimated where the attributes are treated qualitatively (effects coded). Ensuring that the cost attribute is linear is important for subsequent willingness to pay estimations.

The CL model is then compared with more flexible models to assess assumptions about women's preferences. An important limitation of the CL model lies in the property of independence of irrelevant alternatives (IIA), which assumes perfect substitutability across alternatives. Since certain alternatives within a choice set may be closely correlated with each other, the assumption that the choice probabilities are proportionately affected when a new alternative is introduced may be unrealistic. This assumption may be relaxed by using the nested logit (NL) model where IIA must hold within nests, but not across them. The NL model generates a dissimilarity parameter (λ), or inclusive value, that describes the degree of independence between each alternative within a nest. In order for the NL model to be consistent with random utility theory the dissimilarity parameter must lie between $0 < \lambda \leq 1$ (McFadden 1978). The choice probability is given by:

$$P_{i(g)n} = P\ (nest\ g) \cdot P(i, \text{given nest } g) \qquad (4.1)$$

where the probability of choosing alternative i from nest g for individual n is dependent on the probability of i coming from nest g. This two stage decision process includes two levels of analyses within the NL model. At the higher level, certain factors (or demographics) are assumed to influence which nest an individual chooses, while at the bottom level, the same attributes underline the utility function for each nest (Amaya-Amaya *et al* 2008).

The NL model is especially attractive given the inclusion of an opt-out option which may be fundamentally different to the two other alternatives on offer. It is possible

that respondents adopt a two-stage decision-making process by first deciding whether or not they want to consume a maternity care alternative (A/B versus Neither), and then which maternity care alternative they would prefer (A versus B). Therefore, the two experimental alternatives and the opt-out option would belong to two different nests where the property of IIA must only hold within the nests. The CL model with an alternative specific constant (ASC) for the opt-out option is compared with the NL model to identify which model best accounts for the unobserved data-generation process (Haaijer *et al* 2001).

4.2.2.2 *Analysis of the dual response choice (DRC) format*

The dual response choice (DRC) format has two functions. First, the DRC is used to identify which discrete choice data should be used for the estimation of women's preferences (i.e. unforced choice scenario, forced choice scenario, or a merged dataset of both). A CL model is used on the unforced and forced choice scenarios separately. The unforced choice scenario is then reduced to a pairwise (or forced) choice scenario where the opt-out option is excluded. This pairwise dataset is merged with data from the forced choice scenario and estimated using a CL model, similar to other analyses (Brazell *et al* 2006; Collins and Rose 2013; Pedersen *et al* 2012).

These models are compared with the 'benchmark' model to identify the discrete choice data that should be used for further analysis. The models are compared in terms of "information". Since discrete choice data are based on the log likelihood function, information criteria are available on Akaike's information criteria (AIC) and Bayesian information criteria (BIC) (StataCorps 2011a).

$$AIC = -2lnL + 2k \qquad (4.2)$$

$$BIC = -2lnL + klnN \quad (4.3)$$

where lnL is the maximised log-likelihood, k is the number of parameters being estimated, and N is the sample size. In both cases, the best fitting model is the one with the lower AIC and BIC values (StataCorps 2011a).

The second function of the DRC is to examine choice consistency. Since the DRC is a relatively new development in the DCE literature, there is a paucity of research examining the effect of this approach on choices. This analysis contributes to the growing body of work on the DRC format by examining choice consistency across the unforced and forced choice scenarios (Brazell *et al* 2006; Collins and Rose 2013; Giergiczny *et al* 2013; Pedersen *et al* 2012). It is likely that choices made in the forced choice scenario differ to choices made in the unforced choice scenario as motivations and interest wane after the initial task (Giergiczny *et al* 2013; Collins and Rose 2013). To allow for scale differences in parameters arising from the two different datasets (unforced and forced choice), a heteroscedastic CL model is estimated, similar to other analyses (Collins and Rose 2013; Pedersen *et al* 2012). This heteroscedastic CL model tests the consistency of choices across the two choice scenarios.

4.2.2.3 *Exploring preferences using a flexible discrete choice model*

Another limitation of the CL model relates to random taste variation. The standard CL model estimates fixed effects only, and assumes that elicited preferences are representative of the entire sample (Amaya-Amaya *et al* 2008). However, it is unlikely that individuals derive the same utility from each of the attributes on offer. Heterogeneity in preferences may be observed using a flexible model such as the

random parameters or mixed logit (MXL) model (Eqn. 4.4). For any individual the choice probability is:

$$P_{ni}(\theta) = \int L_{ni}(\beta) f(\beta|\theta) d\beta \qquad (4.4)$$

where β_n are random variables and θ are the parameters of the distribution. The MXL model generates mean utility estimates for each attribute, and standard deviations of the random coefficients to reflect heterogeneity among individuals in the sample.

Using the appropriate dataset, a number of MXL models are estimated to identify the best specification of women's preferences. In the first instance, the MXL model is specified with one random attribute. This is increased in subsequent models until the model which best describes women's preferences is estimated. Different specifications of the cost attribute are also assumed (i.e. normal versus lognormal distribution).

MRS are calculated for each of the attributes against the cost attribute (Ryan *et al* 2008b) (Eqn. 4.5). This generates information on women's marginal willingness to pay for a specified level of an attribute in the DCE. The WTP calculations are performed in Stata v.12 using the Delta method (Hole 2007; StataCorps 2011a).

$$WTP = \beta_K / -\beta_{priceproxy} \qquad (4.5)$$

Two factors are assumed to influence women's preferences: previous obstetric experience and geographic location. The literature suggests that experience plays a considerable role in influencing preferences (Ryan and Ubach 2003), particularly within maternity care where women are more likely to choose a service if they have experienced it (Cartwright 1979). This analysis investigates this finding in an Irish context. Previous literature suggests that preferences are also driven by inexperience,

or knowledge of a service's availability (Ryan and Ubach 2003; Salkeld *et al* 2000). The two maternity units present an interesting opportunity to assess whether preferences differ across two geographic locations where the type of service provided in each region differs. In CUMH, the only model of care on offer is consultant-led care. In the NMH, a hybrid model of care, which encompasses features of both consultant- and midwifery-led care is provided. This analysis investigates whether preferences are driven by the type of service provided in each region; that is, are women from CUMH likely to prefer consultant-led care than women from the NMH who may have stronger disposition towards midwifery-led care. To investigate whether these factors influence preferences, a series of subgroup analyses are performed, with MRS calculated for each model.

This section (4.2.2) focussed on the estimation of preferences using discrete choice analysis. Several objectives are contained in this analysis, as outlined above, and certain factors that are assumed to influence preferences are tested in an Irish context. The DCE has several other objectives relating to welfare measures and policy analysis. These objectives are the focus of section 4.2.3.

4.2.3 *Welfare measures and policy analysis*

A DCE may be used to explore state-of-the-world models, predict market uptake, and measure welfare change (Lancsar and Savage 2004; Ryan 2004). This DCE explores each of these separately below. To the best of the author's knowledge, this represents the first application of welfare measures and policy analyses within maternity care.

4.2.3.1 *State-of-the-world models*

An individual has the following utility function:

$$V_i = \beta_{continuity}X_1 + \beta_{obdocs}X_2 + \beta_{painrlf}X_3 + \beta_{decmak}X_4 + \beta_{los}X_5 + \beta_{pay}X_6$$

(5.6)

where V is the utility of individual *i*, $\beta_{continuity}$, β_{obdocs}, $\beta_{painrlf}$, β_{decmak}, β_{los}, and β_{pay} are the estimated parameters of the model, and $X_1 - X_4$ are dummy variables (effects coded) and X_5 and X_6 are continuous variables. Utility scores may be estimated for a combination of attributes, or packages of care (Ryan *et al* 2008b). Three different combinations of attributes are generated to reflect care in a CLU, care in a MLU, and DOMINO care, respectively.[31] Care in a CLU describes discontinuity of care with the same midwife, immediate access to an obstetric doctor and epidural anaesthesia, limited involvement in decision-making, and 48 hours length of stay; care in a MLU describes guaranteed continuity of care with the same midwife, limited access to obstetric doctors and epidural, greater involvement in decision-making, and 24 hours length of stay; DOMINO care describes continuity of care with the same midwife, immediate access to an obstetric doctor and epidural anaesthesia, limited involvement in decision-making, and 6 hours length of stay. Individual WTP for each specific state-of-the-world, or package of care, is calculated using 1,000 draws from a standard normal distribution (Train 2002):[32]

$$WTP = \frac{1}{-\beta priceproxy}\ (V_j^1 - V_j^0) \qquad (4.7)$$

[31] While DOMINO care is not evaluated in the CBA, it is investigated here to calculate women's WTP for this package of care; model potential utilisation; and calculate the welfare change arising from its potential introduction in Ireland, which is useful from a policy perspective.

[32] This involves drawing β from $g(\beta|b, W)$, where W is the covariance of β_n. β is drawn from a random number generator for a standard normal distribution: $\beta = b + s.z$

where V^1describes the combination of levels describing a package of care, relative to its alternative, V^0 (Ryan 2004).

These individual WTP estimations are useful in determining the exact value women place on each model of care. It is possible to estimate the welfare change arising from the introduction of midwifery-led care, for instance, using state-of-the-world models. However, these models assume that individuals will utilise the new service with certainty. It is also possible to measure welfare change arising from the provision of midwifery-led care alongside consultant-led care. This involves predicting market uptake and weighting the benefits of both alternatives by the probability of uptake. Predicting market uptake is the focus of the next section (4.2.3.2). This information is then used to measure welfare change (section 4.2.3.3).

4.2.3.2 *Predicting market uptake*

State-of-the-world models assume that there is only one alternative on offer, and that an individual will consume that alternative with certainty (Ryan 2004; Ryan *et al* 2008b). It is more likely that there are multiple options, and the likelihood of an individual consuming an alternative depends on the utility associated with all other alternatives on offer. The probability that an individual will choose an alternative is given by the logit specification (Eqn. 2.10). This analysis predicts utilisation of alternative models of care, including consultant-led care, midwifery-led care, and DOMINO care. Moving from a state-of-the-world situation where the only alternative on offer is care in a CLU, this study simulates the probability of uptake for care in a MLU (relative to care in a CLU); DOMINO care (relative to care in a CLU); and care in a MLU and DOMINO care (relative to care in a CLU). Probabilities are simulated

over 1,000 draws from the estimated distributions of the random parameters, and calculated as means over the total number of replications (Train 2002).

4.2.3.3 *Measuring welfare change*

Discrete choice data are increasingly used to elicit measures of welfare gain. These data, or WTP estimations, may then be used in a CBA of alternative treatments or programs (McIntosh 2006). It may be used to calculate individual WTP (state-of-the-world models) or measure welfare change arising from the provision of multiple alternatives. In a multiple alternative scenario, welfare change is calculated by weighting the utility of each alternative by the probability of uptake. This is an important consideration as the provision of multiple alternatives may not benefit everyone. For instance, some people may substitute to a new alternative (gainers), while others may remain with the existing alternative. Those people that stay with the existing service do not benefit from the provision of the new service; hence, it is important to capture the benefit of the new service in terms of those that actually gain from its provision (Ryan 2004).

Introduced by Hicks (1939), compensating variation (CV) provides an exact monetary valuation of welfare. It measures the amount of money that needs to be given or taken away to maintain an individual at their initial state of utility. Small and Rosen (1981) developed a measure for CV for a logit specification which may be used to calculate welfare change arising from a multiple alternative scenario. The formula accounts for the probability that an individual will utilise an alternative given the utility associated with that alternative relative to all other alternatives on offer:

$$CV = \frac{1}{\gamma}[ln \sum_{j=1}^{J} e^{V_j^1} - ln \sum_{j=1}^{J} e^{V_j^0}] \qquad (4.9)$$

where V_j^1 describes the state of the world after the new alternative is introduced, and V_j^0 describes the state of the world before the new alternative is introduced (Hicks 1939). The log sum expressions, $ln \sum_{j=1}^{J} e^{V_j^1}$ and $ln \sum_{j=1}^{J} e^{V_j^0}$, weight the utility of each alternative by their associated probability of uptake. γ is the marginal utility of income, which can be substituted with the negative coefficient for the cost attribute in a DCE (Lancsar and Savage 2004).

Welfare gain is measured following the hypothetical introduction of midwifery-led care and DOMINO care, relative to consultant-led care. Both measures are estimated separately first, and then jointly, relative to care in a CLU. The CV of welfare gain is estimated in the same way as the predicted probabilities: drawn from the mean of 1,000 simulations of the estimated distributions (Train 2002).

This analysis concludes the DCE. The results are presented in Chapter 6 where each objective is addressed separately, similar to above. The following section presents the data source for the DCE and includes a description of the data techniques employed to conduct the DCE.

4.2.4 *Data collection and source: the DCE*

This section describes the various stages undertaken to conduct the DCE. The data collection techniques are presented in section 4.2.4.1. The data source is described in section 4.2.4.2. This section also provides summary statistics on response rates and participant characteristics.

4.2.4.1 *Survey distribution and data collection: the DCE*

The DCE is distributed across two groups of women attending antenatal care in two teaching hospitals in Ireland: CUMH and the National Maternity Hospital, Dublin (NMH) (see Figure 4.2 for breakdown of survey distribution and data collection for the DCE). CUMH is the sole secondary care setting for a catchment area that caters to 8,000 deliveries per annum in the south west of Ireland (CUMH 2013). The NMH is located in the east of Ireland, and caters to approximately 9,000 deliveries per annum (NMH 2013).

To minimise the effect of experience on preferences, women are surveyed during antenatal care, or before they give birth. Only women who are considered to be at low risk of obstetric complications are invited to participate in the study; high risk women are excluded from the analysis as the option of delivering in a MLU is not available to this group. Low risk is defined according to the NICE guidelines and includes women between 18 and 39 years of age with no history of obstetric complications or Caesarean section and no contraindications of morbidities at the time of pregnancy (NICE 2007).

Selecting the appropriate sample size is complex. Lancsar and Louviere (2008) propose that a sample size of twenty is sufficient to reliably estimate a discrete choice model. To protect against a poor response rate this analysis invited 400 women to participate in the study, surveying 200 women from each maternity unit. The study is referred to as the Maternal Assessment of Maternity Services in Ireland study, or MAMS.

MAMS is distributed to 400 women by post in booklet form, along with an invitation letter, information leaflet, pre-paid return envelope, and a consent form. If women

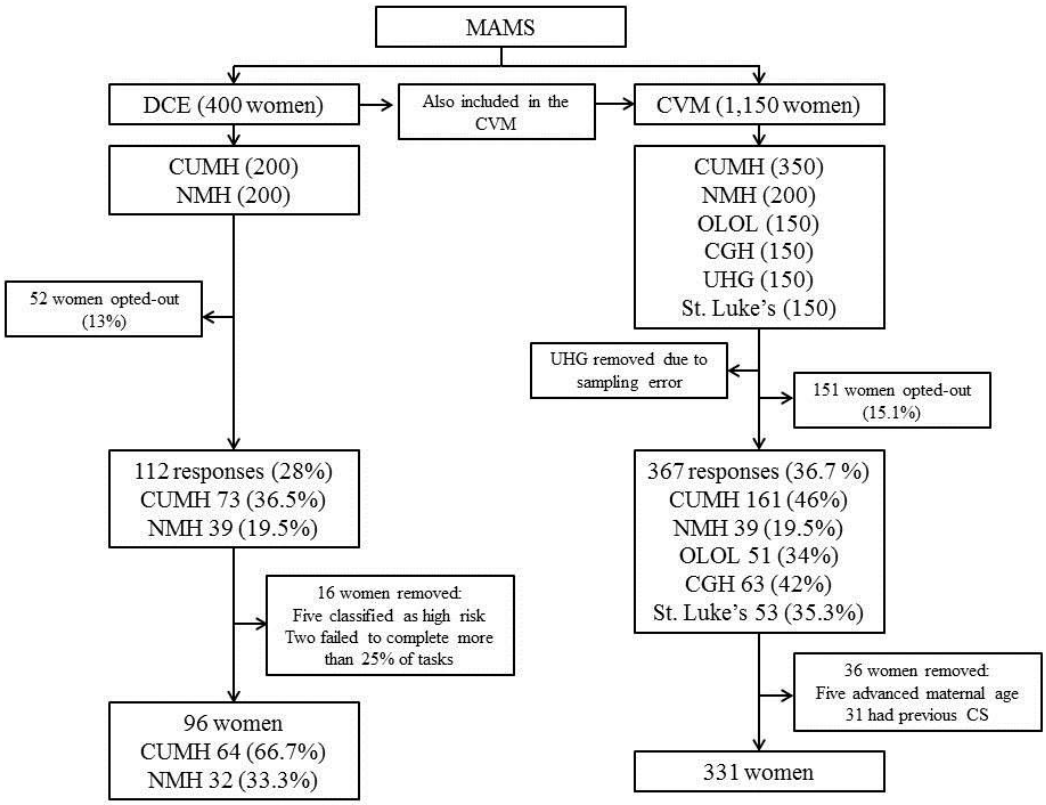


Figure 4.2: Breakdown of survey distribution and data collection for the DCE and CVM.

Notes:

Abbreviations: MAMS, Maternal Assessment of Maternity Services; DRC, dual response choice; CUMH, Cork University Maternity Hospital; OLOL, Our Lady of Lourdes Hospital Drogheda; CGH, Cavan General Hospital; UHG, University Hospital Galway; NMH, the National Maternity Hospital, Dublin.

would like to participate in the study, they are asked to complete and return the survey in the pre-paid envelope provided, thereby signalling their consent, or return the opt-out consent form if they do not wish to participate. Three reminders are distributed to participants who neither return the survey nor opt-out of the study over the course of eight weeks (see Appendix B.1 for sample invitation letter; information leaflet; reminders). The data collected is anonymous; women are assigned a unique Study ID. Respondents are informed of the study's goals and objectives in the invitation letter and accompanying information leaflet. If women would like to find out any further

information about the study they are encouraged to contact the researcher directly. Women are also encouraged to visit the study's webpage (http://www.ucc.ie/en/npec/projects/mams/) which discusses the study in greater detail and provides contact details for and links to important and relevant maternity care support services. Ethical approval for the study was granted by the Clinical Research Ethics Committee, Division of Obstetrics and Gynaecology in CUMH, and the Research Ethics Committee in The NMH, Dublin (Appendix B.2).

The questionnaire comprises four sections (Appendix B.3). The first section asks women about their obstetric history, if any, and plans for their upcoming delivery. Section two investigates women's preferences for each of the attributes in the DCE directly, and asks them to choose their preferred level for each attribute. Women are also asked to identify the attribute that matters most to them. The DCE is introduced in the third section, accompanied by a definition of each of the attributes being considered. Each DCE contains 16 choice sets. A sample choice set is presented in Figure 4.1. Respondents' demographics are captured in the fourth section, while the fifth section contains the CVM, described in section 4.3. The survey is provided in Appendix B.3.

Questionnaire responses were coded and entered into Stata v.12 (StataCorps 2011b). The discrete choice data are effects coded for the qualitative attributes and continuously for the quantitative attributes. Effects coding, rather than dummy coding, is employed as the DCE includes an opt-out alternative. When an opt-out alternative is included in a DCE, dummy coding cannot differentiate between the effect of a reference category within a variable from the effect of an opt-out alternative {Bech, 2005 #314}. Both effects are captured within the intercept term, making it impossible

to differentiate between the reference category and the opt-out alternative. Effects coding, on the other hand, provides a way to separate these two through the inclusion of an alternative specific constant, or intercept term specific to the opt-out option {Bech, 2005 #314}. The alternative specific constant captures the effect of the opt-out alternative, allowing the effect of the reference category to be internalised in the parameter estimate, or β {Bech, 2005 #314}. Without effects coding it would be difficult to internalise the effect of the reference category in the parameter estimate given the presence of the opt-out alternative.

4.2.4.2 *Response rate and participant characteristics: the DCE*

Of the 400 surveys distributed, 112 questionnaires were returned, yielding a response rate of 28 per cent. The response rate from CUMH (36.5 per cent) was higher than the NMH (19.5 per cent). Three reminder letters were distributed to participants from CUMH, but no reminders could be delivered to participants from the NMH as the maternity unit experienced an unforeseen staff shortage problem after the initial survey was distributed to women. Thirteen per cent of women (52) opted-out of the study with 54 per cent of this group (28) comprising of first-time mothers who felt poorly equipped to evaluate maternity services given their inexperience. Some respondents were removed from the analysis due to the high risk nature of their pregnancy. One woman was removed due to advanced maternal age.[33] Thirteen women were removed given an obstetric history that included a previous Caesarean section.[34] Two respondents were removed for failing to complete more than 25 per

[33] A pregnancy may be classified as low risk if the woman is between 18 and 39 years of age (NICE 2007). At 41 years of age this participant did not meet the inclusion criteria.

[34] Best efforts were made to avoid contacting 'high risk' women, however, some women with a history of Caesarean section were unintentionally invited to participate in MAMS. Some women with a history

cent of the choice sets. 96 women comprise the final sample, with participants from CUMH accounting for two-thirds of this group (64).

The mean age of participants was 30.2, with a median age of 30 (Table 4.3). The average age of first-time mothers was 29.6, with a median age of 29. The youngest participant was 20, while the eldest was 39. Less than half the sample was multiparous (45), while 53.1 per cent were nulliparous with a singleton foetus (53). Women who had given birth before had 1-4 other children. The median number of births was 1, with a mean of 1.4. The majority of participants were married, accounting for 53.7 per cent, with single and cohabitating participants comprising the remaining 18.9 and 27.4 per cent of the sample, respectively. The majority of participants were Irish, accounting for 74.4 per cent of the group (71), with the remaining 25.6 per cent comprising of other white (22) and Asian backgrounds (2). Approximately 30 per cent of participants were in receipt of some form of the medical card, while 39.6 per cent reported having private health insurance (PHI). Household income varied across participants, with the majority of participants concentrated in the highest three income brackets (62.7 per cent).

There were some differences in certain demographics across the two maternity units. For instance, the mean age of participants in the NMH was higher at 31.5, compared with 29.5 in CUMH. The number of women in receipt of some form of the medical card was considerably larger in CUMH, accounting for 32.8 per cent of the group, compared with just 18.8 per cent of women from the NMH. The number of women with PHI was also higher among participants from CUMH (62.5 per cent). In the

of Caesarean may be classified as low risk when the pregnancy is occurring within a CLU; hence, the contact details of some women were available on the hospital's 'low risk' antenatal database records.

Table 4.3: Demographic characteristics of the DCE sample.

Variable	**CUMH** *n* (%)	**NMH** *n* (%)	**All** *n* (%)
Age in years, mean (SD)	29.5 (3.8)	31.5 (4.8)	30.2 (4.3)
First baby (%)	34 (53.1)	17 (53.1)	51 (53.1)
Age of first-time mothers, mean (SD)	28.8 (3.8)	31.0 (4.8)	29.6 (4.3)
Number of children, mean (SD)	1.3 (0.51)	1.5 (0.72)	1.4 (0.60)
Marital status (%)*			
Single	11 (17.2)	7 (22.6)	18 (18.9)
Married	35 (54.7)	16 (51.6)	51 (53.7)
Cohabitating	18 (28.1)	8 (25.8)	26 (27.4)
Education status (%)			
Some primary/primary/junior certificate	1 (1.6)	1 (3.1)	2 (18.9)
Leaving certificate	9 (14.1)	3 (9.4)	12 (12.5)
Diploma	22 (34.4)	7 (21.9)	29 (30.2)
Primary degree	15 (23.4)	5 (15.6)	20 (20.8)
Higher degree	17 (26.6)	16 (50.0)	33 (34.3)
Ethnicity (%)*			
Irish background	49 (77.8)	22 (68.8)	71 (74.4)
Other white background	13 (20.6)	9 (28.1)	22 (23.1)
Asian background	1 (1.6)	1 (3.1)	2 (2.1)
Employment status (%)			
Self-employed	2 (3.1)	-	2 (2.0)
Employee	43 (67.2)	25 (78.1)	68 (70.8)
Homemaker	9 (14.1)	5 (15.6)	14 (14.6)
Unemployed	7 (10.9)	1 (3.1)	8 (8.3)
Student	1 (1.6)	1 (3.1)	2 (2.1)
Unable to work (illness/disability)	2 (3.1)	-	2 (2.1)
Medical card status (%)			
Full card	18 (28.1)	3 (9.4)	21 (21.8)
GP card only	3 (4.7)	3 (9.4)	6 (6.3)
Not covered	43 (67.2)	26 (81.3)	69 (71.9)
Private health insurance (%)			
Yes	24 (37.5)	14 (43.7)	38 (39.6)
No	40 (62.5)	18 (56.3)	58 (60.4)
Household income (%)*			
< €834 per month	1 (1.6)	-	1 (1.1)
€834 - €1,667 per month	8 (12.9)	2 (6.3)	10 (10.6)
€1,668 - €2,500 per month	20 (32.3)	4 (12.5)	24 (25.5)
€2,501 - €3,333 per month	8 (12.9)	8 (25.0)	16 (17.0)
€3,334 - €4,167 per month	14 (22.6)	8 (25.0)	22 (23.4)
> €4,167 per month	11 (17.7)	10 (31.2)	21 (22.3)
Observations	64	32	96

Notes:

Abbreviations: CUMH, Cork University Maternity Hospital; NMH, the National Maternity Hospital, Dublin. * Contains missing observation(s)

Table 4.4: Women's preferred scenario for each attribute.

	CUMH *n* (%)	**NMH** *n* (%)	**All** *n* (%)
Continuity of care with midwife			
You are guaranteed continuity of care with the same midwife	52 (81.3)	30 (93.7)	82 (85.4)
You are *not* guaranteed continuity of care with the same midwife	12 (18.7)	2 (6.3)	14 (14.6)
Involvement of obstetric doctors			
Obstetric doctor(s) will be involved in your care if a complication arises	60 (93.7)	29 (90.6)	89 (92.7)
Obstetric doctor(s) will be involved in your care if a complication arises, but you will have to be transferred to an alongside obstetric unit which is accessed through a corridor	4 (6.3)	3 (9.4)	7 (7.3)
Access to pain relief			
Gas and air, Pethidine, and Epidural	42 (65.6)	23 (71.9)	65 (67.7)
Gas and air, Pethidine, and Birthing Pool	22 (34.4)	9 (28.1)	31 (32.3)
Women's role in decision-making			
Medical staff (midwives/ doctors) keep you informed and involved in decision-making	58 (90.6)	28 (87.5)	86 (89.6)
Medical staff (midwives/ doctors) make all decisions for you, but keep you informed	6 (9.4)	4 (12.5)	10 (10.4)
Preferred length of stay in hospital			
6 hours	4 (6.3)	0	4 (4.2)
24 hours	14 (21.9)	9 (28.1)	23 (23.9)
48 hours	21 (32.8)	15 (49.9)	36 (37.5)
72 days	25 (39.0)	8 (25.0)	33 (34.4)
Observations	64	32	96

Notes:
Abbreviations: CUMH, Cork University Maternity Hospital; NMH, the National Maternity Hospital, Dublin.

NMH, 56.3 per cent reported having PHI. There was a large difference in income levels across the two groups. In CUMH, approximately half the sample was concentrated in the top three income brackets (53.2 per cent). This compares sharply with the NMH where 81.2 per cent of the sample was concentrated in the top three income brackets.

Women's preferred level for each attribute is described in Table 4.4. It describes a model of care that assures continuity of care with the same midwife; provides immediate access to medical services, including obstetric doctors and epidural

anaesthesia; involves women in decision-making; and facilitates extended periods of stay in hospital after delivery. A simple rating exercise reveals that each attribute is important to women, with the majority of participants citing involvement in decision-making as being very important (Table 4.5). In a follow-up question 29.2 per cent of women identified continuity of care with the same midwife as the most important attribute (Table 4.6). Access to epidural anaesthesia was the second most important attribute to 27.1 per cent of the group, while involvement in decision-making was identified as the most important attribute to 21.9 per cent of women.

This concludes the description of the data collection techniques used for the DCE and sample obtained therein. The following section introduces the other stated preference technique employed to explore women's preferences. The various stages involved in designing and analysing the CVM are presented in section 4.3.

4.3 Contingent Valuation Method

The primary aim of the CVM is to assign a monetary valuation to care in a CLU and care in a MLU for use in the CBA in Chapter 7. Two elicitation formats are adopted to achieve this aim: an open-ended WTP question and a payment scale WTP question. Given inherent methodological issues associated with the different elicitation formats, as described in Chapter 2, a secondary aim of the contingent valuation study is to compare the open-ended WTP technique with the payment scale design, and determine whether framing of the WTP question affects the responses given. In this section, consideration is given to the contingent valuation design.

Table 4.5: Level of importance assigned to each attribute by the patient sample

	Very *n* (%)	**Quite** *n* (%)	**Somewhat** *n* (%)	**Not at all** *n* (%)
CUMH				
Continuity of care with midwife	37 (57.8)	17 (26.6)	7 (10.9)	3 (4.7)
Involvement of obstetric doctors	31 (48.4)	15 (23.4)	18 (28.1)	0
Access to pain relief	45 (70.3)	13 (20.3)	5 (7.8)	1 (1.6)
Women's role in decision-making	42 (65.6)	18 (28.1)	3 (4.7)	1 (1.6)
Preferred length of stay in hospital	17 (26.6)	18 (28.1)	15 (23.4)	1 (1.6)
NMH				
Continuity of care with midwife	22 (68.7)	7 (21.9)	3 (9.4)	0
Involvement of obstetric doctors	19 (59.4)	6 (18.7)	5 (15.6)	2 (6.3)
Access to pain relief	17 (53.1)	12 (37.5)	3 (9.4)	0
Women's role in decision-making	23 (71.9)	6 (18.7)	2 (6.3)	1 (3.1)
Preferred length of stay in hospital	7 (21.9)	14 (43.7)	10 (31.3)	1 (3.1)
All				
Continuity of care with midwife	59 (61.5)	24 (25.0)	10 (10.4)	3 (3.1)
Involvement of obstetric doctors	50 (52.1)	21 (21.9)	23 (24.0)	2 (2.0)
Access to pain relief	62 (64.6)	25 (26.0)	8 (8.3)	1 (1.0)
Women's role in decision-making	65 (67.7)	24 (25.0)	5 (5.2)	8 (2.1)
Preferred length of stay in hospital	24 (25.0)	45 (46.9)	25 (26.0)	2 (2.1)

Notes:
Abbreviations: CUMH, Cork University Maternity Hospital; NMH, the National Maternity Hospital, Dublin.

Table 4.6: Most preferred attribute.

	CUMH *n* (%)	**NMH** *n* (%)	**All** *n* (%)
Continuity of care with midwife	17 (26.6)	11 (34.4)	28 (29.2)
Involvement of obstetric doctors	8 (12.5)	10 (31.2)	18 (18.7)
Access to pain relief	19 (29.7)	7 (21.9)	26 (27.1)
Women's role in decision-making	17 (26.6)	4 (12.5)	21 (21.9)
Preferred length of stay in hospital	3 (4.7)	0	3 (3.1)
Observations	64	32	96

Notes:
Abbreviations: CUMH, Cork University Maternity Hospital; NMH, the National Maternity Hospital, Dublin.

4.3.1 *Designing the WTP question*

Frew (2010) outlines several key stages involved in designing an appropriate WTP question. In this section, consideration is given to the scenario description and

payment vehicle (4.3.1.1), direction of measurement and welfare measure (4.3.1.2), elicitation perspective (4.3.1.3), and pilot testing (4.3.1.4).

4.3.1.1 *Describing the scenario and selecting an appropriate payment vehicle*

The validity of a contingent valuation study hinges on the description of the hypothetical market. In this analysis, women are presented with a hypothetical scenario where they are asked to choose between alternative models of maternity care, and indicate how much they would be willing to give up to receive a particular package of care. In particular, women are presented with the choice of receiving their maternity care in a CLU or MLU where they have two different options: care in an alongside MLU or care in a free-standing MLU. The question is designed using specific attributes, similar to the DCE. Since care in a MLU is distinctly different to care in a CLU, it is important that these disparities are identified and highlighted in the scenario description. Each model of care is described and contrasted in terms of continuity of care, average waiting time at each antenatal visit, and access to obstetric, anaesthetic, and neonatal care. These attributes derive from the focus groups, as illustrated in section 4.2.1.2. For instance, respondents are informed that care in a MLU consists of continuity of care, short waiting times at each antenatal visit, and access to obstetric, anaesthetic, and neonatal services in the event of a complication.

An out-of-pocket expense, or co-payment, is employed as the payment vehicle. In Ireland, women are somewhat familiar with out-of-pocket expenses for maternity care. To receive a private package of care, which entitles women to antenatal and intrapartum care being provided by an obstetric doctor (consultant), women must pay a fee in advance of their care. Other payment vehicles, such as taxation or a donation

to charity, are deemed inappropriate given women's familiarity with out-of-pocket expenses. Further, since private care has an established price in Ireland, costing approximately €3,500, it is assumed that women have a useful 'benchmark' to compare the public package of maternity care.

Women were given the following excerpt and asked to identify their preferred model of care:

> *In the following question we would like to ask you how much you would value care in an obstetric unit or a midwifery-led unit. Please try to provide an answer, even if it is difficult. Please note that maternity care is free and will remain free. What we are trying to find out is how much value you would place on care in an obstetric unit or care in a midwifery-led unit, depending on your preferred location of care.*
>
> *One way to find out how much value you place on maternity care is to ask you how much of your own money you would be willing to give up to receive a maternity care package in your preferred location. The following describes three locations and packages of care, please read them carefully before answering the following two questions.*

Respondents are then provided with a description of each model of care which is described using specific attributes, as discussed above. The contingent valuation question is presented in Appendix B.3.

4.3.1.2 *WTP and CV*

The direction of payment assumed in this analysis is WTP. Respondents are asked to indicate how much they would be willing to give up for the welfare gain associated with their preferred maternity care package. Therefore, the exact welfare measure used to investigate WTP is CV. This is the amount of money that is required to keep utility levels constant (Frew 2010a). In this scenario, the WTP question is described prior to the event occurring. For instance, women are asked to reveal the maximum amount

they would be willing to give up in order to receive their preferred maternity care package. This is referred to as an *ex ante* perspective as the change in welfare has yet to occur (Frew 2010a; Shackley and Donaldson 2000).

4.3.1.3 *Choosing the elicitation format*

The contingent valuation study adopts two elicitation formats: an open-ended WTP question and a payment scale WTP question. These techniques are suitable for mail surveys and can be administered with ease. Other elicitation formats are deemed inappropriate. For instance, an iterative bidding design can only be performed during face-to-face interviews or telephone interviews, while the closed-ended approach was sidestepped to avoid potential starting point bias, or 'yea-saying'. The open-ended approach and payment scale design are favoured in the literature, presenting an opportunity to further the debate on the appropriateness of both techniques to estimate WTP (Frew 2010a).

A marginal WTP approach is also adopted to ensure respondents are estimating their WTP for their preferred model of care instead of their least preferred model of care. In the first instance, women are asked to indicate their preferred model of care, whether care in a CLU, care in an alongside MLU, or care in a free-standing MLU. Based on their initial decision respondents are then asked to indicate their maximum WTP, out of their own pocket, to receive their care in the maternity unit of their choice rather than their least preferred maternity unit. For both options of midwifery-led care women are asked to base their estimate of WTP on the foregone consultant-led care; that is, how much they would be willing to give up to receive their care in a MLU

instead of a CLU. The marginal approach is particularly informative from a policy perspective as it provides a ranking of alternatives (Shackley and Donaldson 2000).[35]

A space is provided at the end of the open-ended WTP question for women to express their maximum WTP value for care in either a CLU or MLU, as outlined below (for care in a CLU instead of a MLU):

> *Based on your choice above, what is the maximum amount you would be willing to pay to receive your entire maternity care in an obstetric unit instead of a midwifery-led unit? Please indicate in the space provided the maximum amount you would be willing to pay out of your own money to receive your maternity care in an obstetric unit instead of a midwifery-led unit.*
>
> *(Please specify the maximum amount)*
>
> *€_____*

For the payment scale question, three horizontal lines are used, describing 12 interval points, ascending in units of €100 from €100 to €800, then €200 to €1,000, and €250 thereafter. Respondents are simply asked to circle the maximum amount they would be willing to pay for their preferred model of care, or express it in writing if their maximum value is not listed. The following describes the payment scale question (for care in a MLU instead of a CLU):

> *Based on your choice above, what is the maximum amount you would be willing to pay to receive your entire maternity care in your preferred midwifery-led unit instead of an obstetric unit? The following lists several amounts of money, please circle the maximum amount you would be willing to pay to receive your maternity care in a midwifery-led unit instead of an obstetric unit. If the maximum amount is not listed, please write in the exact amount in the space provided.*

[35] As the economic evaluation presented in this thesis is concerned with ranking consultant- and midwifery-led care, this is discussed in greater detail in Chapter 7 (The Cost-Benefit Analysis), section 7.3.

€100	€200	€300	€400
€500	€600	€700	€800
€1,000	€1,250	€1,500	€_____

The contingent valuation question is presented in Appendix B.3

4.3.1.4 *Pilot testing the CVM*

Two pilot studies were undertaken to assess the properties of the contingent valuation study. In particular, the scenario description was examined; the feasibility of the payment vehicle was assessed; and the range of values presented in the payment scale question was evaluated. Since the CVM was included in the MAMS booklet, the two pilot studies were identical to the first two pilot studies of the DCE, as discussed in section 4.2.1.4. Table 4.7 describes the lessons learned with respect to the CVM during the course of the pilot studies.

Following the first pilot study, the scenario description was revised and attributes were included in the subsequent pilot study to better differentiate between both models of care. Similar attributes to the DCE were included where each model of care was

Table 4.7: Description of lessons learned during pilot studies of the CVM

Pilot	Location	Distribution method	Number of surveys distributed	Response rate	Lessons learned/changes made
Pilot 1	CUMH	Postal	50	15 (30%)	○ Poor representation of midwifery-led care ○ Language not user-friendly
Pilot 2	CUMH	Postal	50	30 (60%)	○ WTP question made more user friendly ○ Attributes included to describe both models of care more accurately

Notes:
Abbreviations: CVM, contingent valuation method; WTP, willingness to pay; CUMH, Cork University Maternity Hospital.

described in terms of continuity of care, average waiting time at each antenatal visit, and access to medical services including obstetric, anaesthetic, and neonatal care.[36]

The language used to describe the WTP question was made more user-friendly due to a large number of protest responses. In the second pilot study women were re-assured maternity care was free and would remain free, and that the WTP question was simply concerned with identifying the value women place on maternity care.

A secondary objective of the pilot studies was to test the feasibility of the payment vehicle by examining the range of WTP values provided and number of protest responses. This was especially important in an Irish context where women may not be accustomed to assigning a monetary estimate to either model of care as maternity care is provided free of charge in Ireland. The WTP values elicited during the first and second pilot studies were similar and comparable across both elicitation formats. The number of protest responses was reduced following the first pilot study where the scenario description was revised and improved. The payment vehicle was deemed appropriate given comparable WTP values across the two pilot studies and elicitation formats. Reassuringly, these values were also less than the typical price of private care, which is deemed superior in Ireland.

Finally, the range of values presented to respondents in the payment scale WTP question was examined. The selected values ranged from €100 to €1,500 and derived from exhaustive qualitative research, as discussed in section 4.2.1.2. If respondents wished to express a value in excess of €1,500, a space was provided to write in the

[36] It is worth noting that this attribute was dropped from the DCE after the third pilot study due to insignificance.

appropriate amount. No changes were made to the payment scale question for the main study since the WTP values were comparable across the first and second pilot studies.

The following section focuses on the quantitative analysis of the CVM.

4.3.2 *Quantitative analysis of WTP*

The CVM has three uses. In the first instance, it is used to explore the characteristics of respondents who either fail to complete the WTP question (protest response) or provide a zero WTP value. Second, it is used to explore mean WTP, or CV, among respondents who provide a positive WTP value. Finally, it is used to compare potential differences in demographics in terms of women's preferred model of care. In each case, two sets of analyses are conducted: descriptive statistics and regression analysis. The objectives of the CVM are outlined below.

4.3.2.1 *Analysis of non-response (protest) and zero responses*

Two elicitation formats are adopted to explore women's WTP for their preferred model of care: open-ended WTP question and payment scale WTP question. The open-ended approach is associated with higher protest and zero responses compared with the payment scale design (Diamond and Hausman 1992; Donaldson *et al* 1997b; Frew *et al* 2003). The rate of protest and zero responses are compared across the two WTP questions. The characteristics of women who either fail to answer the WTP question or provide a zero WTP value are examined. Chi-squared and Fisher Exact tests are used to explore potential differences in demographics across the two groups compared with positive WTP responders. Logistic regression is the natural progression; however, the relatively small sample size for both groups (protest and zero responders) prohibits such analysis.

4.3.2.2 *Analysis of positive WTP responses*

Descriptive statistics and hypothesis testing

The CV of WTP values are reported for both the open-ended question and the payment scale design. Standard descriptive statistics on the distribution of WTP values are reported, including mean, median, and coefficients of skew. Typically, mean WTP is used in a policy context (Pearce *et al* 2006), however, the median WTP may be a better predictor for the sample if the data are skewed or include potential outliers. All positive WTP values are explored in the first instance. Potential outliers are subsequently removed, or trimmed. Trims are useful for removing potentially dubious responses (Chilton *et al* 2004). These CV values are incorporated into the CBA in Chapter 7.

Positive WTP values are compared across the different elicitation formats. In the first instance, WTP for care in a CLU is compared across the open-ended question and the payment scale design. This is repeated for care in a MLU. Parametric tests are performed to test whether there is a statistically significant difference between the two formats and models of care. A two-sample t-test is used to test the null hypothesis that the WTP values elicited are the same (StataCorps 2011a). Parametric tests are used here since the data are unpaired.

Positive WTP values are then compared across the five maternity units and several respondent characteristics. These include previous obstetric experience, private health insurance (PHI) status, and income. Non-parametric tests are performed to test differences in WTP across the different groups. This is useful if the data are positively skewed. The Wilcoxon Rank-Sum test is used on binary variables, including previous obstetric history and PHI status (StataCorps 2011a). A Kruskall-Wallis test is used to

test whether there is a difference in WTP across the different maternity units, and income groups (StataCorps 2011a).

Correlation analysis is also performed to investigate whether an association between income and WTP exists. This is an important consideration in contingent valuation studies as the approach is criticised for being intrinsically linked to ability to pay, rather than WTP (Kenkel 1997). Using Spearman's rank correlation coefficient, this analysis explores whether WTP valuations are linked with ability to pay, which is identified in other research (Bateman *et al* 2002; Cross *et al* 2000; Donaldson *et al* 1997b; Frew *et al* 2003). While an association might exist within this analysis, an investigation of the distribution of preferences for the different models of care across high and low income earners is investigated. The literature suggests that the association between ability to pay and WTP valuations is only problematic if the distribution of preferences is dissimilar (Olsen and Donaldson 1998). That is, if high income earners prefer consultant-led care more than low income earners, then WTP valuations are distorted by ability to pay. A chi-squared test is employed to examine the distribution of preferences (StataCorps 2011a).

The distribution of preferences is subsequently examined to assess whether ability to pay distorts WTP.

Regression analysis

Regression analysis is used to identify the characteristics that predict WTP. It is expected that geographic location influences WTP. Certain maternity units offer consultant-led care only, while other units offer a combination of consultant- and midwifery-led care. It is expected that women receiving care in a catchment area that

only offers consultant-led care are willing to pay more for this model of care. Previous obstetric history and parity are also expected to influence WTP, with experienced users willing to pay less than first-time mothers given their knowledge of maternity care. PHI status and income are expected to be strong predictors of WTP. Finally, ethnicity is expected to influence WTP. Maternity care systems differ throughout the world; it is possible that these cultural differences, or attitudes towards maternity care, influence women's WTP.

Separate analyses are performed on the two elicitation formats. Since the open-ended question generates a continuous WTP variable, standard Ordinary Least Squares (OLS) regression is performed in the first instance on the open-ended WTP question. The relationship between the dependent variable and explanatory variables is expressed as follows:

$$WTP = \beta_0 + \beta_{conlu}X_1 + \beta_{exper}X_2 + \beta_{parity}X_3 + \beta_{phi}X_4 + \beta_{highestinc}X_5 + \beta_{irish}X_6 \quad (4.10)$$

where β_{conlu} is the parameter estimate for a dummy variable capturing geographic location. This variable is created to separate women delivering in a catchment area that only offers care in a CLU (1 = CUMH, Luke's, and the NMH) against other catchment areas where both care in a CLU and MLU is provided (0 = CGH and OLOL hospital). β_{exper} captures WTP across obstetric experience (1 = first-time mothers, 0 = experienced users). β_{parity} is the parameter estimate for a continuous variable describing the number of children each experienced maternity care user has had. β_{phi} describes WTP across PHI status (1 = with PHI, 0 = without PHI); $\beta_{highestinc}$ is another parameter estimate for a dummy variable which is created to compare WTP

Table 4.8: Description of variables used in contingent valuation regression analysis

Variable	Description	Code
conlu	Captures where each woman is due to give birth, whether in a region that offers consultant-led care only, or a combination of consultant- and midwifery-led care.	1 = CUMH, NMH, Luke's 0 = CGH, OLOL
exper	Previous obstetric experience	1 = First-time mothers 0 = Experienced maternity care users
parity	Number of times a woman has given birth before	Continuous variable
phi	Private health insurance status	1 = Private health insurance 0 = No private health insurance
highestinc	Dummy variable for highest income group	1 = > €4,168 per month 0 = < €4,168 per month
irish	Nationality	1 = Irish background 0 = Other white, black, Asian, African background

Notes:
Abbreviations: CUMH, Cork University Maternity Hospital; NMH, the National Maternity Hospital, Dublin; CGH, Cavan General Hospital; OLOL, Our Lady of Lourdes Hospital, Drogheda.

between the highest income category and all other categories (1 = >€4,168 per month, 0 = <€4,168 per month). β_{irish} is the parameter estimate for a dummy variable comparing Irish women with other nationalities (1 = Irish women, 0 = other nationalities). The variables are described in detail in Table 4.8.

Since WTP data are generally skewed, a log linear OLS regression analysis is performed and compared with the OLS model:

$$\ln(WTP) = \beta_0 + \beta_{conlu}X_1 + \beta_{exper}X_2 + \beta_{parity}X_3 + \beta_{phi}X_4 + \beta_{highestinc}X_5 + \beta_{irish}X_6 \quad (4.11)$$

where $ln(WTP)$ is the logarithmic transformation of the dependent variable. A Tobit regression model is also explored:

$$WTP^* = \beta_0 + \beta_{conlu}X_1 + \beta_{exper}X_2 + \beta_{parity}X_3 + \beta_{phi}X_4 + \beta_{highestinc}X_5 + \beta_{irish}X_6 + e \quad (4.12)$$

where e is a standard normal distribution with zero mean and variance σ^2 ($e \sim N(0, \sigma^2)$ and WTP^* is a latent variable for WTP where values greater than τ are observed and censored otherwise (StataCorps 2011a). Tobit regression is useful when censoring zero values at the lower bound, such that $\tau = 0$:

$$WTP = \begin{cases} WTP^* \; if \; WTP^* > 0 \\ 0 \qquad if \; WTP^* \leq 0 \end{cases} \quad (4.13)$$

The Tobit regression is also useful for censoring potential outliers at the upper bound. A regression analysis is performed for the open-ended WTP question for care in a CLU and care in a MLU.

The payment scale is analysed subsequently. Since the dependent variable is observed in interval ranges, an interval-data model is used. Interval regression is often more efficient than other regression analyses, such as ordered probit/logit models (Alberini 1995; Cameron and Huppert 1991). It is useful when the exact value being selected is censored (Alberini 1995). With the payment scale design, any time a value is selected it is assumed that an individual's maximum WTP lies somewhere between the selected value and the next available value, such that

$$WTP^* = \beta_0 + \beta_{conlu}X_1 + \beta_{exper}X_2 + \beta_{parity}X_3 + \beta_{phi}X_4 + \beta_{highestinc}X_5 + \beta_{irish}X_6 + e \quad (4.14)$$

where WTP^* is unobservable but lies somewhere between the lower and upper bounds $[WTP_1, WTP_2]$. The maximum likelihood function is used to estimate WTP where the

probability that the exact WTP value is greater than the lower bound but less than the upper bound is Pr($WTP_1 \leq WTP^* \geq WTP_2$) (Cawley 2008; StataCorps 2011a).

4.3.2.3 *Analysis of preferences*

Further quantitative analysis of preferences is explored. This section determines the characteristics of women who prefer consultant-led care to midwifery-led care. Since the marginal approach to the CVM is used, readily available information on women's preferred model of care is available. A probit model is used to explore preferences using similar explanatory variables:

$$prefCLU^* = \beta_0 + \beta_{conlu}X_1 + \beta_{exper}X_2 + \beta_{parity}X_3 + \beta_{phi}X_4 + \beta_{highestinc}X_5 + \beta_{irish}X_6 + e \quad (4.15)$$

where $prefCLU^*$ is a dummy variable for whether a woman indicated a preference to receive her care in a CLU. This variable takes a value of 1 if this option is selected and 0 otherwise. The probit model is estimated to identify the factors that influence women's preferences for consultant-led care over midwifery-led care (Greene 2000). The predictor variables included in this analysis are similar to previous analyses. This type of analysis is useful if the WTP data contain noise (Frew 2010b).

The Probit model concludes the quantitative analysis of the CVM. Given the number of objectives contained within the CVM, the results are presented separately to the DCE in Chapter 6 (the results of the DCE are presented in Chapter 5). The data obtained for analysis of the CVM is introduced and described in the following section.

4.3.3 *Data collection and source: the CVM*

The various stages undertaken to conduct the CVM are presented in this section. The data collection techniques are presented in the first instance and outlined in section 4.3.3.1. The data source is described in section 4.3.3.2. Descriptive statistics on response rates and participant characteristics are presented in this section also.

4.3.3.1 *Survey distribution and data collection: the CVM*

Identical data collection techniques are followed for the CVM as the DCE since both SP techniques are included in the MAMS booklet. However, a larger sample is recruited for the CVM (see Figure 4.2 for breakdown of sample across the CVM and DCE). Women receiving antenatal care across six different maternity units are invited to participate in the study, representing the six hospital groups spread across the country (CUMH, Galway University Hospital, the NMH, Cavan General Hospital (CGH), Our Lady of Lourdes (OLOL) Hospital, Drogheda, and St. Luke's Hospital) (Higgins 2013). Two maternity units declined to participate, but were replaced by other willing participants.

Selecting an appropriate sample size is complex for the CVM also. There currently exists no standard guideline on what the minimum sample size should be, especially when the results are intended for use within a formal CBA. Mitchell and Carson (1989) maintain that, using a simple statistical tolerance formula, a sample size between 200 and 2,500 is usually sufficient. To protect against a poor response rate, 900 women are invited to participate in the study, sampling 150 women from each maternity unit in the first instance. The study was conducted at different times across the various maternity units due to lapses in time with ethical approval applications with each of

the maternity units. Ethical approval for this study was granted by the Clinical Research Ethics Committee, Division of Obstetrics and Gynaecology in CUMH; the Health Service Executive (HSE) Mid-Western Regional Hospital Research Ethics Committee; the HSE South-Eastern Regional Hospital Research Ethics Committee; the Research Ethics Committee in University Hospital Galway (UHG); and the Research Ethics Committee in the NMH, Dublin.

4.3.3.2 *Response rate and participant characteristics: the CVM*

Of the six maternity units invited to participate in the study, data were used for five units only; UHG was excluded from the analysis due to a sampling error.[37] Fortunately, there was no loss of data arising from the error as MAMS was distributed to an additional 200 women in CUMH, and an additional 50 women in the NMH.[38] The total number of women invited to participate in the study was 1,000.[39]

Of the 1,000 surveys distributed to women across the five maternity units, 367 questionnaires were returned, yielding a response rate of 36.7 per cent. The response rate differed across the five maternity units. The highest response rate was from CUMH with 46 per cent of surveys returned. 42 per cent of the sample from CGH returned their questionnaire. 34 and 35.3 per cent of the sample from OLOL hospital and St. Luke's hospital returned their surveys, respectively. The lowest response rate came from the NMH. However, women in this group did not receive any reminder about the study whereas in each of the other four maternity units women received three

[37] Local investigators mistakenly distributed the surveys to a randomly selected group of women who had been identified from the unit's postnatal database records, rather than antenatal database records.
[38] This group comprises the sample for the DCE.
[39] This excludes surveys distributed to UHG.

postal reminders. 15.1 per cent of women (151) opted-out of the study after the initial invitation letter was distributed.

A number of participants were removed from the sample due to the high risk status of their pregnancy. Five women were removed due to advanced maternal age. A further 31 participants were removed due to a history of Caesarean section. There were 331 women in the final sample.

The average age of participants was 31.2, with a median age of 32 (Table 4.9). The mean age of first-time mothers was 30.5, with a median age of 31. Forty-six point eight per cent of the sample was expecting their first child. The average number of children per woman was 1.6, with a median number of 1. The majority of participants were married (67.6 per cent), with 10.6 per cent of the sample comprising of single people, while 21.5 per cent were cohabitating with their partner. Approximately three-quarters of the sample were Irish. Other ethnicities included other white (19.1 per cent), African (1.2 per cent), and Asian backgrounds (1.2 per cent). 23.6 per cent of women were in receipt of some form of the medical card, while 45.0 per cent reported having PHI. The majority of participants were concentrated in the top three income brackets (63.5 per cent).

There were some differences in demographics across the five maternity units. The average age of women in OLOL hospital was 32.5, which differs considerably from the youngest average age of 30.6 in CGH, and the overall average age of 31.2. In St. Luke's hospital, the sample consisted largely of multiparous women who accounted for 65.3 per cent of the group. 60.4 per cent of the sample in OLOL hospital consisted

Table 4.9: Demographic characteristics of the CVM sample.

Variable	CUMH *n* (%)	Cavan *n* (%)	OLOL *n* (%)	Luke's *n* (%)	NMH *n* (%)	All *n* (%)
Age in years, mean (SD)	30.9 (3.9)	30.6 (4.7)	32.5 (3.1)	31.2 (3.8)	31.5 (4.8)	31.2 (4.1)
First baby (%)	73 (51.1)	29 (49.2)	19 (39.6)	17 (34.7)	17 (53.1)	155 (46.8)
Age of first-time mothers, mean (SD)	30.4 (4.2)	29.2 (4.5)	32 (3.6)	30.7 (3.4)	31.0 (4.8)	30.5 (4.2)
Number of children, mean (SD)	1.5 (3.5)	1.7 (0.9)	1.6 (0.8)	1.6 (0.7)	1.5 (0.72)	1.6 (0.82)
Marital status (%)						
Single	14 (9.8)	7 (11.9)	4 (8.3)	3 (6.1)	7 (22.6)	35 (10.6)
Married	96 (67.1)	43 (72.9)	30 (62.5)	38 (77.6)	16 (51.6)	223 (67.6)
Cohabitating	32 (22.4)	9 (15.2)	14 (29.2)	8 (16.3)	8 (25.8)	71 (21.5)
Separated	1 (0.70)	-	-	-	-	1 (0.3)
Education status (%)						
Some primary/primary/junior	5 (3.4)	3 (5.1)	6 (12.5)	2 (4.1)	1 (3.1)	17 (5.1)
Leaving certificate	17 (11.9)	6 (10.2)	9 (18.8)	5 (10.2)	3 (9.4)	40 (12.1)
Diploma	47 (32.9)	19 (32.2)	20 (41.7)	13 (26.5)	7 (21.9)	106 (32.0)
Primary degree	30 (20.9)	7 (11.8)	7 (14.6)	16 (32.6)	5 (15.6)	65 (19.6)
Higher degree	44 (30.8)	24 (40.7)	6 (12.5)	13 (26.6)	16 (50.0)	103 (31.1)
Ethnicity (%)						
Irish background	110 (77.5)	49 (83.1)	40 (83.3)	37 (77.1)	22 (68.8)	258 (78.4)
Other white background	30 (21.1)	9 (15.2)	8 (16.7)	7 (14.6)	9 (28.1)	63 (19.1)
African background	1 (0.7)	-	-	3 (6.3)	-	4 (1.2)
Asian background	1 (0.7)	1 (1.7)	-	1 (2.0)	1 (3.1)	4 (1.2)
Employment status (%)						
Self-employed	7 (4.9)	1 (1.7)	1 (2.1)	-	-	9 (2.7)
Employee	94 (65.7)	42 (71.2)	29 (60.4)	39 (79.6)	25 (78.1)	229 (69.1)
Homemaker	26 (18.2)	6 (10.2)	12 (25.0)	6 (12.3)	5 (15.6)	55 (16.6)
Unemployed	10 (7.0)	8 (13.5)	5 (10.4)	2 (4.1)	1 (3.1)	26 (7.6)
Student	2 (1.4)	1 (1.7)	1 (2.1)	1 (2.0)	1 (3.1)	5 (1.5)
Unable to work	4 (2.8)	1 (1.7)	-	1 (2.0)	-	7 (2.1)
Medical card status (%)						
Full card	33 (23.1)	17 (28.8)	15 (31.2)	10 (20.4)	3 (9.4)	78 (23.6)
GP card only	5 (3.5)	4 (6.8)	3 (6.2)	2 (4.1)	3 (9.4)	17 (5.1)
Not covered	105 (73.4)	38 (64.4)	30 (62.5)	37 (75.5)	26 (81.3)	236 (71.3)
Private health insurance (%)						
Yes	68 (47.5)	24 (40.7)	19 (39.6)	24 (49.0)	14 (43.7)	149 (45.0)
No	75 (52.5)	35 (59.3)	29 (60.4)	25 (51.0)	18 (56.3)	182 (55.0)
Household income (%)						
< €834 per month	1 (0.7)	5 (8.6)	-	3 (6.5)	-	9 (2.8)
€834 - €1,667 per month	14 (10.1)	9 (15.5)	9 (19.6)	4 (8.7)	2 (6.3)	38 (11.9)
€1,668 - €2,500 per month	37 (26.8)	13 (22.4)	6 (13.0)	10 (21.7)	4 (12.5)	70 (21.9)
€2,501 - €3,333 per month	27 (19.6)	10 (17.2)	18 (39.1)	7 (15.2)	8 (25.0)	70 (21.9)
€3,334 - €4,167 per month	25 (18.1)	10 (17.2)	4 (8.7)	9 (19.6)	8 (25.0)	56 (17.5)
> €4,167 per month	34 (24.6)	11 (19.0)	9 (19.6)	13 (28.3)	10 (31.2)	77 (24.1)
Observations	143	59	48	49	32	331

Notes: Abbreviations: CUMH, Cork University Maternity Hospital; NMH, the National Maternity Hospital, Dublin; CGH, Cavan General Hospital; OLOL, Our Lady of Lourdes Hospital, Drogheda; UHG, University Hospital Galway.

of multiparous women, while in each of the other units the division between nulliparous and multiparous women was evenly distributed across the two groups.

This concludes the description of the data collection techniques used for the DCE and sample obtained therein (Figure 4.2). The results of the CVM are presented in Chapter 6. Section 4.4 compares the sample obtained for the CVM with the DCE and qualitative research and draws comparisons across these groups of women with available data on the general obstetric population.

4.4 The samples

Three sample populations are obtained in this analysis, and range in size from a minimum of 19 participants in the focus groups to a maximum of 367 participants in the CVM. An 11.3 per cent response rate was achieved by the focus groups. However, response rates to qualitative research are rarely reported in the literature, rather the focus is on the reasons why participants did not participate. Many women who were invited to participate in the focus groups reported that they did not feel comfortable sharing their views in a group setting, while others cited their inexperience as the main reason why they did not want to participate. A response rate of 22 per cent (37 women) was expected, although 18 women could not attend the scheduled sessions.

The response rate to MAMS was poorer than anticipated. A response rate of 28 and 36.7 per cent was generated by the DCE and CVM, respectively. This contrasts sharply with the pilot studies which achieved a considerably higher response rate. For instance, in its second iteration, MAMS achieved a 60 per cent response rate. It is difficult to determine the reasons for the low response rate to the main DCE and CVM. It is assumed that poor timing contributed to a low response rate to the DCE for CUMH as

the surveys were distributed during a mid-term break. The response rate in CUMH was stronger than all other hospitals for the DCE and CVM; therefore, it is assumed that the response rate was stronger in this hospital as women knew the research centre and its affiliated researchers. It is believed that there may have been reluctance among women from other maternity units to participate in the studies given their lack of knowledge of the research centre.

Small sample size likely affects the representativeness of the samples to the population due to non-response bias. This bias describes the differences that might exist between respondents and non-respondents. Ideally, the demographic characteristics of both groups are compared to explore whether meaningful differences exist between responders and non-responders. However, this study was not granted ethical approval to access the personal information of the sample frame. Therefore, it was not possible to compare the characteristics of the responders with non-responders.

It is difficult to compare the samples with the low risk obstetric population also. While the National Perinatal Reporting System (NPRS) publishes nationally representative data on the obstetric population on an annual basis, it cannot distinguish between low and high risk women (NPRS 2013). The data presented in this thesis describes the demographic characteristics of low risk women, which are expected to differ to the overall obstetric population. For instance, it is expected that the average age of low risk women is lower than the average age of the obstetric population, while the percentage of mothers delivering for the first time is also expected to be higher than the obstetric population.

Table 4.10 compares the samples with the general obstetric population using available data. Also included in the table is the demographic information of women included in the MidU (2009) study. These data are compared with the samples presented in this thesis as they are expected to more closely resemble the demographic characteristics of low risk women. Across the DCE and CVM, the average age of participants is lower than the general obstetric population, although it is higher than the MidU study. The average age of participants in the focus groups is higher than all other data. This may be due to the fact that 42 per cent of this group comprised private patients, which were slightly older than public patients. The percentage of women delivering for the first time in in the samples presented in this thesis is comparable with the MidU (2009) study, where all data are higher than the obstetric population. There are some differences in the number of women that report being married. The CVM data are similar to the general obstetric population data, while the DCE data closely resemble the MidU (2009) study data. Irish nationality is comparable across all data, where roughly 75 per cent of deliveries are by women with an Irish heritage.

Differences in demographics may be attributable to differences in sample size. For instance, the MidU (2009) study contained 552 participants. At its highest, the CVM included 331 women, while the DCE contained 96 participants. With only 19 women in the focus groups it is difficult to meaningfully compare these demographics with other data. Non-response bias may be a problem with the data; however, it is impossible to reveal the extent of this bias. In addition, the data obtained from the MidU (2009) study might not reflect the low risk obstetric population. Without nationally representative data on the demographic characteristics of low risk women, it is difficult to determine the representativeness of the samples to the population.

Table 4.10: Demographic characteristics of sample compared with MidU study and general obstetric population

	Focus groups	**DCE**	**CVM**	**MidU***	**General population†**
Age, mean (SD)	32.3 (5.2)	30.2 (4.3)	31.2 (4.1)	28.7 (5.0)	31.9
Parity	9 (47.3)	51 (53.1)	155 (46.8)	276 (50.0)	28,169 (39.1)
Married	*No data*	51 (53.7)	223 (67.6)	312 (56.5)^	46,071 (64.0)
Irish nationality	14 (73.7)	71 (74.4)	258 (78.4)	*No data*	54,709.4 (76.0)
Total	19	96	331	552	71,986

Notes:

Abbreviations: DCE, discrete choice experiment; CVM, contingent valuation method.

* MidU (2009).

† NPRS (2013).

^ Includes women that were not separated.

Nevertheless, it is assumed that the data presented in this thesis closely resemble low risk women given comparable characteristics with the MidU (2009) study and overall population.

4.5 Conclusion

The various stages involved in designing the DCE and CVM are described in detail in this chapter. The data instruments used for both SP techniques are described in terms of distribution, response rates, and participant characteristics.

Each SP technique carries several important objectives. In terms of the DCE, a number of discrete choice analyses are performed, as outlined in section 4.2. In the first instance, women's strengths of preferences for the different attributes is explored on the unforced choice scenario (section 4.2.2.1). The DRC is then explored to identify the best specification of preferences across the unforced and forced choice scenarios (section 4.2.2.2). Underlying assumptions about preferences are explored using a flexible model and compared with the benchmark model to find the model of best fit (section 4.2.2.3). Two factors that are assumed to influence preferences are investigated (experience and geographic location), and MRS are calculated for the

different attributes (section 4.2.2.3). The DCE is also used for policy analysis and to measure welfare change. Women's individual WTP for care in a CLU, MLU, and DOMINO scheme is calculated using state-of-the-world models (section 4.2.3.1). An analysis of potential market uptake for the different models of care is then calculated (section 4.2.3.2), and used to measure welfare change (section 4.2.3.3).

In terms of the CVM, several objectives contained within this analysis are also presented in this chapter (section 4.3). First, the data are used to explore the characteristics of zero and protest responders against positive WTP responders (section 4.3.2.1). Positive WTP responses are then analysed to elicit CV, and compared across several important demographics such as experience, geographic location, income, and PHI (section 4.3.2.2). Regression analysis is performed to predict WTP (section 4.3.2.2), and to investigate the characteristics of women that prefer consultant-led care over midwifery-led care (section 4.3.2.3).

Given the extent of the different objectives contained within the DCE and CVM, the findings of the different SP techniques are reported in separate chapters. The results from the DCE are presented in Chapter 5, while the results of the CVM are presented in Chapter 6.

5 THE DISCRETE CHOICE EXPERIMENT

5.1 Introduction

This chapter presents the results of the various analyses employed to address the objectives of the DCE. In section 5.2, a summary of the sample and breakdown of respondents' choices is provided. Section 5.2.1 presents the first analysis of the DCE, which aims to identify the best specification of the continuous attributes and preferences on the unforced choice scenario. The DRC is explored in section 5.2.2. This section seeks to identify the best specification of preferences across the two choice scenarios. Choice consistency is compared between the unforced and forced choice scenario in this section also. Section 5.2.3 explores flexible models and investigates how preferences change when assumptions about respondents' choices are relaxed. Finally, in section 5.2.4, issues relevant to policy analysis and welfare measures are explored. This includes an analysis of market uptake and estimation of CV. A summary of the various findings presented in this chapter is outlined in section 5.4 and placed in the context of existing literature.

5.2 The discrete choice experiment results

Of the 400 surveys distributed, 112 women returned the questionnaire, yielding a response rate of 28 per cent. Two respondents are removed for failing to complete more than 25 per cent of the choice sets. Fourteen further respondents are removed from the sample due to the high risk nature of their pregnancy. The final sample comprises 96 women, with participants from CUMH accounting for two-thirds of this group (64).

Eighty-five per cent of women (82) completed all 16 choice sets.[40] On 449 occasions, or across 29.9 per cent of the choice sets, respondents chose the 'Neither' option in the unforced choice scenario (Table 5.1). The experimental alternatives (A and B) are selected a similar number of times: alternative A is chosen 523 times (34.8 per cent) while alternative B is selected 531 times (35.3 per cent). In the forced choice scenario, respondents are evenly distributed across the two experimental alternatives: alternative A is selected 224 times (50.6 per cent) and alternative B is chosen 219 times (49.4 per cent).

The following section introduces the first analysis of the DCE, which focuses on the unforced choice scenario and the best specification of the continuous attributes. In each of the following sections a number of discrete choice analyses are performed. To distinguish between each analysis, a shorthand name is defined for each model. These models are described in Table 5.2.

5.2.1 *Exploring preferences on the unforced choice*

In this section, three analyses are presented. In the first instance, a benchmark model

Table 5.1: Breakdown of choices across unforced and forced choice scenarios

	Unforced Choice		**Forced Choice**	
Alternative	**N**	**%**	**N**	**%**
A	523	34.8	224	50.6
B	531	35.3	219	49.4
Neither	449	29.9		
Total	1,503	100	443	100

[40] It is believed that some of these missing observations occurred unintentionally when respondents flipped over two pages of their booklet, rather than one.

Table 5.2: List and description of all discrete choice analyses

Model	Description	Section
5.2.1 Exploring preferences on the unforced choice		
Model 1a	CL model on unforced choice scenario (benchmark model)	5.2.1.1
Model 1b	CL model with continuous variables coded qualitatively	5.2.1.2
Model 1c	CL model with quadratic term assumed for length of stay	5.2.1.2
Model 1d	NL model on unforced choice	5.2.1.3
5.2.2 The dual response choice format		
Model 2a	CL model on forced choice	5.2.2.1
Model 2b	CL model on unforced choice (excluding opt-out)	5.2.2.1
Model 2c	CL model on pairwise choice (unforced and forced)	5.2.2.1
Model 2d	Heteroscedastic CL model on unforced and forced choice at pairwise level (A or B)	5.2.2.2
5.2.3 A flexible approach to discrete choice analysis		
Model 3a	MXL model (ASCA set as random)	5.2.3.1
Model 3b	MXL model (continuity set as random)	5.2.3.1
Model 3c	MXL model (continuity, obdocs set as random)	5.2.3.1
Model 3d	MXL model (continuity, obdocs, painrlf set as random)	5.2.3.1
Model 3e	MXL model (continuity, obdocs, painrlf, decmak set as random)	5.2.3.1
Model 3f	MXL model (continuity, obdocs, painrlf, decmak, los set as random)	5.2.3.1
Model 3g	MXL model (all attributes set as random)	5.2.3.1
Model 3h	MXL model (cost set as fixed and specified with lognormal distribution)	5.2.3.1
Model 4a	MXL model on first-time mothers	5.2.3.2
Model 4b	MXL model on experienced maternity care users	5.2.3.2
Model 4c	MXL model on women from CUMH	5.2.3.2
Model 4d	MXL model on women from the NMH	5.2.3.2

Notes:

Abbreviations: CL, conditional logit; NL, nested logit; MXL, mixed logit; ASCA, alternative-specific constant for alternative A; CUMH, Cork University Maternity Hospital; NMH, National Maternity Hospital, Dublin

that examines preferences on the unforced choice scenario is estimated (5.2.1.1). The second section identifies the best specification of the continuous attributes (5.2.1.2). The final section (5.2.1.3) then compares the benchmark model with a generalised model to examine how preferences change when different assumptions about respondents' choices are implied.

5.2.1.1 *The 'benchmark' model*

A standard CL model is estimated on the unforced choice scenario and used as a 'benchmark' model for further analyses (Model 1a). An ASC for the opt-out option is included in the model, as well as an ASC for alternative A. The results are presented

in Table 5.3. Neither ASC is significant, suggesting respondents were not influenced by any of the alternatives on offer, but instead were influenced by the combination of attributes and levels. Each attribute is significant and the sign of the coefficients is as expected. The negative coefficient on cost implies a disutility associated with having to pay for maternity care, with respondents preferring to spend less. The positive coefficient on each of the other attributes indicates that women derive utility from being guaranteed continuity of care with the same midwife; having immediate access to medical services, including obstetric doctors and epidural anaesthesia; experiencing extended periods of stay in hospital; and being actively involved in the decision-making.

5.2.1.2 *Search for best specification of the continuous attributes*

Different specifications of the continuous attributes are explored (cost and length of stay). In Model 1a, both attributes are treated continuously. A separate model is estimated where the attributes are coded qualitatively (Model 1b). A quadratic expression for length of stay is also assumed in a separate analysis (Model 1c) as it is possible that women's preferred length of stay follows a u-shaped curve: women may want to stay in hospital longer than a few hours, but are happy to return home after a few days.

The models are compared in Table 5.4. Both attributes are significant when coded qualitatively (Model 1b), however, length of stay is insignificant when a quadratic term is used. The models are compared using the AIC and BIC (Eqn. 4.3 and 4.4, respectively). Model 1a performs best given the lower BIC value (Table 5.4). There is a marginal difference between the AIC values in Model 1a and Model 1c; however,

Table 5.3: (Model 1a) CL on unforced choice 'benchmark model'

Variables	**Model 1a**
ASCN	-0.005
	(0.100)
ASCA	-0.012
	(0.070)
Continuity of care	**0.279*** **
	(0.046)
Involvement of ob. doctors	**0.284*** **
	(0.040)
Pain relief	**0.175*** **
	(0.046)
Role in decision-making	**0.251*** **
	(0.047)
Length of stay	**0.011*** **
	(0.002)
Cost	**-0.001*** **
	(0.001)
Observations	1,503

Notes:

Model 1a: CL on unforced choice; ASCN, alternative-specific constant for opt-out; ASCA, alternative-specific constant for alternative A.

Standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1.

since the quadratic term for length of stay is insignificant, it can be assumed that the quantitative attribute has a classical linear effect. This assumption of linearity is tested on Model 1a using an adaptive model and joint Wald test (StataCorps 2011a). The tests show that both attributes are linear given insignificant test results for cost (H = 1.89, 4 d.f., p = 0.5945; Figure 5.1) and length of stay (H = 4.41, 3 d.f., p = 0.2200; Figure 5.2).

5.2.1.3 *A comparison of the benchmark model with a generalised model*

The property of IIA is examined using a NL model. By relaxing this assumption, it is possible to determine whether perfect substitutability holds across the three

Table 5.4: Search for best specification of continuous attributes

Variables	Model 1a	Model 1b	Model 1c
ASCN	-0.005	0.122	0.238
	(0.100)	(0.148)	(0.186)
ASCA	-0.012	-0.015	-0.020
	(0.070)	(0.070)	(0.070)
Continuity of care	**0.279*** **	**0.362*** **	**0.350*** **
	(0.046)	(0.077)	(0.065)
Involvement of ob. doctors	**0.284*** **	**0.328*** **	**0.332*** **
	(0.040)	(0.072)	(0.051)
Pain relief	**0.175*** **	**0.258*** **	**0.243*** **
	(0.046)	(0.075)	(0.064)
Role in decision-making	**0.251*** **	**0.335*** **	**0.315*** **
	(0.047)	(0.074)	(0.063)
24 hour stay		**0.142** **	
		(0.064)	
48 hour stay		**0.347*** **	
		(0.069)	
72 hour stay		**0.294** **	
		(0.124)	
Cost of €500		-0.129	
		(0.097)	
Cost of €1,000		**-0.177***	
		(0.101)	
Cost of €1,500		**-0.297** **	
		(0.140)	
Length of stay	**0.011*** **		**0.026*** **
	(0.002)		(0.010)
Cost	**-0.001*** **		**-0.000*** **
	(0.001)		(0.000)
Length of stay (squared)			-0.000
			(0.000)
Log-likelihood	-1460.94	-1458.44	-1459.77
Parameters	8	12	9
AIC	2937.89	2940.87	2937.54
BIC	2989.20	3017.84	2995.27
Observations	1,503	1,503	1,503

Notes:

Model 1a, CL on unforced choice; Model 1b, CL with continuous variables coded qualitatively; Model 1c, CL with quadratic term assumed for length of stay; ASCN, alternative-specific constant for opt-out; ASCA, alternative-specific constant for alternative A; AIC, Akaike information criterion; BIC, Bayesian information criterion,

Standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

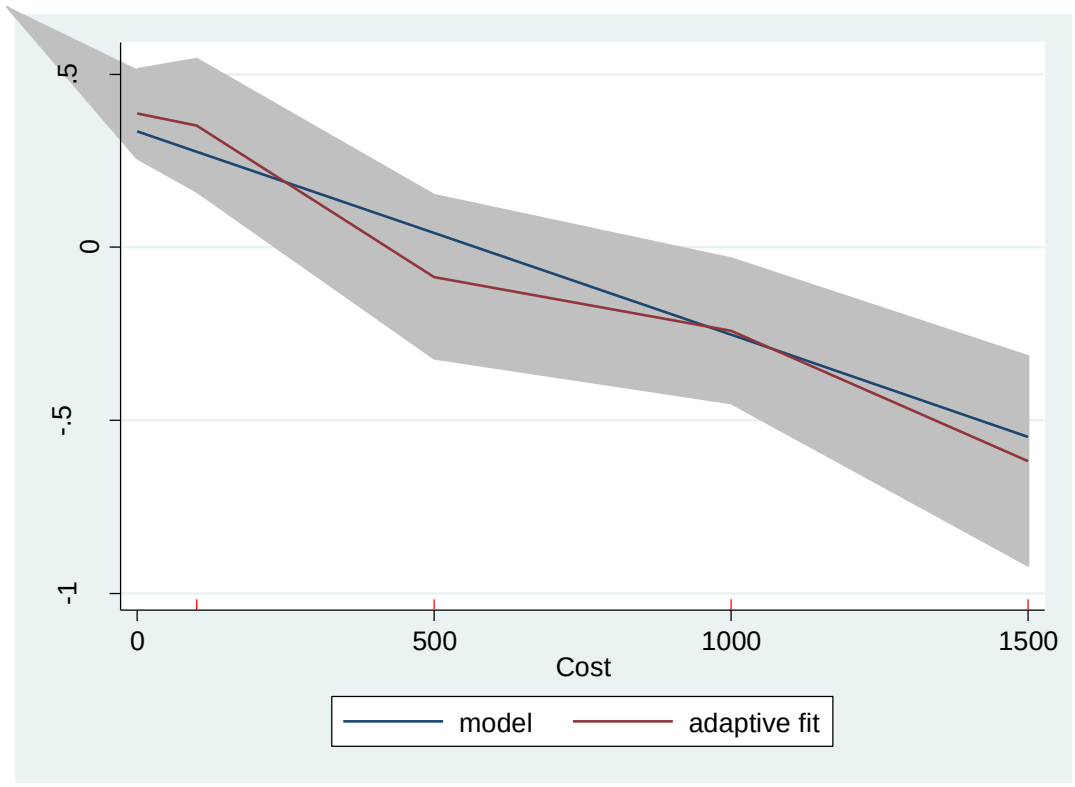


Figure 5.1: Linearity of the pay attribute

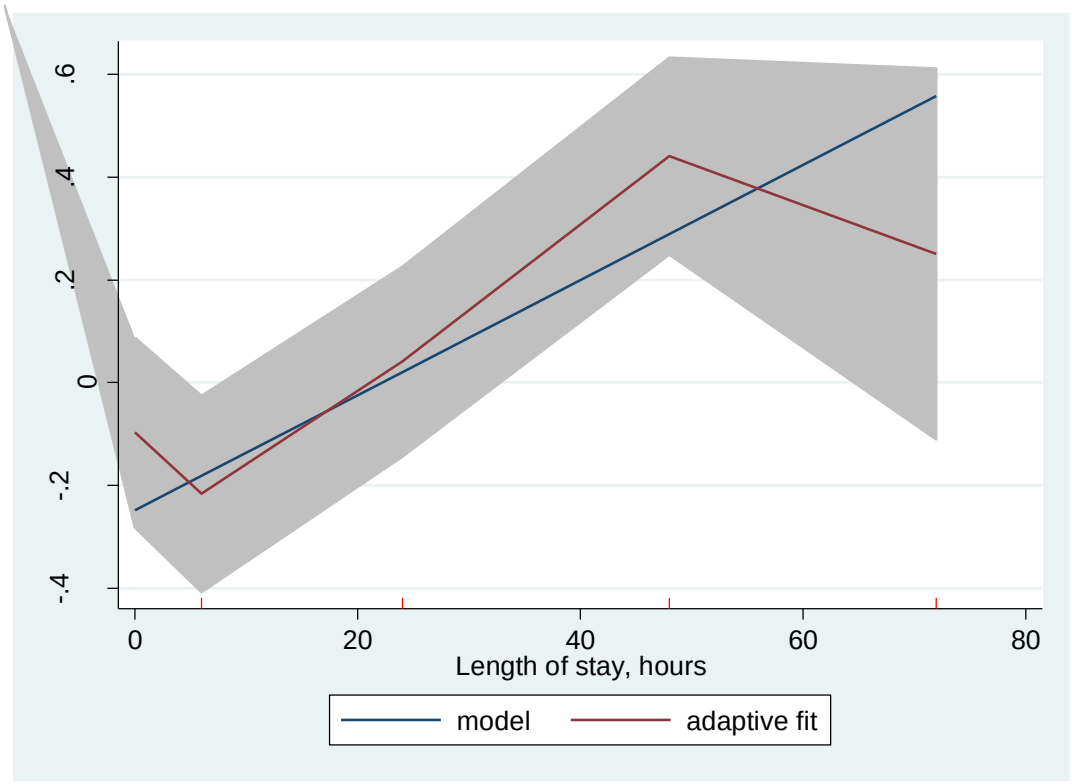


Figure 5.2: Linearity of length of stay attribute

alternatives (Amaya-Amaya *et al* 2008). It is hypothesised that the two experimental alternatives are closely correlated and, hence, compete more equally with each other than they do with the opt-out option. For instance, a woman may choose Maternity Care Service A because the attributes are more attractive than Maternity Care Service B, rather than the opt-out alternative. A two-level NL model is specified where all six attributes underline the utility function (bottom level). Additional information is applied to the nesting structure at the higher level (select alternative A or B, or opt-out). Factors that are assumed to influence women's decision-making at the higher

Table 5.5: (Model 1d) Nested logit on unforced choice scenario

Variables	**Model 1d**
Continuity of care	**0.271*** **
	(0.055)
Involvement of ob. doctors	**0.276*** **
	(0.053)
Pain relief	**0.170*** **
	(0.052)
Role in decision-making	**0.244*** **
	(0.056)
Length of stay	**0.011*** **
	(0.002)
Cost	**-0.001*** **
	(0.000)
Experience	0.011
	(0.111)
Private health insurance status	-0.127
	(0.115)
Dissimilarity parameter	0.977
	(0.139)
Observations	1,503

Notes:
Model 1d, NL on unforced choice.
Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

level are experience and PHI.[41] The results of the NL model are presented in Table 5.5. The estimated coefficients for the attributes are the same as Model 1a. Experience and PHI are insignificant and do not influence whether a woman opts out of the unforced choice scenario. The dissimilarity parameter (0.9769034) is not significantly different to one (p = 0.8692), rendering the NL model inappropriate.

The benchmark model performs best against different specifications of the continuous attributes and more generalised models, such as the NL model. A flexible model is used to investigate how preferences change given further changes in assumptions about respondents' choices. The appropriate dataset to use for this analysis is explored in the first instance and reported in the following section.

5.2.2 *The DRC format*

The DRC format has two objectives. First, it is used to identify the appropriate dataset for further analysis. The results from these analyses are presented in section 5.2.2.1. The second objective is theoretical, and relates to choice consistency. The results from this analysis are presented in section 5.2.2.2.

5.2.2.1 *Identifying the best specification of preferences*

The DCE is designed using a two-stage decision process in that respondents are asked to complete a subsequent choice question (forced choice scenario) if they opt-out of the initial choice question (unforced choice scenario). Therefore, two datasets are

[41] Since women are asked to consider how much they would be willing to pay for maternity care, we modelled PHI to investigate whether the introduction of a payment would influence women who could most likely afford private care to select 'Neither', against those who could not.

obtained. This analysis combines both datasets to assess whether preferences are better specified when estimated collectively, rather than separately.

The benchmark model (Model 1a) describes preferences arising from the unforced choice scenario. Model 2a describes preferences arising from the forced choice scenario (Table 5.6). In Model 2a, the ASC for the opt-out option is removed since it is no longer offered in the choice set; however, an ASC for alternative A is included.

Table 5.6: Comparison of CL on unforced, forced, unforced (excluding opt-out), and pairwise dataset

Variables	Model 1a	Model 2a	Model 2b	Model 2c
ASCN	-0.005			
	(0.100)			
ASCA	-0.012	0.057	-0.053	0.002
	(0.070)	(0.098)	(0.076)	-0.059
Continuity of care	**0.279*** **	**0.159** **	**0.278*** **	**0.245*** **
	(0.046)	(0.064)	(0.049)	-0.038
Involvement of ob. doctors	**0.284*** **	0.093	**0.274*** **	**0.214*** **
	(0.040)	(0.059)	(0.043)	-0.034
Pain relief	**0.175*** **	**0.114***	**0.170*** **	**0.160*** **
	(0.046)	(0.067)	(0.051)	-0.040
Role in decision-making	**0.251*** **	**0.142** **	**0.241*** **	**0.221*** **
	(0.047)	(0.068)	(0.052)	-0.040
Length of stay	**0.011*** **	0.004	**0.012*** **	**0.009*** **
	(0.002)	(0.003)	(0.003)	-0.002
Cost	**-0.001*** **	-0.000	**-0.001*** **	**-0.000*** **
	(0.001)	(0.000)	(0.000)	(0.000)
Log-likelihood	-1460.94	-294.34	-553.12	-865.92
Parameters	8	7	7	7
AIC	2937.89	602.69	1120.24	1745.85
BIC	2989.20	636.20	1159.81	1787.87
Observations	1,503	443	1,060	1,503

Notes:

Model 1a, CL on unforced choice; Model 2a, CL on forced choice; Model 2b, CL on unforced choice (excluding opt-out); Model 2c, CL on pairwise choice (unforced and forced); ASCN, alternative-specific constant for opt-out; ASCA, alternative-specific constant for alternative A; AIC, Akaike information criterion; BIC, Bayesian information criterion.

Standard errors in parentheses,

*** p<0.01, ** p<0.05, * p<0.1

This constant is insignificant, along with some of the attributes. Continuity of care with the same midwife and involvement in decision-making are significant at the 5 per cent level, while access to epidural anaesthesia is significant at the 10 per cent level.

The other attributes are insignificant including access to obstetric doctors, length of stay, and cost. The number of observations used for this analysis is reduced, and includes only those women who opted-out of the unforced choice scenario (443 observations).

Preferences are estimated for the unforced choice scenario with the 443 opt-outs removed (Model 2b). This leaves 1,060 observations for analysis. The attributes are significant and the direction of the coefficients are consistent with Model 1a (Table 5.6).

The data from the unforced and forced choice scenario are merged by replacing the opt-out alternative with respondents' subsequent choice. A standard CL model is estimated on the merged data (Model 2c; Table 5.6). The number of observations used for this analysis is similar to Model 1a as all response data are included. Again, each of the attributes is significant, and the sign of the parameter estimates is similar to those reported in Model 1a. The only notable difference is in the size of the estimated coefficients; the utility associated with each of the attributes is smaller in Model 2c than Model 1a.

The different models are compared using the AIC and BIC (Table 5.6). The weakest model is Model 2a (forced choice scenario) due to small sample size. Marked improvements in model fit are achieved by moving from this model to the unforced choice scenario at the pairwise level (Model 2b), then to the unforced choice scenario

(Model 1a). The model that best describes preferences is Model 2c due to large sample size, lower log-likelihood, and considerably lower AIC and BIC than Model 1a where the sample size is equivalent. This pairwise dataset is used to assess how preferences change given changes in the assumptions about respondents' choices (section 5.2.3).

5.2.2.2 *Testing choice consistency*

The second objective of the DRC format investigates choice consistency. Since the DRC is set up with a forced choice question following an unforced choice question, this analysis examines whether choices made in the follow-up question are similar to those made in the initial choice question. A heteroscedastic CL model is used to investigate choice consistency, or differences in scale (Model 2d). This involves including an additional parameter in the analysis which models the error variance between the two choice questions (Hole 2006; StataCorps 2011a). This scale parameter is inversely related to variance. The parameter is labelled *scale*, and assumes a value of 1 if the choice is from the forced choice scenario and 0 otherwise. The pairwise dataset of the unforced and forced choice scenarios is used (Model 2c).

The results are presented in table 5.7 and indicate that choices made in the forced choice scenario have greater error variability than choices made in the unforced choice scenario, as illustrated by the negative coefficient on the scale parameter. Since this scale parameter is a function of an exponential gamma distribution, the results also show the magnitude of errors arising from the forced choice scenario ($e^{-0.976} = 0.377$) relative to the unforced choice scenario ($e^{0}=1$). This is similar to previous findings which demonstrate that subsequent choices are less consistent than initial choices (Brazell *et al* 2006; Pedersen *et al* 2011; Pedersen *et al* 2012).

Table 5.7: Heteroscedastic CL on pairwise dataset

Variables	Model 2d
ASCA	-0.037
	(0.073)
Continuity of care	**0.289*** **
	(0.047)
Involvement of ob. doctors	**0.271*** **
	(0.042)
Pain relief	**0.181*** **
	(0.047)
Role in decision-making	**0.254*** **
	(0.049)
Length of stay	**0.011*** **
	(0.003)
Cost	**-0.001*** **
	(0.000)
Scale	-0.976
	(0.221)
Observations	1,503

Notes:

Model 2d, Heteroscedastic CL of unforced and forced choice at pairwise level (A or B).

Standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

This analysis demonstrates that the pairwise dataset is the best specification of preferences. The following section uses the pairwise dataset to examine how preferences change given further changes in underlying assumptions about respondents' choices.

5.2.3 *A flexible approach to discrete choice analysis*

A major limitation of the CL model relates to random taste variation (Amaya-Amaya *et al* 2008). This assumption restricts the interpretation of the discrete choice data to represent all individuals in the sample. This assumption is relaxed when using a flexible model, such as the MXL model (Amaya-Amaya *et al* 2008). The MXL model allows preferences to vary across respondents by some predefined distribution (Hensher and Greene 2003). This heterogeneity in preferences is reflected in the

attributes which are specified as random. Several MXL models are estimated to identify the best specification of preferences using the pairwise dataset. The results are presented in section 5.2.3.1. MRS are calculated in terms of women's WTP for a specified level of an attribute, and reported in section 5.2.3.2. The MXL model is also used for subgroup analyses. Two factors are expected to influence preferences: experience and geographic location. These factors are explored separately with MRS calculated in each instance. The results of the subgroup analyses are presented in section 5.2.3.3

5.2.3.1 *Search for best specification of attributes (preferences)*

There are no formal guidelines on what parameters should be specified as random, or what distribution should be assumed for the parameters (Amaya-Amaya *et al* 2008). The best specification of preferences is identified through iterative modelling. This analysis begins by specifying the ASC for alternative A as random (Model 3a). The

Table 5.8: A comparison of model fit across different specifications of random attributes

Model	Observations	Log-likelihood	Parameters	AIC	BIC
Model 2c	1,503	-865.92	7	1745.85	1787.87
Model 3a	1,503	-865.92	8	1747.85	1795.87
Model 3b	1,503	-840.14	8	1696.28	1744.30
Model 3c	1,503	-821.81	9	1661.62	1715.65
Model 3d	1,503	-725.04	10	1470.07	1530.10
Model 3e	1,503	-696.93	11	1415.87	1481.90
Model 3f	**1,503**	**-675.20**	**12**	**1374.40**	**1446.43**
Model 3g	1,503	-674.89	13	1375.78	1453.82

Notes:

Model 2c, CL on pairwise choice (unforced and forced); Model 3a, MXL (ASCA as random); Model 3b, (continuity as random); Model 3c, (continuity, obdocs as random); Model 3d, (continuity, obdocs, painrlf as random); Model 3e, (continuity, obdocs, painrlf, decmak as random); Model 3f, (continuity, obdocs, painrlf, decmak, los as random); Model 3g, (all attributes set as random).

Abbreviations: AIC Akaike information criterion; BIC, Bayesian information criterion

ASC is set as fixed in subsequent analyses where each of the attributes are incrementally specified as random.[42]

The models are compared in Table 5.8.[43] Marked improvements in model fit are achieved by relaxing assumptions about random taste variation. The MXL model is considerably better at estimating women's preferences than the standard CL model, as demonstrated by the reduced AIC and BIC values. The estimation of preferences is further improved by increasing the number of specified random attributes, suggesting that preferences are not fixed, but rather vary across respondents. The model that best describes women's preferences includes five random attributes and two fixed attributes (Model 3f). The two fixed attributes are the ASC for alternative A and cost, or WTP. This model is better than the MXL model which specifies all attributes as random (Model 3g), as illustrated by the lower AIC and BIC values.

The best performing model is presented in Table 5.9 (Model 3f; hereafter, the Preferred Model). Similar to previous analyses, each of the attributes is significant and the sign of the coefficients is as expected. There is considerable heterogeneity in preferences, as captured in the large standard deviations for each of the attributes. The attribute with the greatest utility is continuity of care with the same midwife. Having immediate access to obstetric doctor appears to be the second most important attribute. The greatest heterogeneity in preferences surrounds the attribute for pain relief. (Section 5.2.3.3 investigates potential differences in preferences for pain relief, among other attributes, across experience and geographic location.) The least important

[42] Model 3b specifies *continuity* as random; Model 3c: *continuity* and *obdocs*; Model 3d: *continuity, obdocs* and *painrlf*; Model 3e: *continuity, obdocs, painrlf* and *decmak*; Model 3f: *continuity, obdocs, painrlf, decmak* and *los*; Model 3g: *continuity, obdocs, painrlf, decmak, los* and *cost*.
[43] 500 Halton draws are used in each MXL model.

Table 5.9: Preferred Model with cost specified as fixed and normally distributed

	Preferred Model	
Variables	**Mean**	**SD**
ASCA	0.023	
	(0.097)	
Continuity of care	**0.558*** **	**0.704*** **
	(0.101)	(0.096)
Involvement of ob. doctors	**0.514*** **	**0.693*** **
	(0.080)	(0.092)
Pain relief	**0.285** **	**0.980*** **
	(0.136)	(0.12)
Role in decision-making	**0.418*** **	**0.731*** **
	(0.105)	(0.101)
Length of stay	**0.023*** **	**0.029*** **
	(0.005)	(0.004)
Cost	**-0.001*** **	
	(0.000)	
Log-likelihood	-675.20	
Parameters	12	
AIC	1374.40	
BIC	1446.43	
Observations	1,503	

Notes:

Preferred model is Model 3f (continuity, obdocs, painrlf, decmak, los as random, and cost and ASCA set as fixed).

Abbreviations: ASCA, alternative-specific constant for alternative A; AIC, Akaike information criterion; BIC, Bayesian information criterion.

Standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

attribute is length of stay, with little heterogeneity in preferences found for this attribute.

A normal distribution is assumed for the estimated parameters in each of the above analyses. A lognormal distribution is assumed for the cost attribute and examined in a separate analysis (Model 3h). The model is compared with the Preferred Model (Model 3f) in Table 5.10. The results from both models conform to previous analyses: each of the attributes is significant, and the sign of the coefficients is as expected with the exception of Model 3h where the sign of the length of stay and cost attribute is

reversed. Model fit is also compared in Table 5.10. Specifying the cost attribute as fixed and normally distributed is the best fit for the data. This is useful for calculating MRS where, in order to estimate WTP, both variables need to be distributed normally (Hole 2007). The Preferred Model is used to calculate MRS (below).

5.2.3.2 *Calculating marginal rates of substitution*

MRS are calculated for each of the attributes against the cost attribute using the Delta method (Hole 2007). This generates information on women's marginal WTP for a specified level of an attribute. The WTP estimates are calculated using information from the preferred model. The estimates are compared with the standard CL model (Model 2c) to examine how the different utility functions influence women's WTP. The estimated mean WTP for both models is presented in Table 5.11.

There are some similarities in the estimated WTP values. In both models, the most important attribute is continuity of care with the same midwife. In Model 3f, women are willing to give up €557.59 to ensure this outcome, compared with €608.99 in the CL model (Model 2c). The second most important attribute in the MXL model is having immediate access to an obstetric doctor in a CLU during intrapartum care. Women are willing to pay €514.14 for this outcome. While this is the third most important attribute in the CL model, women are willing to pay a similar amount to ensure this outcome (€533.30). The second most important attribute in Model 2c is women's role in decision-making, with respondents willing to give up €551.17 to ensure they are actively involved in the decision-making around their labour; this is the third most important attribute in Model 3f with women willing to pay €418.18 for an active role. Having immediate access to epidural anaesthesia in a CLU over a

Table 5.10: Mixed logit model: normal versus lognormal distribution for WTP attribute (Preferred Model versus Model 3h)

	Preferred Model		**Model 3h**	
Variables	**Mean**	**SD**	**Mean**	**SD**
ASCA	0.023		0.019	
	(0.097)		(0.093)	
Continuity of care	**0.558*** **	**0.704*** **	**0.506*** **	**0.670*** **
	(0.101)	(0.096)	(0.098)	(0.095)
Involvement of ob.	**0.514*** **	**0.693*** **	**0.455*** **	**0.642*** **
doctors	(0.080)	(0.092)	(0.078)	(0.088)
Pain relief	**0.285** **	**0.980*** **	**0.262** **	**0.913*** **
	(0.136)	(0.120)	(0.132)	(0.108)
Role in decision-	**0.418*** **	**0.731*** **	**0.381*** **	**0.661*** **
making	(0.105)	(0.101)	(0.098)	(0.097)
Length of stay	**0.023*** **	**0.029*** **	**-4.171*** **	**0.974*** **
	(0.005)	(0.004)	(0.262)	(0.175)
Cost	**-0.001*** **			
	(0.000)			
Cost (log)			**0.001*** **	
			(0.000)	
Log-likelihood	-675.20		-683.15	
Parameters	12		12	
AIC	1374.40		1390.31	
BIC	1446.43		1462.34	
Observations	1,503		1,503	

Notes:

Preferred model is Model 3f (cost specified with normal distribution); Model 3h (cost specified with lognormal distribution); all other attributes set as random.

Standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

birthing pool in a MLU is the second least preferred attribute in both models, with women willing to give up less money to ensure this outcome (€284.76 and €398.33, respectively). Length of stay in hospital is the least preferred attribute.

There are some notable differences in mean WTP values also. In almost all cases, estimated WTP is larger in Model 2c than Model 3f with women often willing to sacrifice considerably more money to ensure their preferred outcome. The only attribute where WTP is higher in Model 3f is found in the length of stay attribute. Women are willing to pay slightly more for an additional hour in hospital after birth (€23.29) than in Model 2c (€21.42). A major difference between the two models lies

Table 5.11: Comparison of willingness to pay across Preferred Model and Model 2c

	Preferred Model			Model 2c		
		95% CI			95% CI	
Variable	**Mean WTP**	**0.025 quantile**	**0.975 quantile**	**Mean WTP**	**0.025 quantile**	**0.975 quantile**
Continuity	€557.59	€317.21	€903.71	€608.99	€327.25	€1,159.16
Involvement of ob. doctors	€514.14	€331.72	€737.21	€533.30	€292.49	€953.26
Pain relief	€284.76	€27.12	€623.06	€398.33	€164.60	€849.59
Role in decision-making	€418.18	€200.48	€741.00	€551.17	€276.06	€1,090.56
Length of stay	€23.29	€15.03	€32.18	€21.42	€13.15	€31.54

Notes:

Preferred model is Model 3f: MXL model with cost specified as fixed and normally distributed; Model 2c: CL model on pairwise dataset (unforced and forced choice scenario).

Abbreviations: WTP, willingness to pay, CI: confidence intervals.

in the size of the estimated 95 per cent confidence intervals. The estimated confidence intervals for the MXL model are considerably narrower than the CL model. This is the result of relaxing assumptions about respondents' choices through the use of a flexible model, rather than a restrictive model.

5.2.3.3 *A subgroup analysis of experience and geographic location*

Subgroup analyses are performed to assess whether preferences differ across two factors: previous obstetric experience and geographic location. A MXL model is used on the pairwise dataset to compare preferences. The first subgroup analysis explores the preferences of first-time mothers (Model 4a). Experienced maternity care users (any woman who has given birth before) are examined in Model 4b. There are 51 first-time mothers in the sample, and 45 experienced maternity care users.

The results from the two subgroups are presented in Table 5.12. Previous obstetric experience plays a considerable role in influencing preferences, as illustrated by the strengths of preferences, or utility scores, on the different attributes. Similar to previous analyses the sign of the estimated coefficients is as expected and almost all

Table 5.12: Comparing preferences of first-time mothers (Model 4a) versus experienced maternity care users (Model 4b)

	Model 4a		**Model 4b**	
Variables	**Mean**	**SD**	**Mean**	**SD**
ASCA	0.036		-0.024	
	(0.133)		(0.144)	
Continuity of care	**0.741*** **	**0.747*** **	**0.358*** **	**0.699*** **
	(0.152)	(0.164)	(0.123)	(0.142)
Involvement of ob.	**0.487*** **	**0.552*** **	**0.692*** **	**0.852*** **
doctors	(0.122)	(0.117)	(0.120)	(0.147)
Pain relief	-0.081	**0.962*** **	**0.772*** **	**1.028*** **
	(0.156)	(0.140)	(0.184)	(0.180)
Role in decision-	**0.442*** **	**0.876*** **	**0.511*** **	**0.637*** **
making	(0.150)	(0.168)	(0.144)	(0.131)
Length of stay	**0.030*** **	**-0.014** **	**0.018** **	**0.035*** **
	(0.006)	(0.006)	(0.007)	(0.006)
Cost	**-0.001*** **		**-0.001*** **	
	(0.000)		(0.000)	
Observations	794	794	701	701

Notes:

Model 4a: first-time mothers; Model 4b: experienced users.
Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

of the attributes are significant. There are several notable differences between the two groups. Having access to epidural anaesthesia over a birthing pool is insignificant in Model 4a; first-time mothers are not concerned about the epidural. On the other hand, experienced maternity care users are primarily concerned about having immediate access to the epidural (Model 4b). This is the most important attribute for this group of women. The most important attribute for first-time mothers is continuity of care with the same midwife during antenatal through to intrapartum care. Having immediate access to obstetric doctors in a CLU over restricted access in a MLU is the second most important attribute for both groups; however, experienced maternity care users derive greater utility from this attribute than first-time mothers. In terms of the length of stay attribute, women who have given birth before enjoy shorter periods of stay in hospital post-delivery, as illustrated in the lower mean utility score for this attribute.

MRS are calculated for both subgroups, and presented in Table 5.13. As evidenced in the size of the utility scores above, the most important attribute for experienced maternity care users is access to epidural anaesthesia. Women are willing to pay €750.11 to forego a birthing pool. The most important attribute for first-time mothers is continuity of care with the same midwife. This group are willing to give up €745.74 to ensure this outcome. Having immediate access to an obstetric doctor in a CLU is the second most important attribute for both groups, however, experienced maternity care users are willing to pay considerably more for this outcome, €671.90 compared with €490.05 for first-time mothers. Both groups are willing to sacrifice a similar amount of money to be actively involved in the decision-making around their labour. First-time mothers are willing to pay almost twice as much for an additional hour spent in hospital post-delivery.

The second subgroup analysis focuses on geographic location. A MXL model on the pairwise dataset is also used to explore potential differences in preferences. The first analysis is on response data from CUMH (Model 4c). The second analysis is on the

Table 5.13: Comparing the WTP of first-time mothers (Model 4a) against experienced maternity care users (Model 4b)

	Model 4a			**Model 4b**		
		95% CI			**95% CI**	
Variable	**Mean WTP**	**0.025 quantile**	**0.975 quantile**	**Mean WTP**	**0.025 quantile**	**0.975 quantile**
Continuity	€745.74	€314.78	€1,176.70	€347.39	€53.96	€640.82
Involvement of ob. doctors	€490.05	€169.15	€810.95	€671.90	€354.20	€989.60
Pain relief	-€81.20	-€378.42	€216.02	€750.11	€267.04	€1,233.18
Role in decision-making	€444.67	€67.11	€822.24	€496.46	€126.52	€866.41
Length of stay	€30.56	€20.52	€40.59	€17.13	€5.00	€29.25

Notes:
Model 4a: first-time mothers; Model 4b: experienced users.
Abbreviations: WTP, willingness to pay; CI, confidence intervals

NMH (Model 4d). The results from the subgroup analyses are presented in Table 5.14.

The results suggest that geographic location plays an important role in influencing preferences. This is illustrated in the different utility scores on the various attributes. In CUMH, women's preferences are indicative of the consultant-led model of care, which is the only model of care on offer in the region. In the NMH, preferences are more illustrative of the hybrid model of consultant and midwifery-led care, or DOMINO care, which is provided by the maternity unit.

The sign of the estimated coefficients is as expected, and almost all of the attributes are significant. The attribute for access to epidural anaesthesia is insignificant in Model 4d. Women attending this maternity unit are indifferent between the epidural and birthing pool, or CLU and MLU. In Model 4c, having immediate access to the epidural is important, however, it is not the most important attribute. The most

Table 5.14: Comparing preferences between CUMH (Model 4c) and the NMH (Model 4d)

	Model 4c		**Model 4d**	
Variables	**Mean**	**SD**	**Mean**	**SD**
ASCA	-0.022		0.125	
	(0.116)		(0.171)	
Continuity of care	**0.462*** **	**0.658*** **	**0.614*** **	**0.998*** **
	(0.117)	(0.112)	(0.170)	(0.229)
Involvement of ob. doctors	**0.430*** **	**0.670*** **	**0.567*** **	**-0.587*** **
	(0.118)	(0.118)	(0.151)	(0.122)
Pain relief	**0.344** **	**0.917*** **	0.248	**0.930*** **
	(0.140)	(0.127)	(0.221)	(0.159)
Role in decision-making	**0.422*** **	**0.661*** **	**0.492*** **	**0.795*** **
	(0.121)	(0.107)	(0.183)	(0.192)
Length of stay	**0.027*** **	**0.030*** **	**0.0140** **	**0.0215*** **
	(0.0056)	(0.005)	(0.007)	(0.007)
Cost	**-0.001*** **		**-0.001*** **	
	(0.000)		(0.000)	
Observations	995	995	500	500

Notes:

Model 4c: CUMH; Model 4d: the NMH.

Standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

important attribute for this group of women (CUMH) is continuity of care with the same midwife. This is also the case for women attending the NMH; however, the attribute is valued differently between both groups. The mean utility score in Model 4d is considerably higher than Model 4c. Having immediate access to obstetric doctors in a CLU is the second most important attribute to both groups of women, with large differences in utility scores estimated also. Having an active role in the decision-making around their labour is the third most important attribute for both groups, with similar utility scores estimated. Women attending the NMH are keen to stay in hospital for shorter periods, similar to the DOMINO scheme, than women attending CUMH. While there are several differences between the groups, particularly in terms of the estimated utility scores, it is important to note that fewer observations are obtained from the NMH. This is likely affecting the level of heterogeneity in preferences for this group, as depicted by the large standard deviations for some of the attributes in Model 4d.

The above conclusions are better illustrated using MRS against the cost attribute. These calculations are presented in Table 5.15. The higher utility score for continuity of care in Model 4d suggests that women attending the NMH are willing to give up €726.52 to ensure this outcome, compared with €444.44 for women attending CUMH. The similarly higher utility score for having immediate access to an obstetric doctor in a CLU implies that women attending the NMH are willing to sacrifice €670.03 for this outcome. This compares sharply with Model 4c where women are willing to give up €414.14 to have immediate access to an obstetric doctor in a CLU over restricted access in a MLU. Being actively involved in the decision-making is important to both groups, with women attending the NMH willing to pay more for this active role than

Table 5.15: Comparing the WTP of women attending CUMH (Model 4c) against women attending the NMH (Model 4d)

	Model 4c			Model 4d		
		95% CI			95% CI	
Variable	**Mean WTP**	**0.025 quantile**	**0.975 quantile**	**Mean WTP**	**0.025 quantile**	**0.975 quantile**
Continuity	€444.44	€156.51	€732.37	€726.52	€113.19	€1,339.84
Involvement of ob. doctors	€414.11	€141.57	€686.64	€670.03	€114.11	€1,225.95
Pain relief	€331.72	€24.97	€638.47	€293.01	-€268.95	€854.97
Role in decision-making	€405.94	€111.81	€700.07	€582.08	-€5.20	€1,169.36
Length of stay	€26.37	€16.81	€35.93	€16.50	€3.20	€29.80

Notes:
Model 4c: CUMH; Model 4d: the NMH.
Abbreviations: WTP, willingness to pay; CI, confidence intervals

women attending CUMH. In contrast, women attending CUMH are willing to pay almost twice as much for an additional hour in hospital after birth (€26.37) than women attending the NMH (€16.50).

This analysis concludes this sub-section and section on the flexible approach to the DCE. An interpretation of these findings is presented at the end of this chapter. The final analysis of the DCE is presented first and focuses on policy analysis and welfare measures (section 5.2.4).

5.2.4 *Policy analyses and welfare*

This section presents the final analysis of the DCE. The discrete choice data are used for policy analysis in the first instance. State-of-the-world models are examined to identify women's individual WTP for different models of care, reported in section 5.2.4.1. The probability of uptake for each model of care is subsequently calculated and described in section 5.2.4.2. These data are then used to measure welfare change. The measures of welfare change are reported in section 5.4.2.3

5.2.4.1 *Estimating individual WTP (state-of-the-world models)*

Mean utility scores for the attributes in the DCE are estimated by Model 3f in section 6.2.3.1. These data are used to generate a mean utility score for a combination of attributes which reflect three different packages of care: care in a CLU; care in a MLU; and DOMINO care.[44] Individual WTP for each model of care is calculated using 1,000 draws from a standard normal distribution (Train 2002), and presented in Table 5.16.

Women are willing to pay €949.71 for a state-of the-world where the only available model of care on offer is care in a CLU. For a state-of-the-world where the only model of care available is care in a MLU, women are willing to pay €725.31. It is possible to measure welfare change by moving from the former to the latter by subtracting the individual WTP for the initial state-of-the-world from the WTP for the new state-of-the-world. In this case women would have to be compensated by €224.44 to maintain their initial level of utility. DOMINO care is valued the most with women willing to pay €1,112.31 for this state-of-the-world. To move from care in a CLU to DOMINO care, women are willing to pay €162.60 for this welfare gain.

The measures of welfare change described above are useful if only one alternative can be pursued as the WTP calculations are based on the assumption that the service will be utilised with certainty. State-of-the-world models cannot measure welfare change arising from the provision of multiple alternatives (Lancsar and Savage 2004; Ryan

[44] As described in section 4.2.3.1, Care in a CLU describes discontinuity of care with a midwife, immediate access to an obstetric doctor and epidural anaesthesia, limited involvement in decision-making, and 48 hours length of stay; care in a MLU describes guaranteed continuity of care with a midwife, limited access to obstetric doctors and epidural, greater involvement in decision-making, and 24 hours length of stay; DOMINO care describes continuity of care with a midwife, immediate access to an obstetric doctor and epidural anaesthesia, limited involvement in decision-making, and 6 hours length of stay.

2004). To measure welfare change arising from the provision of alternative services, consideration of the welfare gain associated with each alternative is required. This is reflected in Hick's (1939) measure of welfare change, or CV, which weights the utility of each alternative by the probability of uptake. The probability of uptake is calculated in section 5.2.4.2 (below), and incorporated into the CV of welfare change in section 5.2.4.3.

5.2.4.2 *Market uptake: predicting utilisation*

Using the logit specification (Eqn. 2.10), this analysis estimates the probability that an individual will utilise care in a MLU relative to care in a CLU. The probability of utilising DOMINO care relative to care in a CLU is also estimated, while both experimental alternatives are modelled against care in a CLU in a separate analysis. It is assumed that the initial probability of uptake for care in a CLU is 1.00 since this analysis is interested in modelling market outcomes in regions where the only model of care on offer (at hospital level) is care in a CLU.[45] Probabilities are simulated over 1,000 draws and estimated as means over the total number of replications (Train 2002).

The introduction of a MLU would affect the utilisation of consultant-led care (Table 5.17). A large proportion of women would substitute to the new service; the probability of uptake for care in a MLU is estimated at 0.459. The probability of uptake for care in a CLU is estimated at 0.541. If DOMINO care is introduced alongside

[45] While the opt-out option is included in DCEs to improve realism and model market outcomes, the opt-out option is removed from this analysis for several reasons. The opt-out option was included in the DCE to improve realism, but it was not analysed in a meaningful way other than through the use of an ASC. This is because the reference category for each attribute describes an alternative feature of care, rather than the opt-out option. It is possible to re-code the variables with the opt-out option specified as the reference case. However, considerable information is then lost on the original reference categories as it is not possible to create and model dummy variables for each of these categories due to issues with collinearity. This is a limitation of the DCE design, however, the impact on predicted probabilities is assumed to be minor for several reasons, discussed in Chapter 8.

consultant-led care, a greater number of women would utilise the new service with the probability of uptake estimated at 0.524 compared with 0.476 for care in a CLU. If both experimental alternatives are introduced alongside consultant-led care, the probability of uptake across the three models of care is estimated at 0.340 for care in a CLU, 0.274 for care in a MLU, and 0.385 for DOMINO care.

The preferred model of care is DOMINO care. A greater number of women would utilise this service if provided alongside consultant-led care, or both consultant-and midwifery-led care. The next section measures the welfare change arising from the provision of different models of care.

5.2.4.3 *A CV measure of welfare change*

Hicks' (1939) CV is used to estimate the welfare change arising from the introduction of midwifery-led care and DOMINO care relative to consultant-led care. In the first instance, the welfare change arising from the introduction of midwifery-led care is calculated, based on Small and Rosen's (1981) adaptation of Hick's (1939) CV formula (Eqn. 4.9; Table 5.18). The individual WTP for midwifery-led care is valued at €725.31 (see Table 5.16). This compares with an individual WTP of €949.71 for care in a CLU. When care in a MLU is introduced, where the probability of uptake is 0.459, the welfare gain arising from the policy change is €845.56. Intuitively, this is larger than the individual WTP for care in a MLU but smaller than the estimated WTP for care in a CLU since some women substitute away from consultant-led care, while others remain with the existing service. The introduction of DOMINO care relative to care in a CLU generates a welfare gain of €1,110.89 (Table 5.18).

This is the amount women would be willing to pay to experience the welfare gain associated with this change in policy. This value is marginally smaller than the individual WTP for DOMINO care as some women will instead utilise consultant-led care, which is valued at €949.71 (Table 5.16). If both experimental alternatives are introduced alongside an existing CLU the welfare gain is estimated at €1,509.39.

This analysis concludes the DCE. A discussion of these findings is presented next.

Table 5.16: Calculation of individual WTP for different states of the world

		95% CI	
Model of care	**Mean WTP**	**0.025 quantile**	**0.975 quantile**
CLU	€949.71	€873.03	€1,026.38
MLU	€725.31	€662.84	€787.79
DOMINO	€1,112.31	€1,026.36	€1,198.27

Notes:
Abbreviations: CLU consultant-led unit; MLU, midwifery-led unit; DOMINO, domiciliary in and out of hospital care; WTP, willingness to pay; CI, confidence intervals

Table 5.17: Predicting market uptake for different models of care

		95% CI	
Model of care	**Probability**	**0.025 quantile**	**0.975 quantile**
CLU vs MLU			
CLU	0.541	0.524	0.559
MLU	0.459	0.441	0.476
CLU vs DOMINO			
CLU	0.476	0.458	0.495
DOMINO	0.524	0.505	0.542
CLU vs MLU vs DOMINO			
CLU	0.340	0.325	0.356
MLU	0.274	0.260	0.288
DOMINO	0.385	0.368	0.402

Notes:
Abbreviations: CLU, consultant-led unit; MLU, midwifery-led unit; DOMINO, domiciliary in and out of hospital care; WTP, willingness to pay; CI, confidence intervals

Table 5.18: Calculation of welfare change following introduction of a MLU and DOMINO care alongside a CLU

		95% CI	
	Mean WTP	**0.025 quantile**	**0.975 quantile**
Compensating variation			
CLU vs MLU	€845.56	€794.44	€896.68
CLU vs DOMINO	€1,110.89	€1,044.70	€1,177.08
CLU vs MLU vs DOMINO	€1,509.39	€1,440.79	€1,577.99

Notes:
Abbreviations: CLU, consultant-led unit; MLU, midwifery-led unit; DOMINO, domiciliary in and out of hospital care; WTP, willingness to pay; CI, confidence intervals

5.3 A discussion of the DCE findings

Several objectives are contained within the DCE, as outlined in Chapter 4. This section discusses the various findings.

In the first instance, a CL model is estimated to explore how preferences change given changes in the underlying assumptions about respondents' choice. This benchmark model (Model 1a) is compared with a generalised model (Model 1d) to examine whether perfect substitutability holds across each alternative (Amaya-Amaya *et al* 2008). A NL model is used to test whether respondents treat the experimental alternatives differently to the opt-out alternative. An insignificant dissimilarity parameter is generated by the NL model, suggesting that the experimental alternatives are not significantly different to the opt-out alternative (Model 1d; Table 5.5).

Inclusion of an opt-out option in a DCE improves the realism of the task to respondents (Anderson and Wiley 1992; Louviere and Woodworth 1983). However, inclusion of an opt-out alternative may incur a large loss of data; any time the opt-out alternative is selected, information on respondents' strengths of preferences for the different attributes included in the DCE is lost (Brazell *et al* 2006). This analysis employed the

DRC format as a solution to this information loss. The DRC is designed using a two-stage choice process that includes an unforced choice scenario and a forced choice scenario. In the unforced choice scenario, respondents are presented with the option of two experimental alternatives (A or B) and an opt-out option. If the opt-out option is selected, this group of women are asked to evaluate the experimental alternatives in a follow-up question (forced choice scenario). The DRC generates two datasets: one for the unforced choice scenario and another for the forced choice scenario. This analysis explored the different datasets using a standard CL model to examine whether preferences are better estimated separately, or collectively (Table 5.6). To estimate preferences collectively, both datasets are merged at the pairwise level (A or B). This involves replacing the opt-out option in the unforced choice scenario with respondents' choices from the forced choice scenario. This pairwise dataset identifies the best specification of preferences. (Model 2c; Table 5.6).

The DRC format is a relatively new development in the DCE literature, and has only recently been applied within the health economics literature (Pedersen *et al* 2011; Pedersen *et al* 2012). Given the shortage of empirical application of this approach in DCEs, very little is known about the impact of the DRC format on respondents' choices. The literature thus far suggests that choice consistency differs across the two choice scenarios, with greater error variability arising in follow-up choice tasks than initial choice tasks (Collins and Rose 2013; Giergiczny *et al* 2013; Pedersen *et al* 2011). This is supported by this analysis where choices made in the forced choice scenario proved less consistent than choices made in the unforced choice scenario (Model 2d; Table 5.7). A fading interest, or waning motivation, to evaluate the forced choice scenario with the same focus as the unforced choice scenario is likely to be

responsible for the increase in error variability. These results contribute to the growing body of work on the effect of this approach on DCE responses.

The pairwise dataset is used to explore how preferences change given further changes in the underlying assumptions about respondents' choices. A MXL model is employed to investigate potential heterogeneity in preferences and compared with the fixed effects CL model (Model 2c). While the MXL model is popularly used to explore heterogeneity in preferences, the criterion for specifying the appropriate distribution for parameters, or parameters to treat as random (heterogeneous), is not well defined (Amaya-Amaya *et al* 2008; Hensher and Greene 2003). This analysis employs an iterative approach to this specification problem, and treats various parameters as random across different analyses, and explores different distributions for the cost attribute. Considerable improvements in model fit are achieved using the flexible model, compared with the fixed effects CL model, suggesting that preferences are not fixed but vary across respondents (Table 5.8). The best specification of preferences is described by Model 3f where the cost attribute and ASC for alternative A are specified as fixed with the remaining five attributes treated as random. This model, which assumes a normal distribution for the cost attribute, is also better than Model 3g, which assumes a lognormal distribution for the cost attribute.

Women's preferences are summarised by the Preferred Model (Model 3f; Table 5.9) where the importance of each attribute is well defined and demonstrates the value of using qualitative research to develop attributes and levels. Other studies defined similar attributes, confirming their relevance to the obstetric population (Kruk *et al* 2009; Hundley and Ryan 2004; Pitchforth *et al* 2008). Each attribute is significant and the sign of the coefficients is as expected. The negative coefficient on the cost attribute

implies a disutility associated with having to pay for maternity care, with women willing to give up less. The positive coefficient on each of the other attributes implies a utility associated with being guaranteed continuity of care with the same midwife from antenatal through to intrapartum care; having immediate access to obstetric doctors and epidural anaesthesia during labour; being actively involved in the decision-making around their labour; and enjoying extended periods of stay in hospital after the birth of their baby. However, there is considerable heterogeneity in preferences across women, supporting the use of a flexible model to estimate preferences. The large standard deviations suggest that women have varying preferences for each of the random attributes. For instance, the attribute with the greatest heterogeneity in preferences is pain relief, with women divided on their preference for the epidural anaesthesia or a birthing pool (Table 5.9).

The relative importance of attributes is depicted by the size of the utility scores, or MRS (Ryan *et al* 2008b). MRS against the cost attribute are calculated for each of the attributes. The most important attribute to women is continuity of care with the same midwife, with women willing to give up €557.59 to ensure this outcome (Table 5.11). Women are then willing to pay €514.14 to have immediate access to obstetric doctors during labour, and €418.18 to be actively involved in the decision-making around their labour. To have immediate access to an epidural, women are willing to give up €284.76, while for an extra hour in hospital after the birth of their baby, women are willing to pay €23.29.

The literature suggests that previous obstetric experience plays a considerable role in influencing preferences (Ryan and Ubach 2003), especially within a maternity care setting where experience of a service influences a woman's decision to utilise that

service in the future (Cartwright 1979). This is explored in an Irish context using subgroup analysis. The results suggest that women with a history of childbirth have a disposition towards consultant-led care, relative to women who have never given birth before. For instance, experienced maternity care users are WTP considerably more (€671.90) to have obstetric doctors involved in their care than first-time mothers who are willing to pay (€490.05) (Table 5.13). Experienced maternity care users also value the epidural anaesthesia more than any other attribute and are willing to give up €750.11 to ensure this outcome. For first-time mothers, however, this attribute is insignificant. The literature also suggests that knowledge of a service's availability plays a considerable role in influencing preferences (Hundley and Ryan 2004; Ryan and Ubach 2003; Salkeld *et al* 2000). The two maternity units present an interesting opportunity to explore this phenomenon since the range of services provided in each region differs. In CUMH, the only service on offer is consultant-led care; this contrasts with the NMH where consultant-led care is provided alongside DOMINO care, which is more illustrative of midwifery-led care. The results suggest that women delivering in CUMH have a stronger disposition towards consultant-led care, while women in the NMH have a stronger preference for midwifery-led care (Table 5.14). For instance, women in the NMH are willing to pay €726.52 to have continuity of care with the same midwife, compared with €444.44 for CUMH (Table 5.15). This research supports the hypotheses that experience and geographic location influence preferences (Cartwright 1979; Hundley and Ryan 2004; Ryan and Ubach 2003; Salkeld *et al* 2000).

While preferences vary for each attribute, the results suggest that women do not have a clear preference for either consultant-led or midwifery-led care. Instead, women

have a preference for a hybrid model of care which encompasses features of both models of care. For instance, women want continuity of care with the same midwife during antenatal care, which is assured in a MLU but not a CLU, and to deliver in a CLU where the full range of medical services is immediately available. This model of care is synonymous with the DOMINO scheme which offers continuity of care with the same midwife during antenatal care in a community setting and intrapartum care in a CLU (Kennedy 2012).

This preference for DOMINO care is confirmed by the policy analysis where women's individual WTP for the DOMINO scheme is considerably larger (€1,112.31) than their WTP for care in a CLU (€949.71) or care in a MLU (€725.31) (Table 5.16). The probability of uptake for the different models of care is also calculated where the results suggest that women are more likely to utilise the DOMINO scheme than care in a CLU or MLU. The DOMINO scheme would be utilised by 38.5 per cent of the low risk obstetric population, while 34 per cent and 27.4 per cent, respectively, would choose care in a CLU and MLU (Table 5.17).

The policy analysis is assimilated in the measure of welfare change, or CV, which accounts for the probability of uptake. For instance, following the introduction of a MLU alongside an existing CLU, the welfare gain is estimated at €845.56 (Table 5.18). This value is larger than the individual WTP for care in a MLU, but less than the WTP for care in a CLU, as the change in welfare only benefits some maternity users; some women will substitute to the new service (MLU), while others will remain with the existing service (CLU). Following the introduction of both a MLU and the DOMINO scheme, the welfare gain is estimated at €1,509.39 (Table 5.18). Intuitively, this is larger than the individual WTP for the DOMINO scheme and care in a MLU,

but not jointly, as some maternity users will substitute to the DOMINO scheme and others to the MLU, while some women will remain with the existing service.

Based on the results of the DCE, women's preferred model of care in Ireland is the DOMINO scheme, followed by care in a CLU, and care in a MLU. These results are consistent with the qualitative research, presented in Chapter 3. The policy implications arising from these findings are considerable. While there is an increased interest among policy makers to expand MLUs in Ireland (Condon 2015; Culliton 2014; DOH 2015; KPMG 2008), the potential demand for this service appears weak. The results suggest women would largely prefer to deliver in a CLU where they have immediate access to medical services during intrapartum care, and are willing to forego continuity of care with the same midwife to ensure this outcome. Women's WTP for this option is larger than the estimated welfare gain arising from the provision of midwifery-led care alongside consultant-led care.

The measures of welfare change and individual WTP estimates presented here demonstrate the usefulness of a DCE to inform benefit valuations in a CBA. The approach provides important information on state-of-the-world scenarios and can be used to determine the suitability of multiple alternatives, which are important considerations from a policy perspective. In order to use DCE data within CBA, the experiment must be undertaken alongside a clinical trial where exhaustive cost and benefit data can be captured and compared directly (McIntosh 2006). This involves developing attributes to correspond with cost inputs. While it is not possible to use the data presented here in a CBA of consultant- and midwifery-led care, a contingent valuation study is undertaken to compare the two major models of maternity care. The

results of the CVM are presented in Chapter 6. The following section concludes this chapter. A broader discussion of the findings presented here is outlined in Chapter 8.

5.4 Conclusion

This chapter presents the results from the DCE. A number of important findings relating to the different objectives outlined in Chapter 4 are obtained within this analysis. A relatively recent innovation within DCEs is explored in this analysis, relating to the DRC format (section 6.2.2). While choice consistency is reduced in the forced choice scenario, this analysis shows that a pairwise combination of the unforced and forced choice datasets represents the best specification of preferences. The pairwise dataset is used to explore how preferences change given changes in the underlying assumptions about respondents' choices (section 6.2.3). The results show that a flexible model, which allows preferences to vary across respondents, fits the data better than a fixed model which assumes homogeneity of preferences (section 6.2.3.1). The flexible model is also used to test two hypotheses that have been shown to influence preferences: experience and geographic location. This research supports the hypothesis that preferences are influenced by previous obstetric experience and knowledge of a service's availability (geographic location) (section 6.2.3.2).

In its first empirical application within maternity care in Ireland, this analysis investigates women's WTP for different models of care (section 6.2.4.1), predicts market uptake (section 6.2.4.2), and measures welfare change (section 6.2.4.3). In terms of women's individual WTP, the results suggest that women are willing to give up €949.71 for care in a CLU; €725.31 for care in a MLU; and €1,112.31 for the DOMINO scheme. The potential market uptake is calculated for each package of care,

where 34 per cent of the obstetric population would utilise consultant-led care, while 27.4 and 38.5 per cent of the population would utilise midwifery-led care and the DOMINO scheme, respectively. The CV of care in a midwifery- and consultant-led care is €845.56. The WTP for all three alternatives is considerably higher, estimated at €1,509.39.

The CVM is the focus of the next chapter.

6 THE CONTINGENT VALUATION METHOD

6.1 Introduction

This chapter presents the results from the CVM. The various findings are reported for each objective and presented separately. The first objective of the CVM involves comparing zero and protest WTP responders against positive WTP responders, and is outlined in section 6.2.1. Next, positive WTP values are explored in terms of CV and regression analysis (section 6.2.2). The CV values are compared across the two elicitation formats in section 6.2.2.1 and several demographic variables in section 6.2.2.2. Regression analysis is performed to identify the variables that predict WTP and reported in section 6.2.2.3. The final objective involves examining the characteristics of women who prefer consultant-led care over midwifery-led care using regression analysis, and is presented in section 6.2.3. In section 6.3, the validity of the WTP data is assessed. The findings are discussed then in section 6.4 and placed in the context of existing literature. Section 6.5 concludes this chapter.

A brief summary of the response rate to the CVM is presented first (below).

6.2 The contingent valuation results

A total of 367 questionnaires are returned, yielding a response rate of 36.7 per cent. Of the 500 open-ended WTP surveys distributed, 192 surveys are returned (38.4 per cent). This is larger than the payment scale WTP survey, which generated 176 responses, or a 33.4 per cent response rate. Some responses are removed from the sample due to the high risk nature of the pregnancy, as reported in Chapter 4 (see figure 4.2 for breakdown of response rate and sample). The final sample includes 331

Table 6.1: Comparison of zero and protest responses across payment scale and open-ended elicitation format, *n* (%)

	Payment scale	**Open-ended**	**Total**
Zero	3 (1.9)	6 (3.5)	9 (2.7)
Protest	5 (3.1)	8 (4.7)	13 (3.9)
Positive	153 (95.0)	156 (91.8)	309 (93.4)
Observations	161	170	331

participants, and comprises 170 responses for the open-ended WTP question and 161 responses for the payment scale WTP question.

The following sections present the findings of the CVM. Section 6.2.1 deals with the first objective of the CVM and compares the characteristics of zero and protest WTP responders with positive WTP responders.

6.2.1 *Analysing non-response (protest) and zero responses*

Across the two elicitation formats, few participants provide a protest or zero response. In total, nine zero responses are given and 13 protest responses (Table 6.1). The number of zero responses is higher in the open-ended WTP question, with six zero responses generated, compared with three in the payment scale WTP question. Similarly, the level of non-responders is higher in the open-ended question than the payment scale question. Eight participants protested against the open-ended question compared with five in the payment scale design. This finding is consistent with the literature which demonstrates that open-ended WTP questions generate larger zero and protest responses (Diamond and Hausman 1992; Donaldson *et al* 1997a; Frew *et al* 2003).

The demographics of non-responders and zero responders are compared with positive WTP responders using Fisher's Exact test.[46] The demographic variables explored include geographic location (maternity unit), previous obstetric experience, PHI status, and income. There is no association between any of the demographic variables and zero responders across either elicitation format. There is an association between income and protest responders for the open-ended question at the 10 per cent level ($p < 0.080$) and payment scale design at the 5 per cent level ($p < 0.028$) (Table 6.2). The natural progression is to use logistic regression analysis to compare demographics; however, sample size for both types of responses, and across both elicitation formats, is too small and prohibits such analysis. Analysis of positive WTP values is presented in the following section.

6.2.2 *Analysing positive WTP values*

This section comprises three parts. Firstly, the CV values across the open-ended question and payment scale question are described and compared (section 6.2.2.1). Parametric tests are performed to determine whether the two elicitation formats generate different WTP values, and whether the WTP values for the two models of care are different within the two elicitation formats. Next, the WTP values are compared across several demographic variables (section 6.2.2.2). Finally, regression analysis is performed to identify the variables that predict WTP.

[46] Fisher's exact test is used instead of a chi-squared test due to sample size. Too many cells have fewer than five observations, rendering the chi-squared test inappropriate (StataCorps 2011a).

Table 6.2: Protest responders by income group and elicitation format

	<€834 p/m	€834 - €1,667	€1,668- €2,500	€2,501- €3,333	€3,334- €4,167	>€4,168 p/m	Total
Open-ended WTP question							
Protest WTP	0 (0.0)	3 (20.0)	0 (0.0)	0 (0.0)	1 (5.3)	2 (9.5)	6 (5.7)
Positive WTP	5 (100.0)	12 (80.0)	19 (100.0)	27 (100.0)	18 (97.4)	19 (90.5)	100 (94.3)
Observations	5	15	19	27	19	21	106
Payment scale WTP question							
Protest WTP	1 (33.3)	2 (25.0)	1 (20.0)	1 (5.0)	0 (0.0)	0 (0.0)	5 (5.7)
Positive WTP	2 (66.7)	6 (75.0)	20 (95.2)	19 (95.0)	17 (100.0)	18 (100.0)	82 (94.3)
Observations	3	8	21	20	17	18	87

Notes:

Fisher's Exact test (open-ended WTP question: $p < 0.080$; payment scale WTP question: $p = 0.028$).
Abbreviations: WTP, willingness to pay.

6.2.2.1 *CV of the CVM*

Following the removal of zero and protest responses from the sample, 156 and 153 responses remain in the respective open-ended and payment scale WTP questions. Since the WTP question is designed using the marginal approach, these responses are distributed between two models of care according to women's preferences: consultant-led care and midwifery-led care. Initially, women are asked to choose between three models of care: care in a CLU, care in an alongside MLU, and care in a free-standing MLU. 130 women (42.0 per cent) chose care in a CLU, 163 women (52.8 per cent) chose care in an alongside MLU, and 16 women (5.2 per cent) chose care in a free-standing MLU (Table 6.3). Data obtained on women's WTP for care in an alongside MLU and free-standing MLU are combined given the relatively small sample size of the latter group. Of the 156 responses in the open-ended WTP question, 59 (37.8 per cent) and 97 (62.2 per cent) responses describe women's WTP for care in a CLU and care in a MLU, respectively. For the payment scale WTP question, 71 (46.4 per cent)

Table 6.3: Breakdown of preferences across the elicitation formats, *n* (%)

	Payment scale *n* (%)	**Open-ended** *n* (%)	**Total** *n* (%)
Positive WTP	153 (50)	156 (50)	309 (100)
CLU	71 (55)	59 (45)	130 (100)
Alongside MLU	76 (47)	87 (53)	163 (100)
Free-standing MLU	6 (38)	10 (62)	16 (100)

Notes:
Abbreviations: WTP, willingness to pay; CLU, consultant-led unit; MLU, midwifery-led unit

and 82 (53.6 per cent) responses describe women's WTP for care in a CLU and care in a MLU, respectively.

The distribution of the WTP data is explored and the data are trimmed to remove potentially dubious responses. A one per cent trim is applied at the upper end of the WTP distribution, as performed in the literature (Chilton *et al* 2004). Three observations are removed from the data. The WTP data are presented in Table 6.4. Mean WTP values generated by the open-ended WTP question are larger than the payment scale WTP question. Women are willing to pay more for consultant-led care across both elicitation formats. The data appear widely dispersed across both elicitation formats, as illustrated by the range and large standard deviations. With the exception of the payment scale question for consultant-led care which may be normally distributed, the data appear to be positively skewed. A test for normality is examined and presented in Table 6.5 using the skewness and kurtosis test for normality (StataCorps 2011a). The results suggest that each WTP question is positively skewed, as illustrated by the significant *p*-value for each elicitation format.

Parametric tests are performed to examine whether the mean WTP values differ within and across the elicitation formats. Parametric tests are used since the data are unpaired.

Table 6.4: Distribution of WTP data across open-ended and payments scale surveys

WTP Type	Mean	Median	S.D.	Skewness	Kurtosis	Min	Max
OE (CLU)	€956.03	€1,000.00	€739.26	1.49	4.69	€100	€3,000
OE (MLU)	€808.33	€650.00	€556.81	1.15	4.55	€50	€3,000
PS (CLU)	€821.13	€800.00	€485.41	0.61	3.37	€100	€2,500
PS (MLU)	€795.06	€700.00	€504.15	1.32	6.04	€100	€3,000

Notes:

Abbreviations: OE, open-ended WTP survey; PS, payment scale WTP survey; CLU, consultant-led unit; MLU, midwifery-led unit; WTP, willingness to pay; Min, minimum WTP; Max, maximum WTP; S.D., standard deviation.

Table 6.5: Test for normality across the different WTP questions

WTP Type	Obs	Skewness	Kurtosis	Adj. Chi2	p
OE (CLU)	58	0.000	0.024	16.15	0.000
OE (MLU)	96	0.000	0.015	19.96	0.000
PS (CLU)	71	0.033	0.328	5.33	0.070
PS (MLU)	81	0.000	0.001	21.82	0.000

Notes:

Abbreviations: OE, open-ended WTP survey; PS, payment scale WTP survey; CLU, consultant-led unit; MLU, midwifery-led unit; WTP, willingness to pay; Adj. Chi2, adjusted Chi-squared; p, p-value for test of significance

In the first instance, the mean WTP for care in a CLU is compared with the mean WTP for care in a MLU. Using a two sample t-test, the results show that there is no statistically significant difference between the mean WTP for care in a CLU (€956.03) and the mean WTP for care in a MLU (€808.33), as generated by the open-ended WTP question (two-sample $t(152) = 1.407$, $p < 0.162$). In terms of the payment scale design, where the mean WTP for care in a CLU and MLU, respectively, is €821.13 and €795.06, the two sample t-test shows that there is no statistically significant difference between the two mean WTP values (two-sample $t(150) = 0.324$, $p < 0.747$).

A two sample t-test is also used to test whether the mean WTP values for the same model of care differ across the two elicitation formats. The results suggest that the framing of the WTP question has no effect on WTP; there is no statistically significant

difference between the mean WTP for care in a CLU between the open-ended question (€956.03) and payment scale design (€821.13) (two-sample t(127) = -1.245, $p <$ 0.216). In terms of the WTP for care in a MLU, the results suggest that there is no statistically significant difference between the mean WTP value generated by the open-ended question (€808.33) and payment scale design (€795.06) (two-sample t(175) = -0.165, $p <$ 0.869). These findings support other research that reports that the open-ended and payment scale WTP questions generate similar valuations (Frew *et al* 2003; Grutters *et al* 2009).

These data represent the measure of welfare change, or CV. In order to forego midwifery-led care, women are willing to give up €956.03 for care in a CLU, according to the open-ended WTP question, and €821.13 according to the payment scale design. According to the open-ended WTP question, women are willing to give up €808.33 to deliver in a MLU instead of a CLU, and €795.06 according to the payment scale design. These data are incorporated into the CBA in Chapter 7. The estimated confidence intervals and associated information for use in the CBA are summarised in Table 6.6.

6.2.2.2 *Comparing WTP across demographics*

This section presents CV in terms of several demographics. The variables of interest are similar to previous analyses, and include geographic location, previous obstetric experience, PHI status, and income. Standard descriptive statistics are reported for each variable. Non-parametric tests are also used to test the null hypothesis that the WTP values are the same for each category. Since the data are positively skewed and due to small sample size, non-parametric tests are used instead of parametric tests, in

line with the CVM literature (Donaldson *et al* 1997b; Frew *et al* 2003; Haefeli *et al* 2008; Ryan and Watson 2009). Correlation analysis is also presented for income and WTP. This is useful in determining whether WTP is associated with ability to pay.

The WTP of women attending five different maternity units is reported in Table 6.7. The open-ended WTP question typically generates larger WTP values than the payment scale design. For women attending CGH and OLOL hospital, a larger WTP for care in a MLU is generated by the payment scale design. In almost all cases, the WTP for care in a CLU exceeds the WTP for care in a MLU. On two occasions, women reveal a larger WTP for care in a MLU instead of care in a CLU. Using data obtained from the payment scale design, women attending OLOL hospital are willing to give up €886.67 to forego care in a CLU. This compares with €667.67 for women who wish to forego midwifery-led care. In the NMH, women are willing to pay €1,107.14 for care in a MLU, compared with €1,093.75 for care in a CLU. A Kruskal-Wallis test is used to test the null hypothesis that the mean ranks of the groups are the same. A statistically significant result is found for the open-ended WTP question on

Table 6.6: Compensating variation of WTP values for use in the cost-benefit analysis

					95% CI	
WTP Type	**n**	**Mean**	**Median**	**Std. Error**	**0.025**	**0.975**
OE (CLU) † *	58	€956.03	€1,000.00	€97.07	€706.23	€936.02
OE (MLU) † ^	96	€808.33	€650.00	€56.83	€683.59	€906.54
PS (CLU) ‡ *	71	€821.13	€800.00	€57.61	€761.66	€1,150.41
PS (MLU) ‡ ^	81	€795.06	€700.00	€56.02	€695.51	€921.15

Notes:

Abbreviations: OE, open-ended WTP survey; PS, payment scale WTP survey; CLU, consultant-led unit; MLU, midwifery-led unit; WTP, willingness to pay; Std. error, standard error; p, p-value for test of significance.

† ($p < 0.1616$).

‡ ($p < 0.7467$).

* ($p < 0.2156$).

^ ($p < 0.8692$)

midwifery-led care at the 10 per cent level (H = 7.856, 4 d.f., $p < 0.097$); the mean ranks of WTP across the other elicitation formats are insignificant.

Women's WTP for the different models of care across nulliparous and multiparous women is presented in Table 6.8. The open-ended question generates larger WTP values than the payment scale design for consultant-led care, with women also willing to give up more for consultant-led care than midwifery-led care within each elicitation format. Women with a history of childbirth are willing to pay more for midwifery-led care in the payment scale question than the open-ended question. A Wilcoxon signed-rank test on the two median values reveals that the difference between the elicitation formats is significantly different from zero at the 10 per cent level (Z = -1.767, $p < 0.077$). In all cases, first-time mothers are willing to pay more for both models of care than experienced maternity care users. However, when the same non-parametric test is performed on the other elicitation formats, no significant results are found.

Similar results are found when the WTP of women with PHI are compared with women without PHI (Table 6.9). The open-ended question generates larger WTP values than the payment scale design for consultant-led care; however, a larger WTP value for care in a MLU is generated by the payment scale design. Women who prefer midwifery-led care are willing to give up €708.54 to forego consultant-led care, while women who prefer the alternative model of care are willing to pay €661.90. The payment scale design generates a larger WTP value for care in a MLU. Across each elicitation format, women with PHI are willing to pay considerably more for maternity care. The greatest difference between the two groups is captured by the payment scale question for consultant-led care. Women with PHI are willing to pay €1,051.72 for care in a CLU compared with €661.90 by women without PHI. A Wilcoxon signed-

Table 6.7: Estimated WTP by maternity units

				Quantiles				
	n	**Mean**	**S.D.**	**Min**	**0.25**	**Median**	**0.75**	**Max**
CUMH								
OE (CLU)	35	€870.00	€594.36	€100	€500	€500	€1,000	€3,000
OE (MLU)*	28	€750.00	€502.22	€100	€350	€500	€1,000	€2,000
PS (CLU)	35	€791.43	€441.50	€100	€300	€800	€1,000	€1,500
PS (MLU)	34	€729.41	€413.80	€100	€500	€650	€1,000	€2,000
Cavan								
OE (CLU)	6	€1,016.67	€1,030.37	€100	€500	€750	€1,000	€3,000
OE (MLU)*	19	€615.79	€477.28	€100	€250	€500	€800	€2,000
PS (CLU)	13	€853.85	€666.60	€200	€300	€500	€1,000	€2,500
PS (MLU)	17	€844.12	€406.16	€300	€500	€700	€1,000	€1,500
OLOL								
OE (CLU)	4	€950.00	€759.39	€300	€400	€750	€1,500	€2,000
OE (MLU)*	21	€811.90	€460.95	€100	€500	€750	€1,000	€2,000
PS (CLU)	3	€666.67	€723.42	€200	€200	€300	€1,500	€1,500
PS (MLU)	15	€886.67	€789.09	€100	€300	€700	€1,500	€3,000
Lukes								
OE (CLU)	9	€1,066.67	€824.62	€300	€500	€1,000	€1,000	€3,000
OE (MLU)*	18	€886.11	€721.07	€50	€500	€850	€1,000	€3,000
PS (CLU)	12	€729.17	€419.12	€100	€500	€700	€1,000	€1,500
PS (MLU)	8	€525.00	€271.24	€100	€400	€500	€650	€1,000
NMH								
OE (CLU)	4	€1,375.00	€1,362.29	€200	€250	€1,150	€2,500	€3,000
OE (MLU)*	10	€1,190.00	€585.85	€500	€600	€1,250	€1,500	€2,000
PS (CLU)	8	€1,093.75	€325.62	€500	€1,000	€1,000	€1,375	€1,500
PS (MLU)	7	€1,107.14	€453.16	€500	€500	€1,250	€1,500	€1,500

Notes:

Abbreviations: OE: open-ended WTP survey; PS, payment scale WTP survey; CLU, consultant-led unit; MLU, midwifery-led unit; WTP, willingness to pay; S.D., standard deviation; Min, minimum WTP; Max, maximum WTP.

* Statistically significant difference between mean ranks at 10 per cent level ($p < 0.097$).

rank test is used to examine whether the median difference between the elicitation formats is significantly different from zero. Three statistically significant results are found. The payment scale question for care in a CLU shows that the median difference between the two groups is significantly different from zero at the 1 per cent level (Z = -3.218, $p < 0.001$). At the 10 per cent level, the difference between the median values

Table 6.8: Estimated WTP by previous obstetric experience

				Quantiles				
	n	**Mean**	**S.D.**	**Min**	**0.25**	**Median**	**0.75**	**Max**
Nulliparous								
OE (CLU)	26	€978.85	€711.92	€100	€500	€1,000	€1,000	€3,000
OE (MLU)	48	€903.13	€562.33	€100	€500	€800	€1,500	€2,000
PS (CLU)	32	€887.50	€430.68	€200	€500	€1,000	€1,250	€1,500
PS (MLU)	35	€832.86	€547.04	€100	€500	€800*	€1,000	€3,000
Multiparous								
OE (CLU)	32	€937.50	€771.57	€200	€500	€750	€1,000	€3,000
OE (MLU)	48	€713.54	€540.46	€50	€400	€500	€1,000	€3,000
PS (CLU)	39	€766.67	€525.32	€100	€300	€800	€1,000	€2,500
PS (MLU)	46	€766.30	€473.06	€100	€400	€500*	€1,000	€2,000

Notes:

Abbreviations: OE, open-ended WTP survey; PS, payment scale WTP survey; CLU, consultant-led unit; MLU, midwifery-led unit; WTP, willingness to pay; S.D., standard deviation; Min, minimum WTP; Max, maximum WTP.

* Significantly different from zero ($p < 0.077$).

Table 6.9: Estimated WTP by private health insurance status

				Quantiles				
	n	**Mean**	**S.D.**	**Min**	**0.25**	**Median**	**0.75**	**Max**
With PHI								
OE (CLU)	23	€1,143.48	€839.82	€300	€500	€1,000^	€1,500	€3,000
OE (MLU)	50	€906.00	€570.14	€100	€500	€800†	€1,000	€3,000
PS (CLU)	29	€1,051.72	€523.29	€200	€700	€1,000*	€1,500	€2,500
PS (MLU)	40	€883.75	€538.09	€100	€500	€800	€1,000	€3,000
Without PHI								
OE (CLU)	35	€832.86	€648.41	€100	€300	€500^	€1,000	€3,000
OE (MLU)	46	€702.17	€527.67	€50	€250	€500†	€1,000	€2,000
PS (CLU)	42	€661.90	€389.47	€100	€300	€600*	€1,000	€1,500
PS (MLU)	41	€708.54	€458.79	€100	€400	€500	€1,000	€1,500

Notes:

Abbreviations: OE, open-ended WTP survey; PS, payment scale WTP survey; CLU, consultant-led unit; MLU, midwifery-led unit; WTP, willingness to pay; S.D., standard deviation, Min, minimum WTP; Max, maximum WTP.

* ($p < 0.001$).

^ ($p < 0.088$).

† ($p < 0.045$)

generated by the open-ended question for care in a CLU is significantly different from zero (Z = -1.707, $p < 0.088$). The difference between the median values for the open-

ended WTP question for care in a MLU is statistically significant at the five per cent level ($Z = -2.006$, $p < 0.045$).

Finally, the WTP values are compared across income groups, and presented in Table 6.10. The results are similar to previous analyses where the open-ended question generally generates larger WTP estimates than the payment scale design. The WTP for care in a CLU is typically larger than the WTP for care in a MLU. The estimated WTP increases as income increases. For instance, women in the highest income bracket are willing to pay €1,116.67 for care in a CLU instead of a MLU, according to the open-ended question. This compares with women in the second lowest income bracket who are willing to give up €783.33 for the same welfare gain. Using data obtained from the payment scale design, women in the highest income bracket are willing to pay €1,084.09 to forego care in a MLU, compared with €600.00 by women in the second lowest income bracket. A Kruskal-Wallis test is performed on the different elicitation formats and two significant results are found. There is a statistically significant difference between the mean rank WTP for care in a CLU across the different income strata at the one per cent level for the payment scale question ($H = 15.25$, 4 d.f., $p < 0.004$). The mean rank WTP for care in a MLU is statistically significant at the one per cent level for the open-ended WTP question ($H = 18.54$, 5 d.f., $p < 0.002$).

Correlation analysis is performed on income and WTP using Spearman's rank correlation coefficient to investigate whether WTP is associated with ability to pay (StataCorps 2011a). A significant and positive correlation is found for care in a MLU using the payment scale data ($r = 0.409$; $p < 0.000$). There is a significant positive correlation between income and WTP for care in a CLU using the open-ended data (*r*

= 0.469; $p < 0.000$). There is no significant correlation between income and WTP according to the other models of care and elicitation formats. These results suggest that ability to pay is associated with WTP using data obtained from the payment scale question and open-ended question for care in a MLU and CLU, respectively. This effect is found throughout the CVM literature where income or financial circumstances are positively correlated with WTP (Bateman *et al* 2002; Cross *et al* 2000; Donaldson *et al* 1997b; Frew *et al* 2003).

While an association exists between ability to pay and WTP, the effect is not considered problematic provided the distribution of preferences for the different alternatives is consistent across high and low income earners (Olsen and Donaldson 1998). For instance, if high income earners prefer consultant-led care and low income earners prefer midwifery-led care, then ability to pay is said to distort the results. If the distribution of preferences is similar for both income groups, then ability to pay is not problematic (Olsen and Donaldson 1998). The distribution of preferences for care in a CLU and MLU across high and low income earners is examined using a chi-square test for each elicitation format. The null hypothesis, which assumes preferences are independent across both group, is rejected, suggesting that ability to pay is not distorting the WTP valuations (Table 6.11).

The relationship between these demographic variables and WTP are further explored using regression analysis.

6.2.2.3 *Regression analysis of WTP*

Regression analysis is explored to identify the characteristics that predict WTP. Since two differing elicitation formats are used, generating two different types of dependent

Table 6.10: Estimated WTP by income

				Quantiles				
	n	**Mean**	**S.D.**	**Min**	**0.25**	**Median**	**0.75**	**Max**
<€834 p/m								
OE (CLU)	1	€1,000.00	.	€1,000	€1,000	€1,000	€1,000	€1,000
OE (MLU)	5	€300.00†	€297.91	€50	€100	€250	€300	€800
PS (CLU)	0	.	.	.	.	.	.	.
PS (MLU)	2	€750.00	€353.55	€500	€500	€750	€1,000	€1,000
€834 - €1,667 p/m								
OE (CLU)	6	€783.33	€719.49	€100	€100	€750	€1,000	€2,000
OE (MLU)	9	€444.44†	€255.50	€100	€300	€500	€500	€1,000
PS (CLU)	8	€600.00^	€377.96	€100	€300	€550	€1,000	€1,000
PS (MLU)	5	€860.00	€589.92	€300	€500	€500	€1,500	€1,500
€1,668 - €2,500 p/m								
OE (CLU)	15	€973.33	€777.79	€300	€500	€500	€1,000	€3,000
OE (MLU)	19	€726.32†	€445.77	€100	€500	€600	€1,000	€1,500
PS (CLU)	15	€516.67^	€338.94	€100	€300	€500	€700	€1,250
PS (MLU)	18	€605.56	€416.53	€100	€300	€500	€800	€1,500
€2,501-€3,333 p/m								
OE (CLU)	10	€800.00	€405.52	€200	€500	€1,000	€1,000	€1,500
OE (MLU)	24	€766.67†	€538.85	€100	€400	€600	€1,000	€2,000
PS (CLU)	13	€738.46^	€442.60	€200	€300	€700	€1,000	€1,500
PS (MLU)	19	€931.58	€637.75	€100	€500	€800	€1,000	€3,000
€3,334-€4,167 p/m								
OE (CLU)	8	€1,137.50	€892.73	€300	€400	€1,000	€1,500	€3,000
OE (MLU)	18	€1,044.44†	€586.34	€100	€500	€1,000	€1,500	€2,000
PS (CLU)	12	€958.33^	€494.44	€200	€500	€1,000	€1,500	€1,500
PS (MLU)	17	€761.76	€501.72	€200	€500	€500	€1,000	€2,000
>€4,168 p/m								
OE (CLU)	15	€1,116.67	€890.76	€250	€500	€1,000	€1,500	€3,000
OE (MLU)	19	€1,057.89†	€643.18	€200	€500	€1,000	€1,500	€3,000
PS (CLU)	22	€1,084.09^	€498.90	€300	€700	€1,000	€1,500	€2,500
PS (MLU)	18	€836.11	€444.51	€100	€500	€900	€1,000	€1,500

Notes:

Abbreviations: OE, open-ended WTP survey; PS, payment scale WTP survey; CLU, consultant-led unit; MLU, midwifery-led unit; WTP, willingness to pay; S.D., standard deviation, Min, minimum WTP; Max, maximum WTP.

† ($p < 0.002$).

^ ($p < 0.004$).

variables, different regression analyses are examined. For the open-ended WTP question, an OLS, log-linear OLS, and Tobit model are examined given the continuous nature of the dependent variable. Interval regression is performed on the payment scale

WTP given the interval nature of the data. However, upon analysing the data it became clear that the sample size is too small to meaningfully predict WTP using regression analysis. Few models are statistically significant, with fewer variables significantly predicting WTP. Since the parametric tests show that there is no statistically significant difference between the open-ended WTP question and the payment scale WTP question, both datasets are merged in an effort to determine whether an increase in sample size improves the results. Little improvement in model fit is achieved using the combined data.

As the sample size is too small to predict WTP, the results of the different regression analyses are moved to Appendix C.1 where they are described and reported in full.

While the data are too few and WTP values too dispersed to meaningfully predict WTP, it is important to note that it is not a requirement of the SP approach to perform regression analysis. Problems with sample size are common in the CVM literature, with many studies limiting their analysis to descriptive statistics and hypothesis testing (Borghi 2008; Grutters *et al* 2009; Haefeli *et al* 2008). Mitchell and Carson (1989) explain that a sample size between 200 and 2,500 is usually sufficient to reliably

Table 6.11: An examination of ability to pay by preferences

	CLU *n* (%)	**MLU** *n* (%)	**Chi-square**	**p-value**
Open-ended WTP				
Rich*	15 (44.1)	19 (55.9)	0.6291	0.428
Poor^	7 (33.3)	14 (66.7)		
Payment scale WTP				
Rich	22 (55.0)	18 (45.0)	0.1043	0.747
Poor	7 (50.0)	7 (50.0)		

Notes:
Abbreviations: WTP, willingness to pay; CLU, consultant-led unit; MLU, midwifery-led unit.
* Rich = >$4,168 per month.
^ Poor = < $1,667 per month

predict WTP. This is considerably larger than the sample sizes presented here.

While it is not possible to predict WTP using regression analysis, it is possible to investigate the characteristics of women that prefer consultant-led care over midwifery-led care. This is explored in section 6.2.3.

6.2.3 *Characterising preferences: a probit model*

The characteristics of women that prefer consultant-led care over midwifery-led care are explored in this section. Since the marginal approach is assumed, information on women's preferred model of care is captured. A total of 331 responses are analysed, including zero and protest responses. Women considered at high risk of obstetric complications are excluded from this analysis. 137 participants chose care in a CLU over care in a MLU (41.4 per cent), while 194 participants chose care in a MLU (58.6 per cent). A probit model is used to determine the characteristics of women that prefer consultant-led care over midwifery-led care. Similar predictor variables are included (see Table 4.8 for a description of these variables).

The results from the probit model are described in Table 6.12 (Eqn. 4.15; Model 7a). 306 responses are analysed due to missing data on income and ethnicity. The likelihood ratio test suggests that the model fits significantly better than a model with no predictors, $\chi^2(6) = 33.20$, $p < 0.0000$. Four of the six explanatory variables significantly predict women's preferences for consultant-led care. There is a significant effect for geographic location. Delivering in a region where the only model of care available is consultant-led care, positively and significantly influences preferences for this model of care. In fact, women who have access to consultant-led care are 68 per cent more likely to prefer consultant-led care than women who have

access to both consultant- and midwifery-led care. Previous obstetric experience also significantly predicts women's preferred model of care. Women who have never given birth before are 44 per cent less likely to prefer consultant-led care than women who have a history of childbirth. This variable is significant at the 10 per cent level. Having PHI negatively and significantly predicts preferences. Women with PHI are 35 per cent less likely to prefer consultant-led care than women without PHI. This finding is significant at the five per cent level. In contrast, being in the top income bracket positively influences women's preferences for consultant-led care at the one per cent level. Women in the highest income bracket are approximately 52 per cent more likely to prefer consultant-led care than women from other income groups. Parity or ethnicity do not significantly influence women's preferred model of care.

Table 6.12: Characterising preferences for alternative models of maternity care

Variables	**Model 7a**
Geographic location	**0.678*** **
	(0.166)
Experience	**-0.436***
	(0.256)
Parity	-0.191
	(0.135)
PHI status	**-0.351** **
	(0.163)
Income	**0.519*** **
	(0.185)
Ethnicity	-0.250
	(0.183)
Constant	-0.103
	(0.308)
Observations	306

Notes:

Model 7a: Probit model.
Abbreviations: PHI, private health insurance.
Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

This analysis concludes the CVM. A discussion of the findings is presented in section 6.4. The following section (6.3) examines the validity of the contingent valuation study and DCE where applicable.

6.3 The validity of the SP techniques' study design

Three approaches are used to assess the validity of the study design: content, construct, and criterion validity. Content validity describes the extent that a survey instrument is unambiguous and meaningful to respondents, and responses are not influenced in any way (Carmines and Zeller 1979). Construct validity describes whether the content of a survey is captured and measured in the way it is intended, and responses are consistent with theory. Criterion validity refers to the extent that a variable(s) is consistent with externally-defined variables (Carmines and Zeller 1979). Each of these is explored in relation to the CVM and DCE where applicable.

6.3.1 *Content validity*

The survey instruments for the DCE and CVM are piloted on a number of occasions and several changes are made to the content of the data capture instruments. These steps are undertaken to ensure that the instruments are unambiguous and meaningful to respondents. For the DCE, women are provided with a detailed description of how to answer the choice scenarios, while a definition of the attributes and levels used in the DCE is provided alongside the choice experiment. A similar description is used for the CVM where women are provided with a description of the WTP question and task at hand. In each case, women are asked to consider how much they would be willing to pay for maternity care. Participants are informed that maternity care is free and will remain free. This is emphasised in italics and underlined. The purpose of

informing women that maternity care will remain free is to minimise the potential for any protest or zero responses.

The payment vehicle assumed in this analysis is an out-of-pocket expense. This is deemed the appropriate payment vehicle given women's familiarity with paying out-of-pocket for private care, which costs approximately €3,500 in Ireland.[47] A taxation payment vehicle is deemed inappropriate as women may feel that they already pay enough in taxes. It is assumed that such a payment vehicle would generate more protest responses.

As comparable WTP estimates are elicited across the two elicitation formats (open-ended and payment scale WTP questions), it is assumed that the scenario description and payment vehicle are appropriately defined. It is important to note that it is not possible to directly compare the WTP estimates derived from the DCE with the CVM as the base case scenario in each case is different. In the DCE, women's WTP for consultant-led care, for example, is relative to a combination of attributes and levels that do not necessarily describe midwifery-led care. In contrast, the CVM estimates women's WTP for consultant-led care relative to midwifery-led care. Since the base case scenarios are not comparable, it is not reasonable to draw comparisons across the two SP techniques.

For further affirmation on the validity of the content, ethical approval for the DCE and CVM is obtained from six different maternity units.

[47] This value derives from the expert opinion of a consultant obstetrician (Professor Richard A. Greene). In Ireland, a private package of care costs in the region of €3,000 - €5,000, depending on the consultant.

6.3.2 *Construct validity*

The theoretical predictions of the WTP questions are confirmed in this analysis. The direction of women's WTP for maternity care is consistent with expected behaviour using data obtained from the DCE. The negative coefficient on the cost attribute confirms that women prefer to spend less on maternity care. It is also hypothesised that women with higher incomes would be willing to pay more for maternity care using data obtained from the CVM. This is confirmed across several different elicitation formats using non-parametric tests. In addition, having PHI also supports the prediction that financial circumstances are associated with WTP, as determined by non-parametric tests across a number of the elicitation formats.

6.3.3 *Criterion validity*

This is the process of verifying the results with externally-defined values (Carmines and Zeller 1979). Ideally, the WTP valuations would be compared with revealed preferences (RPs). However, a fee-paying market for publicly provided maternity care does not exist; therefore it is not possible to compare SP data with RP data. It is possible to compare the results of the DCE and CVM with the fee-paying private market. As women availing of public care are invited to participate in the DCE and CVM, this group have revealed a preference for public care. This implies that women's WTP for private care lies somewhere in the region of zero and €3,500. If the WTP valuations elicited in this study exceed the cost of private care then the results of the SP techniques are questionable. The validity of the SP data is confirmed in this analysis as women's WTP for publicly provided maternity care is less than the cost of private care. It can be inferred then that women's WTP for private care lies somewhere

in the region of their maximum WTP for public care (as determined by the CVM) and €3,500.

6.4 A discussion of the CVM findings

The primary aim of the CVM is to elicit monetary valuations of maternity care for use in the CBA. Two elicitation formats are adopted to achieve this aim and compared to assess whether framing of the WTP task affects responses: an open-ended and payment scale WTP question. Several objectives are contained within the CVM and addressed within this chapter. This section discusses the findings of these objectives.

The CVM elicits WTP for consultant-led care and midwifery-led care using the marginal approach; women are first asked to identify their preferred model of care, and then how much they would be willing to pay for that model of care instead of their less preferred model of care. The marginal approach is assumed by both elicitation formats. The open-ended question asks women to provide the maximum amount they would be willing to pay for the welfare gain, while the payment scale question asks women to identify their maximum WTP from a range of values (the CVM is presented in Appendix B.3). The two elicitation formats present an interesting opportunity to compare responses, and investigate whether framing of the WTP question affects responses.

In the first instance, zero and protest responses are compared with positive WTP responses across the two elicitation formats. While the total number of zero and protest responses is small, it is higher in the open-ended survey than the payment scale survey. For instance, eight protest responses are obtained by the open-ended WTP question, compared with five in the payment scale WTP question. This is comparable with other

studies which show that the open-ended approach generates more zero and protest responses than other elicitation formats (Diamond and Hausman 1992; Donaldson *et al* 1997b; Frew *et al* 2003). Ideally, the characteristics of respondents that provide zero and protest responses instead of a positive WTP value is analysed using regression analysis, however, too few responses are obtained.

Positive WTP values are explored in terms of CV, and compared across the two models of care, elicitation formats, and several demographics. According to both elicitation formats, women's WTP for care in a CLU is higher than women's WTP for care in a MLU. Using data obtained from the open-ended WTP question, women are willing to pay €956.03 for care in a CLU instead of a MLU, compared with €808.33 for care in a MLU instead of a CLU (Table 6.6). Despite the sizeable difference between the two values, there is no statistically significant difference between women's WTP for both models of care. According to the payment scale question, women's WTP for care in a CLU (€821.13) exceeds women's WTP for care in a MLU (€795.06), although there is no statistically significant difference between the two values.

The positive WTP responses are also explored in terms of the elicitation method. Since a cue is not included in the open-ended approach, this elicitation format is often associated with generating ill-considered WTP values (Frew *et al* 2003). The approach typically generates more zero and protest responses, as supported by this analysis. Donaldson *et al* (1995) argue that the absence of a cue in the open-ended approach leads respondents to evaluate the task in terms of its expected cost, rather than their maximum WTP. The authors suggest that this results in lower WTP valuations (Donaldson *et al* 1995), especially when compared with the payment scale approach

(Donaldson *et al* 1997b). More recently, however, research suggests that the open-ended and payment scale WTP questions generate similar valuations (Frew *et al* 2003; Grutters *et al* 2009). For this analysis, the open-ended question consistently generates larger WTP values than the payment scale design (Table 6.6). For instance, the open-ended question estimates women's WTP for care in a CLU at €956.03. This is larger than the payment scale question for the same model of care, which is estimated at €821.13. However, the difference between the two values is insignificant, suggesting that framing of the WTP question does not affect responses. These results contribute to the growing body of work on contingent valuation studies, and support recent findings that the two approaches generate similar WTP values (Frew *et al* 2003; Grutters *et al* 2009).

CV is further explored in terms of demographics. Due to positively skewed data and small sample size, non-parametric tests are used to examine potential differences in WTP across several demographics. A significant result is found for geographic location. Similar to the DCE, women delivering in a region with access to both consultant- and midwifery-led care are willing to pay more for midwifery-led care than women delivering in a region with sole access to consultant-led care (Table 5.14; Table 5.15; Table 6.8). There is a significant difference between the WTP for care in a MLU among first-time mothers and experienced maternity care users. Women who have given birth before are willing to give up more for care in a MLU than women with a history of childbirth. This supports the conclusions drawn from the DCE in Chapter 5 which found that experienced maternity care users have a stronger disposition towards consultant-led care than first-time mothers (Table 5.12; Table 5.13; Table 6.9).

CV values are further explored using regression analysis. An OLS (Eqn. 4.10), log-linear OLS (Eqn. 4.11), and Tobit model (Eqn. 4.12) are estimated on the open-ended WTP data to account for the continuous nature of the dependent variable. An interval regression model (Eqn. 4.14) is examined on the payment scale WTP data since the dependent variable is measured in intervals. Due to small sample size, few models are loosely significant with few variables significantly predicting WTP (Appendix C.1). Efforts to increase sample size are undertaken, and involve merging the open-ended WTP question with the payment scale WTP question. For instance, an ordered probit model is analysed where WTP values are classified as low (< €500), medium (€501 - €1,000), and high (> €1,001). The same problems are encountered, suggesting that sample size is still an issue. Small sample size is common in the CVM literature (Borghi 2008; Grutters *et al* 2009; Haefeli *et al* 2008). However, it is not a requirement of the approach to predict WTP, thus many studies do not progress to regression analysis (Borghi 2008; Grutters *et al* 2009; Haefeli *et al* 2008).

An important consideration in a contingent valuation study relates to ability to pay, and whether valuations are reflective of an individual's financial circumstances (Bateman *et al* 2002). Regression analysis is useful for examining this effect. While it is not possible to determine this effect using regression analysis, certain income effects are observed using bivariate analysis. A significant result is found for income and WTP across both elicitation formats. For instance, women in the highest income bracket are willing to give up €1,084.09 for care in a CLU, compared with €600.00 for the same model of care among women in the second lowest income bracket (Table 6.11). Correlation analysis confirms this association for care in a CLU and care in a MLU, as elicited by the payment scale and open-ended WTP questions, respectively.

A significant result is also found for PHI status, which is a useful proxy for an individual's financial circumstances, or ability to pay. Previous literature supports this finding, suggesting that ability to pay plays a considerable role in WTP valuations, regardless of the elicitation format adopted (Bateman *et al* 2002; Cross *et al* 2000; Donaldson *et al* 1997b; Frew *et al* 2003). While an association is highlighted for income and WTP, the results suggest that the ability to pay does not distort WTP valuations as the distribution of preferences across high and low income earners is comparable (Table 6.11) (Olsen and Donaldson 1998).

Finally, the characteristics of women that prefer consultant-led care over midwifery-led care are considered using a probit model (Eqn. 4.15; Table 6.16). The analysis presents some interesting findings, and supports previous findings from the DCE. For instance, geographic location is a significant predictor of women's preferences. Women delivering in a region where the only model of care on offer is consultant-led care are 68 per cent more likely to prefer this model of care than women delivering in a region where both consultant- and midwifery-led care is provided. This supports an earlier finding by the DCE which suggests that women delivering in a consultant-led region have a stronger disposition towards this model of care than women delivering in a region where both models of care are provided (Table 5.14; Table 5.15). Previous obstetric experience is also identified as a significant predictor of preferences. First-time mothers are 44 per cent less likely to prefer consultant-led care than experienced maternity care users (Table 6.12). This effect is supported by the DCE which shows that women with a history of childbirth have a stronger preference for consultant-led care than midwifery-led care compared with their inexperienced counterparts (Table

5.12; Table 5.13). The influence of experience on preferences is also supported in the literature (Cartwright 1979; Ryan and Ubach 2003).

While the analysis presented in this chapter is often restricted by small sample size, several important findings are obtained. For instance, framing of the WTP question has no effect on WTP valuations. This finding supports recent evidence which shows that the open-ended and payment scale WTP questions generate similar valuations (Frew *et al* 2003; Grutters *et al* 2009). An income effect is observed in this analysis where there is a strong positive association between income and WTP, as demonstrated elsewhere (Cross *et al* 2000; Donaldson *et al* 1997b; Haefeli *et al* 2008). Findings from the DCE are also supported by this analysis; the probit model indicates that geographic location and previous obstetric experience significantly predict preferences, as demonstrated by the DCE in section 5.2.3.3. The most important contribution arising from this analysis relates to CV, or measures of welfare gain. The CV values generated by the open-ended and payment scale WTP questions reliably measure welfare gain. The WTP values are comparable across the different elicitation formats and SP techniques, suggesting that meaningful valuations of maternity care are obtained by the CVM. These values are used to inform the benefit valuations of maternity care in the CBA, presented in Chapter 7.

These findings are further explored in Chapter 8.

6.5 Conclusion

The results of the CVM are presented in this chapter. Several objectives are explored and presented separately. The characteristics of zero and protest responders are compared with positive WTP responders in the first instance, and presented in section

6.2.1. Second, positive WTP responses are analysed in terms of CV (6.2.2), and compared across the elicitation formats in section 7.2.2.1 and several important demographics in section 6.2.2.2. Regression analysis is then performed to predict WTP, as outlined in section 6.2.2.3. As the data are too few to meaningfully predict WTP, the results are moved to Appendix C.1, where the results are presented and reported in full. Finally, the data are explored to investigate the characteristics of women that prefer consultant-led care over midwifery-led care using regression analysis, as presented in section 6.2.3. A discussion of these findings is presented in section 7.3, while Chapter 10 explores the results in greater detail.

The primary aim of the CVM is to elicit women's WTP for care in a CLU and MLU for use in the CBA. For care in a CLU instead of a MLU, women are willing to pay €956.03and €821.13, according to the open-ended WTP question and payment scale WTP question, respectively. To forego care in a CLU, this analysis reveals a maximum WTP of €808.33 (open-ended WTP question) and €795.06 (payment scale WTP question), respectively. These CV values inform the CBA in Chapter 7.

A detailed discussion of the qualitative and quantitative findings obtained in this thesis is provided in Chapter 8. The key strengths and specific contributions arising from the findings is presented then in Chapter 9.

7 THE COST-BENEFIT ANALYSIS

7.1 Introduction

Chapters 4-6 investigate maternal preferences for maternity care, and elicit monetary valuations of consultant- and midwifery-led care using SP techniques. This chapter combines the welfare estimates from the CVM with cost estimates in a formal CBA. The two major models of maternity care in Ireland are the focus of this economic evaluation: consultant-led care and midwifery-led care. The primary objective of the economic evaluation is to determine the worthwhileness of both models of care in Ireland.

This chapter presents the CBA. The data sources used to estimate costs are presented first, and outlined in section 7.2. The benefit valuations of consultant- and midwifery-led care have previously been reported in Chapter 6. These valuations are presented in the context of the CBA in section 7.3. In section 7.4, the study design and methodology is described. Section 7.5 presents the results of the economic evaluation. A discussion of the role of DCEs within CBA is presented then in section 7.6. Some considerations for future applications of this approach are outlined in this section also, along with a critique of McIntosh (2006). In section 7.7, a discussion of the results of the CBA is provided. The chapter concludes in section 7.8.

7.2 Sourcing costs

This section presents the data sources used to estimate costs.

Cost estimates derive from primary and secondary data collection, and describe the average cost of care in a CLU and MLU in Ireland. In particular, cost estimates describe a typical package of care that covers antenatal, intrapartum, and postnatal care. All costs accruing to the Health Service Executive (HSE) (third-party payer) are included in this analysis.[48] Resources are valued at their opportunity costs, which are reflected in current market prices (Brouwer *et al* 2001). Micro-costing and gross-costing techniques are employed to estimate the average cost of care per woman. All unit costs are valued at 2014 prices and expressed in Euro.

A resource use inventory is developed for this study. It is informed in the first instance by the MidU (2009) study, which comprises a RCT and CEA. As mentioned in Chapter 1, the MidU (2009) study was undertaken following the recommendations of the Kinder Report (2001), which sought greater maternal choice at hospital level, in an equally safe environment, in the north eastern area of the country. Two MLUs were subsequently installed alongside two existing CLUs on a trial basis pending the results of a RCT and CEA. The MidU (2009) study found that there was no significant difference between adverse outcomes in a MLU and CLU in Ireland, and a normal birth in a MLU generated a cost saving of €57 over a normal birth in a CLU.

The RCT element of the MidU (2009) study provides extensive resource use information on the obstetric path of women availing of consultant- and midwifery-led care. The RCT randomly allocated over 1,102 women to midwifery-led care and 551 women to consultant-led care and captured detailed resource use information arising during antenatal, intrapartum, and postnatal care (MidU 2009). The resource use

[48] As mentioned in Chapter 1, the HSE is responsible for the management and delivery of public health services in Ireland.

information obtained from the RCT was subsequently used to inform cost estimates of care in a CLU and care in a MLU in the economic evaluation component of the MidU (2009) study. The CEA examined the incremental cost of care in a MLU over care in a CLU, where estimated costs were specific to the two maternity units. Data were collected in 2005 and 2006, and inflated to 2009 prices. For care in a CLU, the estimated average cost per woman was €631.64. The average cost per woman in a MLU was estimated at €574.30.

While the resource use information on care in a CLU and MLU represent the only available information on resource use in Ireland, the cost estimates derived from the MidU (2009) study are deemed inadequate for the analysis presented here for a number of reasons. First, the cost data were collected in 2005 and 2006 and inflated to 2009 prices when published. Therefore, these estimates may not reflect current prices. Second, estimated costs were specific to the maternity units under evaluation. This analysis is concerned with estimating costs that are generalizable to any maternity unit in Ireland. Third, guidelines on costing in economic evaluation in Ireland were not available in 2009.[49] Therefore, a number of assumptions were implied in the estimation of administrative costs (staff costs), operational costs (overheads such as heating and lighting, building and maintenance), and capital costs (land and building). These estimates may differ to estimates that would be derived under current guidelines. Finally, the resource use inventory may not fully reflect current medical practices.

[49] The first guidelines on how to conduct an economic evaluation in Ireland were published by the Health Information and Quality Authority (HIQA) in 2010 (HIQA 2010).

Therefore, the resource use information obtained from the RCT element of the MidU (2009) study provides a useful framework for the development of a resource use inventory reflecting current medical practices and prices in Ireland. The identification and measurement of a resource use inventory is the focus of the next section (7.2.1).

7.2.1 *The resource use inventory: identifying and measuring resources*

The resource use inventory developed for this analysis represents a micro-costing technique. It identifies all staff inputs during each episode of care, among other resource use inputs. The inputs derive from the MidU (2009) study, expert opinion[50], and other relevant literature. These resource use inputs are described below.

The resource use inventory is presented in Table 7.1, and describes the resource use input during an uncomplicated pregnancy and childbirth. During antenatal care, women have approximately six visits with their health care provider (MidU 2009). In the MLU, an average of 6.62 visits is estimated (SD=1.54). An antenatal visit takes 15 minutes and is provided by a midwife. In the CLU, women have 6.12 antenatal visits (SD=2.20) where care is provided by a midwife and registrar, taking 15 minutes per consultation (MidU 2009). The antenatal clinic in the CLU is overseen by a consultant who spends approximately five minutes with each woman on average. Some women transfer temporarily from the MLU to the CLU during antenatal care for an ultrasound scan or antepartum cardiotocograph (CTG). This occurs infrequently, accounting for an average of 0.40 visits (SD=0.50) (MidU 2009).

A number of routine ultrasound scans occur during antenatal care in a CLU. On

[50] Expert opinion is provided by Professor Richard A. Greene (consultant obstetrician). Professor Greene provided this information during an interview on 28 January, 2015.

Table 7.1: Inventory of resource use in MLU and CLU

		MLU		CLU	
Resource use description	**Resource used/duration**	**Mean**	**S.D.**	**Mean**	**S.D.**
Antenatal visit to MLU	1 midwife for 15 mins per visit (visits)	6.62˜	1.54˜	-	-
Antenatal visit to CLU	1 midwife and 1 registrar for 15 mins (visits)	0.40˜	0.50˜	6.12˜	2.20˜
Consultant role in overseeing antenatal visit	Average commitment of consultant is 4.67 minutes based on 1 consultant overseeing an antenatal clinic lasting 3 hours with average of 40 women (visits)	0.40˜	0.50˜	6.12˜	2.20˜
Labour length	3 hrs and 32 mins x 1 midwife, 37 mins x 2 midwives (MLU); 2 hrs 26 mins x 1 midwife, 32 mins x 2 midwives (CLU) (hours: mins)	4.09˜	3.14˜	2.58˜	2.28˜
Postnatal length of stay	Average duration of postnatal stay (days)	1.07*	0.85*	2.10^	2.00†
Midwife home visits after birth in MLU	Average of 2.04 postnatal visits to mothers, spending 30 mins (visits)	2.04˜	1.00˜	-	-
Average saving in visits by public health nurse as a result of midwife's visits	Saving on average of 1 public health nurse visit to mothers, spending 30 mins				
No. of ultrasound scans	1 sonographer or midwife for 20 mins	1.29˜	0.53˜	2.12˜	1.48˜
No. of antepartum cardiotocographs	1 midwife performs CTG for 20 mins	0.24˜	0.53˜	1.12˜	0.75˜
No. of biophysical profiles	1 midwife performs profile for 20 mins; not performed in MLU	-	-	0.04˜	0.23˜

Notes:

Abbreviations: MLU, midwifery-led unit; CLU, consultant-led unit; S.D., standard deviation.

˜Source: MidU (2009); * Schroeder *et al* (2013); ^ Hospital In-patient enquiry scheme.

† Since HIPE only provides information on the average postnatal length of stay, a standard deviation of two days is assumed here.

average, 2.12 scans are performed by a midwife, lasting 20 minutes in duration (MidU 2009). In the MLU, an average of 1.29 scans is performed. A CTG is not routinely performed in a MLU, however, it is estimated that a small number of women require temporary transfer to the CLU for this test. On average, 0.24 CTGs are performed on women receiving care in a MLU (SD=0.53) (MidU 2009). A biophysical profile is also valued where an average of 0.04 profiles are performed on women in a CLU (SD=0.23). A biophysical profile is not performed in the MLU (MidU 2009) (Table 7.1).

The average duration of labour in a MLU is estimated at four hours and nine minutes (SD=3:14) (MidU 2009). Different staffing levels are required during different stages of labour. During the first stage of labour, one-to-one care is provided with a midwife, lasting, on average, three hours and 32 minutes in duration (SD=2:35). An additional midwife is involved in a woman's care during the second and final stage of labour, which lasts an average of 37 minutes (SD=39). In a CLU, the average duration of labour is two hours and 58 minutes (MidU 2009). Similar to the MLU, one-to-one care with a midwife is provided during the first stage of labour, which is estimated to last an average of two hours and 26 minutes (SD1:38). During the second and final stage of labour, an additional midwife is involved in a woman's care; this lasts an average of 32 minutes (SD=31) (MidU 2009). There is no requirement for a consultant obstetrician to intervene in a woman's care during a normal delivery. The shorter duration of labour in a CLU is attributed to the active management of labour model (MidU 2009).[51]

[51] A description of this model is provided in Chapter 1 (section 1.2.1). Briefly, active management of labour involves intervening in the labour process using a variety of interventions, such as artificial rupture of membranes and oxytocin; these interventions are used to speed up the labour process.

Postnatal length of stay is identified for both arms. The MidU study (2009) estimated an average postnatal length of stay for care in the MLU at 1.82 days (SD=0.77), and 2.07 days (SD=0.71) for care in the CLU. These estimates are updated to reflect current practices. According to the Hospital In-patient Enquiry Scheme (HIPE), the average postnatal length of stay following an uncomplicated childbirth in a CLU is 2.6 days (HPO 2014).[52] However, this estimate is based on both public and private patients, which may overestimate the average postnatal length of stay for public patients. HIPE data are sourced from Cork University Maternity Hospital (CUMH) for an uncomplicated childbirth for public patients.[53] An average postnatal length of stay of 2.1 days is reported for this group of women for 2014, consistent with MidU (2009). This estimate of 2.1 days is adopted in this analysis, and assumed to be nationally representative of the average postnatal length of stay for public patients given its similarity with the MidU (2009) study and based on expert opinion.[54]

In terms of the average postnatal length of stay in a MLU, the authors of the MidU (2009) study acknowledged that their estimation of 1.82 days was an overestimation of the actual length of stay as their data was measured in days, rather than hours. This implied that some women who returned home shortly after 24 hours were regarded as having spent two days in the maternity unit. The optimum length of stay in a MLU in Ireland is 24 hours as follow-up home visits are provided for women availing of this model of care (MidU 2009). This corresponds with the average length of stay in the UK where a recent study found that women stay in hospital for 25.7 hours after giving

[52] HIPE records incidence rates of all hospital events, and is the most comprehensive source of data on hospital activity.
[53] These data are unpublished; the estimate is sourced directly from the hospital's HIPE database.
[54] Expert opinion is provided by Professor Richard A. Greene (consultant obstetrician). Professor Greene provided this information during an interview on 28 January, 2015.

birth in a MLU (SD=20.3) (Schroeder *et al* 2011). Therefore, the UK estimate of 25.7 hours is included in this analysis as nationally representative data on the average postnatal length of stay in Ireland is unavailable; HIPE cannot currently distinguish between the average length of stay in a CLU and MLU.

A number of home visits are undertaken during postnatal care following care in a MLU. An average of 2.04 visits is estimated (SD=1.00) (MidU 2009). Each visit lasts approximately one hour, and results in a compensating saving of one public health nurse visit. Following care in a CLU and MLU, a public health nurse makes a number of home visits (MidU 2009). Since this is shared across both arms, this cost is excluded. However, the cost saving arising from the home visits by a midwife following care in a MLU is accounted for in this analysis (MidU 2009).

In terms of medical consumables and pharmaceuticals, many of these costs are excluded from this analysis as the level of resource use is similar across both arms (MidU 2009). Where variation exists between both models of care, such as in the use of transcutaneous electrical nerve stimulation (TENS), these costs are omitted on the assumption of negligible costs (MidU 2009).

The resource use inventory is valued, as outlined below in section 7.2.2.

7.2.2 *Valuing the resource use inventory*

The resource use inventory is valued according to administrative costs and length of stay costs. Staff costs for midwives, public health nurses, and medical doctors are obtained from consolidated salary scales (DOH 2013), and adjusted for pay-related costs in accordance with recent guidelines (HIQA 2014). Associated non-pay costs include employer's Pay Related Social Insurance (PRSI) contributions,

superannuation, and overheads. A charge of four per cent is applied to direct pay to reflect pension costs, and 25 per cent to represent overheads (HIQA 2014). Unit costs per hour are calculated following the Regulatory Impact Analysis (RIA) guidelines, issued by the Department of the Taoiseach (RIA 2009). All unit costs for hospital staffing are reported in Table 7.2. The unit cost per hour of employing a midwife is calculated at €32.44. The hourly unit cost of employing a consultant obstetrician is €141.52. These cost inputs are used to value the duration of time spent caring for a woman during each episode of maternity care.

The cost estimates are presented in Table 7.3. Length of stay is valued according to costs per bed-day. This represents the gross-costing element of this analysis. Costs per bed-day are informed by the Ready Reckoner of Inpatient and Daycase Activity and Costs, or Diagnostic Related Groups (DRGs) (HSE 2013). The relevant DRG (O61Z) describes a cost per bed-day following an uncomplicated birth. The estimated cost per bed-day is €1,288 for 2.6 days postnatal stay. This is deemed considerably high for what is regarded as a recuperative period in hospital, requiring minimal resource use (MidU 2009). The Ready Reckoner estimates that a cost-per bed-day exceeding 2.6 days is €373 (HSE 2013). This estimate is considered a better representation of the cost per bed-day following a natural birth, and is adopted in this analysis. In contrast, the MidU (2009) study applied a cost per bed-day of €135, although the authors did not substantiate its use in their analysis, or how it was derived. Therefore, this cost estimate is deemed a poor reflection of the actual cost per bed-day following a natural birth in Ireland today. A cost per bed-day of €373 is assumed in this analysis, as per the Ready Reckoner (HSE 2013).

Table 7.2: Salary costs and non-pay costs

Costs and unit estimation	€	Notes	Source of cost
Midwife	36,137.00	Midpoint salary (grade 7)	Consolidated salary scales November 2013
PRSI	3,884.73	Assuming PRSI is paid at class A (10.75%)	Department of Social Protection (2014)
Superannuation	1,445.48	Applying 4% superannuation	RIA (2009); HIQA (2014)
Overheads	9,034.25	Overheads calculated on direct cost basis (25%)	RIA (2009); HIQA (2014)
Total	50,501.46		
Unit cost per hour	***32.44***	Total staff costs/(249-25)*6.95	RIA (2009)
Public health nurse	49,544.00	Midpoint salary (grade 5)	Consolidated salary scales November 2013
PRSI	5,325.98	Assuming PRSI is paid at class A (10.75%)	Department of Social Protection (2014)
Superannuation	1,981.76	Applying 4% superannuation	RIA (2009); HIQA (2014)
Overheads	12,386.00	Overheads calculated on direct cost basis (25%)	RIA (2009); HIQA (2014)
Total	69,237.74		
Unit cost per hour	***44.47***	Total staff costs/(249-25)*6.95	RIA (2009)
Registrar	55,503.00	Midpoint salary (grade 3/4)	Consolidated salary scales November 2013
PRSI	1,115.61	Assuming PRSI is paid at class B (registered doctors employed in civil service) (2.01)	Department of Social Protection (2014)
Superannuation	2,220.12	Applying 4% superannuation	RIA (2009); HIQA (2014)
Overheads	13,875.75	Overheads calculated on direct cost basis (25%)	RIA (2009); HIQA (2014)
Total	72,714.48		
Unit cost per hour	***46.19***	Total staff costs/(249-22.5)*6.95	RIA (2009)
Consultant	163,660.00	Category II, contract Type B	Consolidated salary scales November 2013
PRSI	3,289.57	Assuming PRSI is paid at class B (registered doctors employed in civil service). PRSI may be absent if PRSI class S (2.01%)	Department of Social Protection (2014)
Superannuation	6,546.40	Applying 4% superannuation	RIA (2009); HIQA (2014)
Overheads	40,915.00	Overheads calculated on direct cost basis (25%)	RIA (2009); HIQA (2014)
Total	214,410.97		
Unit cost per hour	***141.52***	Total staff costs/(249-31)*6.95	RIA (2009)

Table 7.3: Breakdown of cost estimates by model of care

	MLU				CLU			
			95% CI				95% CI	
Resource use description	**Mean cost**	**Std. error**	**Lower**	**Upper**	**Mean cost**	**Std. error**	**Lower**	**Upper**
Antenatal visit to MLU	€53.68[†]	€1.65	€52.04	€55.33	-	-	-	-
Antenatal visit to CLU	€7.86[‡]	€1.30	€6.57	€9.16	€120.30	€7.52	€112.78	€127.83
Consultant role in overseeing antenatal visit	€4.41[±]	€0.73	€3.68	€5.13	€67.41	€4.21	€63.20	€71.63
Labour length	€154.63	€13.83	€140.80	€168.46	€96.24	€10.06	€86.18	€106.30
Postnatal length of stay[^]	€399.11	€41.80	€357.31	€440.91	€783.30	€129.75[††]	€653.55	€913.05
Midwife home visits after birth in MLU	€90.72	€5.86	€84.86	€96.58	-	-	-	-
Average saving in visits by public health nurse as a result of midwife's visits	-€44.47[¤]	-	-	-	-	-	-	-
No. of ultrasound scans	€13.95	€0.76	€13.19	€14.70	€22.92	€2.78	€20.14	€25.71
No. of antepartum cardiotocographs	€2.60	€0.76	€1.84	€3.35	€12.11	€1.41	€10.70	€13.52
No. of biophysical profiles	-	-	-	-	€0.43	€0.43	€0.00	€0.87
Total cost of normal birth	**€682.49**	**€66.67**	**€615.82**	**€749.16**	**€1,102.72**	**€156.17**	**€946.55**	**€1,258.89**

Notes:

Abbreviations: MLU, midwifery-led unit; CLU, consultant-led unit; Std. error, standard error; CI, confidence intervals.

[††] Estimated standard error is based on assumed standard deviation of two days.

[^] Cost per bed-day estimated at €373 per day, based on Ready Reckoner of Inpatient and Daycase Activity and Costs (HSE 2013).

[†] Hourly unit cost of a midwife is €32.44; [‡] Hourly unit cost of a registrar is €46.19; [±] Hourly unit cost of a consultant is €141.52; [¤] Hourly unit cost of a public health nurse is €44.77.

MidU (2009) estimated the capital cost of building an alongside MLU in CGH and OLOL. The estimated capital cost for CGH was €39.75 per woman and €53.56 per woman for OLOL.[55] This analysis excludes capital costs for a number of reasons. First, the capital costs estimated by the MidU (2009) study reflect 2005 and 2006 prices (pre-financial crisis) and may not be representative of current capital costs. Second, the capital cost of building a MLU is variable, and depends on capacity issues, expected throughput, and geographic location; the capital cost of building a MLU in an urban area, such as in Dublin, may be considerably higher than the cost in a remote location like OLOL. Therefore, it is difficult to estimate a capital cost that is nationally representative. Instead, this analysis focuses on utilising existing infrastructure to establish a MLU, rather than building a MLU. This may involve converting another building within the hospital into a MLU, or maximising existing infrastructure by dedicating a wing or section of a CLU to midwifery-led care. While capital costs are excluded from this analysis, the impact is assumed minimal as the equivalent annual cost is marginal, as illustrated in the MidU (2009) study above. In addition, potential variations in costs are captured in the sensitivity analysis, presented in section 7.4.

The average cost of care in a CLU is considerably higher than care in a MLU. Length of stay costs are the main driver of costs for both models of care. For care in a CLU, length of stay accounts for 71 per cent of costs, while in a MLU it accounts for almost 60 per cent of costs. The mean cost of a package of care in a MLU that covers antenatal, intrapartum, and postnatal care is €682.49. The same package of care in a

[55] Curiously, and without substantiation, the authors estimated the capital cost of building a MLU, but did not include it in their analysis.

CLU costs €1,102.72. This represents a cost differential of €420.23 in favour of a MLU.

These cost estimates are combined with welfare estimates in section 7.5. The CV associated with consultant- and midwifery-led care are the focus of the next section (7.3).

7.3 Sourcing benefits

Considerable debate surrounds the appropriate use of values in economic evaluation, and whether patient values or general population values should be elicited. In the UK, NICE recommends eliciting general population values for CEAs, rather than patient values, as the provision of health care is borne out of public finances (NICE 2004). Mann *et al* (2009) suggest the best approach is to use general population values. The authors argue that these values are valid if respondents are sufficiently informed about the burden of the health state under evaluation (Mann *et al* 2009). However, the decision to elicit patient values or general population values remains a normative issue (Brazier *et al* 2005).

For CBA, the appropriate use of values is also a normative issue. Since the approach is underpinned by welfare theory, which is concerned with the social ranking of alternatives, the natural perspective is a societal perspective; hence, general population values may be more relevant than patient values (Frew 2010a). However, the application of CBA is yet to assume this broad perspective, and has elicited patient values to inform benefit valuations rather than general population values (Borghi 2008; Haefeli *et al* 2008; van der Pol *et al* 2010). Shackley and Donaldson (2000) identify situations where it is appropriate to elicit user values (patient) against non-

user values (general population). The authors recommend eliciting patient values when the specific service is publicly funded as patients bear the opportunity costs of any related decision. For instance, if only one alternative can be undertaken within a budget constraint and at least two alternatives are under evaluation, then those patients that prefer the foregone alternative do not benefit from the implementation of the activity; instead, this group bears the opportunity cost of the decision. In this scenario, the decision to implement a treatment service leads to gainers and losers. Hence, the authors argue that user values should be elicited to decide which treatment is undertaken as patients provide the best information on the relative strengths of preferences for the different alternatives (Shackley and Donaldson 2000).

User values are sourced in this analysis, rather than non-user values, as suggested by Shackley and Donaldson (2000) and consistent with other applications (Borghi 2008; Haefeli *et al* 2008; van der Pol *et al* 2010). Pregnant women are considered the best judge of their welfare, and are directly affected by the opportunity costs of any public policy decision regarding maternity care in Ireland.

A DCE and CVM are employed in this thesis to estimate women's WTP for care in a CLU and MLU in Ireland. Consistent with welfare theory, these SP techniques provide a measure of welfare change. The measure assumed in this analysis is CV. This is the amount of money that needs to be taken away from an individual to maintain that individual at their original level of utility (Mishan 1971). CV is elicited (opposed to EV) as the change in utility has yet to occur; this is referred to as an *ex ante* perspective (Frew 2010a; Shackley and Donaldson 2000).

The welfare estimates derived from the CVM are used in the economic evaluation. As mentioned already in Chapter 5, the DCE is useful in eliciting CV; however, the data can only be used in a CBA when corresponding cost inputs are estimated (McIntosh 2006). As the CV associated with a combination of attributes is relative to some base case combination of attributes, cost estimates must be calculated relative to these base case scenarios in order to directly compare benefits with costs. Clinical trials provide resource intensive information and often employ DCEs to examine preferences (Lancsar *et al* 2007; Petrou and McIntosh 2009); however, the approach rarely progresses to formal CBA (McIntosh 2006). The DCE presented in this thesis demonstrates the usefulness of the SP technique to inform benefit valuations. However, the data cannot be used within a CBA as the defined attributes do not correspond to cost inputs. Therefore, the CV associated with consultant-led care, for instance, is relative to an alternative combination of attributes for which there is no available cost data (see Chapter 5 for further information). While the DCE is unsuitable for use in this chapter, a formal CBA can be completed using data obtained from the CVM.

Chapter 6 presents the CV values obtained from the CVM. Two elicitation formats are adopted in the CVM, including an open-ended WTP question and payment scale WTP question. The CV associated with consultant- and midwifery-led care describe the marginal benefit of a package of care; in the questionnaire, women are asked to provide the maximum amount they would be willing to pay to experience their preferred model of care instead of their less preferred model of care. This approach is referred to as the 'marginal approach' (Donaldson *et al* 1997a). In the context of priority setting, the marginal approach provides an explicit ranking of alternative uses

of resources (Donaldson *et al* 1997a; Shackley and Donaldson 2000). This is important from a policy perspective and supports the use of patient values to elicit CV when the good or service is publicly funded (Shackley and Donaldson 2000). For instance, if only one alternative can be implemented then patients bear the direct opportunity cost of the public policy decision. The marginal approach is useful in this context as it provides information on the extent of the gains and losses arising from the decision. Whether an alternative should be implemented then depends on the relative strengths of preferences, relative costs, and the budget constraint (Shackley and Donaldson 2000). To date, studies have only examined the feasibility of the marginal approach and have not formally included welfare estimates within CBA (Donaldson *et al* 1997a; Shackley and Dixon 2000; Shackley and Donaldson 2002).

This chapter presents one of the first empirical applications of the marginal approach within CBA, to the best of the author's knowledge. The CV associated with consultant- and midwifery-led care is presented in Table 7.4. Similar WTP valuations are obtained

Table 7.4: Compensating variation of WTP according to the CVM*

					95% CI	
WTP Type	**Mean**	**Median**	**S.D.**	**Std. Error**	**0.025**	**0.975**
Open-ended CVM						
CLU	€956.03	€1,000.00	€739.26	€97.07	€706.23	€936.02
MLU	€808.33	€650.00	€556.81	€56.83	€683.59	€906.54
Payment scale CVM						
CLU	€821.13	€800.00	€485.41	€57.61	€761.66	€1,150.41
MLU	€795.06	€700.00	€504.15	€56.02	€695.51	€921.15

Notes:

Abbreviations: CLU, consultant-led unit; MLU, midwifery-led unit; WTP, willingness to pay; CVM, contingent valuation method; S.D., standard deviation; Std. error, standard error; CI, confidence interval.

* Chapter 6 presents the results from the CVM.

from the two elicitation formats for the two models of care. To forego care in a MLU, women are willing to pay €956.03 and €821.13 using data obtained from the open-ended WTP question and payment scale WTP question, respectively. For the welfare gain associated with care in a MLU instead of care in a CLU, women are willing to pay €808.33 and €795.06 according to the respective open-ended WTP question and payment scale WTP question. As discussed in Chapter 6, section 6.3, the welfare estimates are assumed valid for use in CBA.

The CBA study design and methodology is described in section 7.4 (below). This section defines the study perspective and time frame and outlines the decision rules used to determine the desirability of the alternative models of care.

7.4 CBA study design and methodology

The primary objective of the CBA is to determine the relative worth of consultant- and midwifery-led care in Ireland from a policy perspective. Secondary to this objective is to assess the use of the marginal approach within CBA and investigate whether differing net benefit results are obtained when the input parameters are subjected to sensitivity analysis. The study perspective and time frame assumed in the CBA are outlined in section 7.4.1. The net benefit analysis is presented in section 7.4.2. This section describes the base case analysis and outlines the type of sensitivity analysis used to assess the robustness of the base case results.

7.4.1 *Designing the CBA*

This analysis compares the costs and benefits of consultant- and midwifery-led care in Ireland using benefit data obtained from the CVM. The CBA compares the mean cost against the mean benefit of a package of care for a low risk woman in Ireland.

The estimated costs are assumed to represent the expected costs accruing to any maternity unit in Ireland, and estimated benefits to represent the expected welfare gain of any low risk woman availing of maternity care. The two major models of maternity care are evaluated: care in a CLU and care in a MLU. A third-party payer perspective is assumed in this analysis; hence, only direct costs accruing to the HSE are estimated. The time horizon for the study is one year. This allows for an estimation of all costs and benefits arising during antenatal, intrapartum, and postnatal care. Since costs and benefits accrue within one year, discounting is exempt from this analysis.

Standard CBA decision rules are applied to compare the net benefit of care in a CLU and care in a MLU. Sensitivity analysis is performed to assess the robustness of the results to changes in the input parameters. The following section (7.4.2) describes the different analyses employed within the CBA.

7.4.2 *A net benefit analysis*

The decision rules used to determine the desirability of alternatives in CBA are described in Chapter 2, section 2.4.2. Briefly, the alternatives are evaluated separately where net benefit is calculated by deducting estimated costs from estimated benefits (Eqn. 2.3) (Mishan 1971). A positive net benefit implies that an alternative is cost-beneficial and should be undertaken, while a negative net benefit suggests the opposite. These decision rules are applied in this analysis.

Since the marginal approach is assumed to elicit monetary valuations of consultant- and midwifery-led care, cost estimates are calculated in terms of the marginal cost of both models of care. For instance, the marginal benefit of care in a MLU is estimated at €808.33 using data obtained from the open-ended WTP question (Table 7.4). This

marginal benefit is compared against the marginal cost of care in a MLU (€682.49) over care in a CLU (€1,102.72), which is estimated at -€420.23 (Table 7.3).

A net benefit analysis is estimated in the first instance, and describes the base case analysis. Mean and median WTP valuations are compared for both models of care. While mean values are typically used within a policy context, median WTP values may be better predictors if the data are positively skewed (Pearce *et al* 2006).

Sensitivity analysis is performed on both models of care to assess the robustness of the net benefit results to changes in different parameters. The input parameters informing costs are variable across women, as illustrated in the resource use inventory (Table 7.1). For both models of care, length of stay has the greatest impact on estimated costs. In the base case analysis, an average duration of stay in a CLU is estimated at 2.1 days. While this estimate is assumed nationally representative, the average length of stay is likely to vary across women. For care in a MLU, the base case analysis assumes an average postnatal length of stay of 1.07 days. While this estimate is based on UK data (Schroeder *et al* 2011), women availing of this model of care in Ireland may prefer to stay longer than 24 hours. Other cost inputs are also likely to vary across women, such as duration of labour and number of antenatal visits. Benefit valuations likely vary across women also. As described in Chapter 6, women's WTP for maternity care varies considerably. For instance, the mean WTP for care in a CLU using data obtained from the open-ended WTP question is €956.03, and the standard deviation around the mean value is €736.26. To reflect the existence and extent of uncertainty in the input parameters, probabilistic sensitivity analysis (PSA) is performed to assess the robustness of the base case scenarios.

PSA is the process of simulating variations in input parameters to reflect parameter uncertainty (Briggs *et al* 2006). The approach is generally used within decision analytic models and CEAs, although its application is suited within any economic evaluation methodology where potential uncertainty in the input parameters exists. PSA describes the extent that estimated parameters reflect their true value. It involves assigning a probability distribution to the parameters in the model, and propagating this uncertainty over a number of simulations (Briggs *et al* 2006). Choosing the appropriate distribution is not an arbitrary decision; it is influenced by the type of parameter, and various probability distributions exist for different parameters (Briggs *et al* 2006). For instance, where cost data are made up of counts of resource use, weighted by unit costs, the estimated parameters are constrained to be non-negative. A Poisson distribution is often applied to count data as it is constrained on the interval zero to infinity; hence, a Poisson distribution is often appropriate as the parameters remain non-negative. An alternative distribution for cost data is given by the normal distribution provided that the resulting parameters are constrained to be non-negative (Briggs *et al* 2006).

This analysis investigates the use of a normal distribution for costs. Instead of propagating the uncertainty in the expected cost of care in a MLU and CLU, this analysis investigates the uncertainty in each of the input parameters that inform cost estimates, such as antenatal visits, duration of labour, postnatal length of stay, among other inputs. The expected cost of care then is determined by the combination of costs for each simulation. The input parameters are presented in Table 7.5. With the exception of the average postnatal length of stay following care in a CLU, the data informing costs are known for all parameters. Since HIPE only provides information

on the average length of stay, a standard error for this input parameter is assumed *a priori*. Given the similar nature of the WTP data, a normal distribution is assumed for the welfare estimates, as described in Table 7.5 also.

To reflect parameter uncertainty, 10,000 Monte Carlo simulations are performed using Microsoft Excel software (Microsoft 2010). The use of a normal distribution for costs and benefits is assessed, and model stability is examined over a number of trials. Section 7.5 presents the results of the CBA.

Table 7.5: Cost and benefit parameters and distribution

Parameters	MLU			CLU		
	Mean	**Std. Error**	**Distribution**	**Mean**	**Std. Error**	**Distribution**
Costs						
Antenatal visit to MLU	€53.68	€1.65	Normal	-	-	-
Antenatal visit to CLU	€7.86	€1.30	Normal	€120.30	€7.52	Normal
Consultant role in overseeing antenatal visit	€4.41	€0.73	Normal	€67.41	€4.21	Normal
Labour length	€154.63	€13.83	Normal	€96.24	€10.06	Normal
Postnatal length of stay	€399.11	€41.80	Normal	€969.80	€129.75[†]	Normal
Midwife home visits after birth in MLU	€90.72	€5.86	Normal	-	-	-
No. of ultrasound scans	€13.95	€0.76	Normal	€22.92	€2.78	Normal
No. of antepartum cardiotocographs	€2.60	€0.76	Normal	€12.11	€1.41	Normal
No. of biophysical profiles	-	-	-	€0.43	€0.43	Normal
Benefits						
Open-ended	€808.33	€56.83	Normal	€956.03	€97.07	Normal
Payment scale	€795.06	€56.02	Normal	€821.13	€57.61	Normal

Notes:

MLU, midwifery-led unit; CLU, consultant-led unit; Std. error, standard error.

[†] Estimated standard error is based on assumed standard deviation of two days.

[*] This cost saving is ignored in the PSA as variation in the cost of midwife home visits is accounted for.

7.5 Results of the CBA

This section reports the results of the CBA. The base case analysis is presented first in section 7.5.1. To examine the existence and extent of uncertainty in the input parameters, PSA is performed and presented in section 7.5.2. A discussion of the findings obtained in this section is provided in section 7.7.

7.5.1 *Base case analysis*

This analysis compares the costs and benefits of care in a CLU and MLU in Ireland. All costs and benefits accrue to the HSE (third-party payer), and describe the costs and benefits arising during antenatal, intrapartum, and postnatal care. Estimated costs are assumed indicative of the expected cost accruing to any maternity unit for a package of care in Ireland. Similarly, estimated benefits are assumed representative of the expected welfare gain for a low risk woman availing of a package of care in Ireland.

Standard CBA decision rules are employed to investigate costs and benefits using net benefit analysis. The worthwhileness of each model of care is evaluated independently. For instance, the marginal benefit of care in a MLU over care in a CLU is compared against the marginal cost of care between the two units. The model of care is deemed cost-beneficial if the net benefit is positive (Mishan 1971).

The CVM contains an open-ended WTP question and payment scale WTP question. These valuations are compared against their respective costs for both mean and median benefit valuations. Given the positively skewed nature of the CVM data, as described in Chapter 6, median values may be better predictors of women's WTP for maternity care than mean values.

Table 7.6 presents the results of the base case analysis for each model of care. The results suggest that consultant-led care is cost-beneficial. Despite the increased marginal cost of this model of care over midwifery-led care (€420.23), a positive net benefit is produced by the two elicitation formats as women's marginal WTP for this model of care exceeds the marginal cost. For instance, the open-ended WTP question, which estimates women's marginal WTP for care in a CLU at €956.03, generates a positive net benefit of €535.80 when compared with the marginal cost of care in a CLU over care in a MLU. With similar median values for each benefit valuation, the results remain unchanged when this benefit valuation is assumed. Given the positive net benefit generated by the CBA, the results suggest that the activity is cost-beneficial, and should be undertaken for low risk women in Ireland.

Table 7.6: Base case CBA results

	Model of care	**Elicitation format**	**(€) (Differential)**	**Net Benefit**
Mean cost	CLU		€1,102.72 (€420.23)	
	MLU		€682.49 (-€420.23)	
Mean benefit	CLU	Open-ended	€956.03	**€535.80**
		Payment scale	€821.13	**€400.90**
	MLU	Open-ended	€808.33	**€1,228.56**
		Payment scale	€795.06	**€1,215.29**
Median benefit	CLU	Open-ended	€1,000	**€579.77**
		Payment scale	€800	**€379.77**
	MLU	Open-ended	€650	**€1,070.23**
		Payment scale	€700	**€1,120.23**

Notes:
Abbreviations: CLU, consultant-led unit; MLU, midwifery-led unit; CVM, contingent valuation method.

For care in a MLU instead of a CLU, a positive net benefit is produced by the open-ended and payment scale WTP questions. With a cost saving of €420.33 for a package of care in a MLU relative to a CLU, the model of care is deemed cost-beneficial using both mean and median benefit valuations. For instance, the payment scale WTP question produces a positive net benefit of €1,215.29 for midwifery-led care. This is considerably larger than consultant-led care (€400.90) using data obtained from the same elicitation format.

The results suggest that both models of care are cost-beneficial provided women receive their preferred model of care over their less preferred model of care. Given the positive net benefit produced by consultant- and midwifery-led care, standard CBA decision rules suggest both models of care should be undertaken. However, if resources are constrained and only one alternative can be pursued, then the activity with the largest net benefit should be implemented. Although midwifery-led care generates the largest net benefit and should be undertaken instead of consultant-led care, according to standard decision rules, the implication of this finding is more complex given the essential role of consultant-led services in maternity care. These issues are discussed in section 7.7.

While the base case analysis suggests both models of care are cost-beneficial, the results may be sensitive to changes in the input parameters. The existence and extent of uncertainty in these input parameters is explored using PSA. The results of this analysis are presented next, in section 7.5.2.

7.5.2 *Probabilistic sensitivity analysis*

This section presents the results from the PSA. The purpose of this analysis is to examine the existence and extent of uncertainty in estimated costs and benefits. As illustrated in Table 7.1, each of the cost inputs is subject to variation, while benefit valuations vary across women. Changes in these parameters may affect the true values of consultant- and midwifery-led care. For instance, length of stay costs is the largest driver of costs for consultant- and midwifery-led care. In the base case analysis, a 2.1 day postnatal length of stay is assumed for consultant-led care, as per HIPE. Since the estimated cost of a postnatal bed-day is €373 (HPO 2014), the average cost of a package of care is considerably affected when this parameter is varied. Similarly for midwifery-led care, changes to the base case scenario of 1.07 days are likely to affect the average cost of this package of care. Antenatal visits, duration of labour, among other cost inputs are also likely to vary, resulting in differing net benefit results. These parameters are varied in the PSA to examine the existence and extent of uncertainty in the base case scenarios. The WTP estimates are also varied in the PSA to capture differences in women's maximum WTP thresholds.

The results of the 10,000 Monte Carlo simulations are presented in Table 7.7. A mean cost and benefit of the total number of simulations is estimated to represent the results of the PSA and net benefit results are calculated using these data. Similar estimates to the base case analysis are found, confirming that both models of care are cost-beneficial if women receive their preferred model of care. For example, a positive net benefit is produced by the open-ended and payment scale WTP question for both models of care. For a package of care in a CLU instead of a MLU, a positive net benefit of €583.90 is generated using the open-ended WTP question; this value is averaged

Table 7.7: Probabilistic sensitivity analysis of net benefit results

	Model of care	Elicitation format	(€) (Range)	Net Benefit (Range)
Mean cost	CLU		€374.88* (€102 to €643)	
	MLU		-€374.88^ (-€102 to -€643)	
Mean benefit	CLU	Open-ended	€958.78 (€773 to €1,151)	**€583.90** (€250 to €908)
		Payment scale	€821.25 (€707 to €933)	**€446.45** (€155 to €745)
	MLU	Open-ended	€808.48 (€697 to €920)	**€1,183.36** (€889 to €1,475)
		Payment scale	€795.65 (€686 to 907)	**€1,170.53** (€878 to €1,468)

Notes:

Abbreviations: CLU, consultant-led unit; MLU, midwifery-led unit; CVM, contingent valuation method.

* Estimated mean cost of a package of care in a CLU according to PSA is €1,101.28 (see Table 7.8).

^ Estimated mean cost of a package of care in a MLU according to PSA is €726.40 (see Table 7.8).

across the 10,000 simulations. The PSA is comparable with the base case analysis, which produces a positive net benefit of €535.80 using the same elicitation format (Table 7.6).

The resulting interval parameter estimates are presented for each input in Table 7.8, where the resulting parameters are constrained to be non-negative. The average postnatal length of stay following care in a CLU is varied from 1.4 days at its minimum (€525.42) to 2.7 days at its maximum (€1,033.67). Following a package of care in a MLU, the PSA varies the average postnatal length of stay from a minimum of 0.85 days (€316.18.82) to a maximum of 1.3 days (€481.83). At its lowest, the estimated cost of a package of care in a CLU (€842.30) is higher than the maximum cost of a package of care in a MLU (€814.76), confirming that midwifery-led care consistently

Table 7.8: Resulting parameter estimates from the PSA

Parameter	Point-estimate	Range	
		Min	Max
Costs for MLU			
Antenatal visit to MLU	€53.67	€50.50	€56.86
Antenatal visit to CLU	€7.85	€5.34	€10.35
Consultant role in overseeing A/N visit	€4.41	€2.98	€5.87
Labour length	€154.65	€127.18	€181.28
Postnatal length of stay	€398.83	€316.18	€481.83
Public health nurse home visits after birth in MLU	€90.72	€79.39	€102.05
No. of ultrasound scans	€13.96	€12.44	€15.45
No. of antepartum cardiotocographs	€2.58	€1.07	€4.09
Costs for CLU			
Antenatal visit to CLU	€120.29	€105.78	€134.95
Consultant role in overseeing A/N visit	€67.45	€59.17	€75.85
Labour length	€96.20	€76.66	€115.66
Postnatal length of stay	€782.05	€525.42	€1,033.67
No. of ultrasound scans	€22.97	€17.57	€28.43
No. of antepartum cardiotocographs	€12.12	€9.39	€14.88
Cost estimates			
Estimated cost of care in a CLU	€1,101.28	€842.30	€1,352.86
Estimated cost of care in a MLU	€726.70	€639.08	€814.76
Benefit estimates			
Open-ended CVM for care in a CLU	€958.78	€773.10	€1,150.73
Payment scale CVM for care in a CLU	€808.48	€697.35	€919.60
Open-ended CVM for care in a MLU	€821.25	€707.46	€933.34
Payment scale CVM for care in a MLU	€795.65	€685.88	€906.51
Net benefit results			
Open-ended CVM for care in a CLU	€583.90	€250.00	€907.99
Payment scale CVM for care in a CLU	€446.37	€155.34	€744.95
Open-ended CVM for care in a MLU	€1,183.35	€888.71	€1,475.01
Payment scale CVM for care in a MLU	€1,170.53	€878.32	€1,467.91

Notes:

Abbreviations: PSA, probabilistic sensitivity analysis; MLU, midwifery-led unit; CLU, consultant-led unit; A/N, antenatal; Min, minimum value; Max, maximum value; CVM, contingent valuation method

costs less than consultant-led care in Ireland. The benefit valuations vary for each elicitation format. While the mean benefit of care in a CLU is valued higher than midwifery-led care, the interval thresholds show that women's WTP for midwifery-

led care sometimes exceeds consultant-led care. The net benefit results produced by the PSA suggest that both models of care are consistently cost-beneficial provided women receive their preferred over their less preferred model of care. For instance, at its lowest value, consultant-led care produces a net benefit of €155.34 using data obtained from the payment scale WTP question, meaning this model of care is cost-beneficial for women that prefer consultant-led care. Similarly, midwifery-led care produces a positive net benefit of €888.71 at its lowest value using the open-ended WTP question, suggesting this model of care is cost-beneficial for women that prefer midwifery-led care. At its maximum value, consultant-led care produces the largest net benefit (€907.99) using the open-ended question when compared with the lowest values for midwifery-led care (€888.71), suggesting certain uncertainty exists in terms of the most cost-beneficial alternative.

The PSA supports the base case analysis, suggesting consultant- and midwifery-led care are consistently cost-beneficial as long as women receive their preferred package of care. Standard CBA decision rules suggest both alternatives should be undertaken. The implications of these findings are discussed in section 7.7. First, a discussion on the use of DCEs within CBA is presented in section 7.6. Some considerations for future applications of the approach are outlined and a critique of McIntosh (2006) is provided.

7.6 Using DCEs within CBA: some considerations

This section discusses the use of DCEs within CBA and explains why the data presented in this thesis could not be used within the economic evaluation. In addition, a critique of the approach proposed by McIntosh (2006) is presented.

The DCE boasts numerous advantages over the CVM as the approach identifies optimum service configurations and predicts market uptake (van der Pol *et al* 2010). A DCE is employed in this thesis to identify women's strengths of preferences for maternity care, and various welfare measures are undertaken to estimate women's WTP for alternative service configurations. While Chapter 5 demonstrates the usefulness of the approach to measure welfare change, the data do not correspond to cost inputs, which is a requirement of the approach to directly compare costs and benefits (McIntosh 2006). McIntosh (2006) explains that a DCE requires cost data for each attribute, including the status-quo, so that respondents' marginal WTP for an improvement in a specific attribute can be compared with the marginal cost of that improvement. Clinical trials provide a rich data source for combining costs and benefits data, where the attributes included in a DCE can be developed to correspond with cost inputs (McIntosh 2006).

While DCEs are widely used within health economics to examine strengths of preferences and elicit monetary valuations of health care (De Bekker-Grob *et al* 2012), the data are rarely used within CBA (McIntosh 2006). To the best of the author's knowledge, the only study to compare welfare estimates directly with cost estimates was undertaken by van der Pol (2009). The authors conducted their DCE alongside a RCT and defined their attributes to correspond with cost inputs, as informed by the RCT (van der Pol *et al* 2010). The appropriateness of the DCE to inform benefit valuations is well documented in the literature (Lancsar and Savage 2004; McIntosh 2006; Ryan 2004). For instance, a DCE can be used to identify respondents' WTP for an alternative that is expected to be consumed with certainty (state-of-the-world models) (Ryan 2004). This approach is useful under priority setting where only one

alternative can be implemented. It can also be used to estimate welfare change arising from the provision of multiple alternatives, as calculated using Small and Rosen's (1981) CV formula. In this thesis, the DCE could have been used to identify women's WTP for consultant- and midwifery-led care using state-of-the-world models. Under resource constraints, these welfare estimates would have provided information on women's relative strengths of preferences for the different models of care. In addition, the DCE could have been used to explore the welfare change arising from the provision of midwifery-led care alongside consultant-led care.

An alternative use of DCEs within CBAs is suggested by McIntosh (2006). The author proposes extending the decision rules used to guide decision-making in CEAs to CBAs using DCE data. A CEA differs to CBA in terms of its measurement of health outcomes. Whereas a CBA measures consequences in monetary units, a CEA measures consequences in units of health, such as health-related quality of life (Drummond *et al* 2005). Since the inputs and outputs are measured in different units, more complex decision rules are required for CEAs than CBAs. For instance, trade-offs are often required if an improvement in health is achieved at a higher cost, relative to a comparator. The difficulty lies in determining the circumstances under which an alternative is deemed desirable (McGuire 2001). Three approaches are developed to represent the trade-offs and decision rules for CEAs and include incremental cost-effectiveness ratios (ICERs), the net benefit approach, and the probabilistic approach.

McIntosh (2006) suggests extending these approaches to CBA where similar decision rules can be applied. An ICER expresses the relationship between the incremental cost of an intervention relative to a comparator against the incremental effect of the same

intervention relative to the same comparator (Drummond *et al* 2005). By replacing effects with benefits, an incremental cost-benefit ratio (ICBR) is developed:

$$ICBR = \frac{(Cost_i - Cost_c)}{(Benefit_i - Benefit_c)} \quad (7.1)$$

where $Cost_i$ and $Benefit_i$ describe the cost and benefit of the intervention, respectively, and $Cost_c$ and $Benefit_c$ represent the cost and benefit of the comparator. The numerator estimates the additional cost incurred by the intervention, while the denominator estimates the incremental benefit of the intervention over the comparator. In CEAs, the implied decision rule depends on the relationship of the ICER to a pre-defined cost-effectiveness threshold or ceiling ratio (R_c) (Drummond *et al* 2005). The ceiling ratio can be thought of as a policymaker's maximum WTP for an intervention. For instance, if an intervention is more effective but more costly, it is only deemed cost-effective if the ICER is less than the R_c (O'Brien and Briggs 2002).

Applying these decision rules within CBA is not straightforward. While an ICBR can be calculated and the incremental costs and benefits plotted on a 'cost-benefit plane',[56] defining the R_c is problematic within CBA (a sample cost-benefit plane presented in Chapter 2 is repeated below for reference).[57] McIntosh (2006) suggests using the population's maximum WTP for the intervention as the R_c. However, given the nature of the ICBR, it is impossible for the ICBR to exceed the R_c. For instance, assuming

[56] The cost-benefit plane is described in Chapter 2, section 2.4.2. Briefly, a cost-benefit plane is used to depict the decision rules used in CEAs. If the ICBR is plotted in the north-east or south-west quadrant, a trade-off is required and informed by the decision rule, or R_c. If the ICBR is plotted in the north-west quadrant, the intervention is dominated by the comparator (more costly with fewer benefits), whereas in the south-east quadrant the intervention dominates the control (less costly with greater benefits)

[57] Defining the R_c within CEA is also problematic. In the UK, an arbitrary threshold of £20,000 to £30,000 per QALY is used to guide decision-making (McCabe *et al* 2008). More recently, Claxton *et al* (2015) attempted to define a more meaningful threshold for policy purposes, and arrived at a cost-effectiveness threshold of £12,936 per QALY, although this estimate has been criticised for relying too heavily on few data (Barnsley *et al* 2013).

the DCE data presented in Chapter 5 are used within the CBA here, the R_c would be €725.31, as described by women's maximum WTP for midwifery-led care using a state-of-the-world model (the reader is referred to Chapter 5, section 5.2.4.1 for reference; Table 5.17). If we assume that this value describes women's marginal (incremental) WTP for midwifery-led care over consultant-led care, and the marginal cost of care is -€420.23, as illustrated in this chapter, the ICBR is -0.58. Despite the negative marginal cost and positive marginal benefit, which suggest that the intervention is cost-beneficial and would be plotted in the south-east quadrant of the cost-benefit plane, the R_c suggests that the alternative is not cost-beneficial (-€0.58 < €725.31). The problem may lie in the use of a cost-benefit ratio to determine desirability, which is a direct reversal of the benefit-cost ratio assumed by CBA.

While the approach provides a useful opportunity to directly compare competing alternatives, specific decision rules for CBA are required to guide decision making, and consensus on how a population R_c can be identified is needed. Nevertheless, the suitability of the approach is well documented by McIntosh (2006), although the author acknowledges that empirical application and further research is required to assess the viability of the CEA decision rule framework within CBA.[58]

7.7 Discussion of CBA findings

The costs and benefits of care in a CLU and MLU are evaluated separately in this analysis. The different elicitation formats are used to inform benefit valuations and compared to investigate the extent that these valuations affect the net benefit results.

[58] In a 2009 paper by Petrou and McIntosh (2009), the authors indicated that a CBA using DCE data is forthcoming. It is likely that the authors will encounter and discuss the issues mentioned above in this paper when/if it is published.

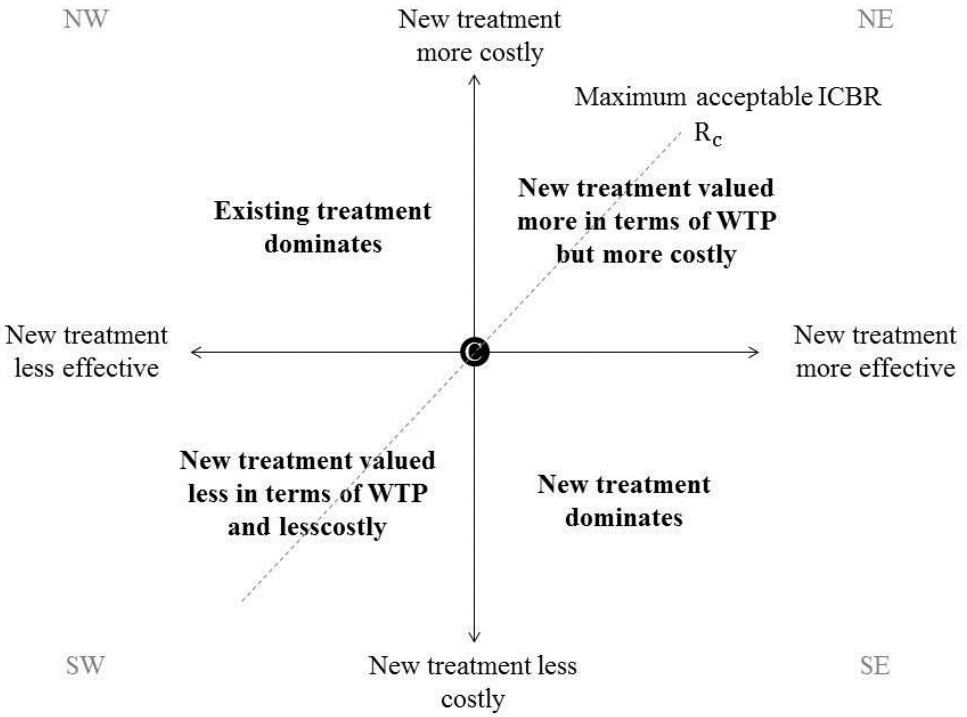


Figure 2.1 (repeated): Sample cost-benefit plane, adapted from McIntosh (2006).

Notes:
Abbreviations: C, comparator treatment, or status-quo; NE, north-east quadrant; SE, south-east quadrant; SW, south-west quadrant; NW, north-west quadrant; R_c, ceiling ratio; ICBR, incremental cost-benefit ratio; WTP, willingness to pay.

Similar benefit valuations are generated by the open-ended WTP question and payment scale WTP question, resulting in corresponding net benefit results. Comparable benefit valuations support the use of the CVM within CBA, as previously discussed in Chapter 6, section 6.3. Respondents clearly demonstrate an understanding of the task, as illustrated in the consistently comparable CV values placed on both models of care across the two elicitation formats; care in a CLU is consistently valued higher than care in a MLU. To support this conclusion, ideally elicited preferences would be compared to RP; however, given the absence of a market for public care, it

is impossible to compare SP data with RP data. A fee-paying market exists for private care, however, where a package of care costs approximately €3,500. It is reassuring that estimates generated by the SP techniques are less than the cost of private care as any value in excess €3,500 would call into question the reliability of the data. The fact that similar WTP valuations are elicited for two different models of care across two different benefit valuations, and the models of care are valued less than private care, suggest that the use of the CVM is validated in the absence of a market.

The results of the base case analysis suggest that both consultant- and midwifery-led care are cost-beneficial when women receive their preferred model of care and should be undertaken. Across the two elicitation formats, a positive net benefit result is generated for the two models of care. The greatest net benefit is produced by midwifery-led care, and estimated at €1,228.56 using data obtained from the payment scale WTP question. While consultant-led care is cost-beneficial for women that prefer this model of care, the net benefit is considerably smaller, calculated at €535.80 using the open-ended WTP question. When median benefit valuations are assumed the results remain unchanged.

The base case analysis is subjected to a PSA to examine the existence and extent of uncertainty in the input parameters. Ten thousand Monte Carlo simulations are performed where the resulting parameter estimates are constrained to be non-negative. The results suggest that midwifery-led care consistently costs less than consultant-led care. There is a small amount of uncertainty around the most cost-beneficial model of care. Consultant-led care is sometimes more cost-beneficial than midwifery-led care according to the open-ended WTP question, however, both models of care are consistently cost-beneficial, confirming the results of the base case analysis.

As the primary objective of the CBA is to determine the worth of consultant- and midwifery-led care, the results carry important policy implications. Whether midwifery-led care should be developed in Ireland largely depends on resource constraints. While the results presented here suggest that both models of care should be undertaken from a public policy perspective, the decision to provide both alternatives may be constrained by resource issues. If only one alternative can be implemented then the CBA suggests that midwifery-led care should be undertaken for all low risk women as the net benefit of this model of care is considerably higher than consultant-led care. For example, the open-ended WTP question produces a net benefit of €1,215.29 for care in a MLU. In contrast, the same elicitation format generates a net benefit of €535.80 for care in a CLU. In this scenario, all low risk women seeking maternity care at hospital level should only be offered midwifery-led care unless their pregnancy is deemed high risk, thus allowing them access to consultant-led care.

However, pursuing only one alternative sharply contradicts a key objective of the National Maternity Strategy, which aims to improve maternal choice at hospital level. The decision then to expand midwifery-led care and restrict access to consultant-led care under resource constraints is complex and controversial. Ideally, multiple alternatives should be pursued as each alternative is cost-beneficial provided women receive their preferred over their less preferred model of care. This scenario produces a net benefit, generates utility for women, and is consistent with the aims of the National Maternity Strategy, which is concerned with improving maternal choice (DOH 2015), and the Strategic Framework for Reform of the Health Service, which aims to deliver care at the lowest levels of complexity where possible (DOH 2012).

The CBA provides an important contribution to public policy and literature. To the best of the author's knowledge, the marginal approach to benefit valuation has yet to be applied within a formal CBA. The results presented here suggest that the WTP data are valid and the use of the marginal approach provides important information on the ranking of alternative programmes, consistent with priority setting and welfare economics. That is, the approach provides information on the relative strengths of preferences which, when compared with relative costs, provide an explicit ranking of alternatives. Under resource constraints, this ranking of alternatives provides information on socially desirable uses of resources. The common unit of analysis facilitates comparisons between different dimensions of health and health care, which can be extended to other sectors. This is a major advantage of the CBA methodology. The specific strengths and contributions of the CBA presented here are discussed in greater detail in Chapters 8 and 9.

There are some notable limitations within the economic evaluation. For instance, the perspective assumed in this analysis is narrower than the natural perspective for CBA: a societal perspective. Whereas the net benefit results are informed by patient valuations, population valuations may have produced different results. These limitations, among others, are explored in Chapter 8.

The following section (7.8) concludes this chapter.

7.8 Conclusion

This chapter presents the results of the CBA. The primary objective of the economic evaluation is to determine the costs and benefits of consultant- and midwifery-led care in Ireland. The net benefit results suggest that a package of care in a CLU and MLU

for a low risk woman is cost-beneficial and should be undertaken provided the woman receives her preferred over her less preferred model of care. This finding is supported by the PSA which examines the existence and extent of uncertainty in each of the input parameters. Whether midwifery-led care should be developed in Ireland is complex and largely depends on resource constraints. If only one alternative can be implemented then standard decision rules suggest midwifery-led care should be provided for all low risk women with consultant-led care left to provide emergency care and care for high risk pregnancies. However, restricting maternal choice in this way contradicts a key objective of the National Maternity Strategy which aims to improve maternal choice (DOH 2015). Ideally, both alternatives should be undertaken where a positive net benefit could be generated, utility could be maximised, and the overall objectives of key government policy could be achieved. Of course, pursuing multiple alternatives may be resource constrained.

These findings are discussed in detail in Chapter 8. The thesis is concluded in Chapter 9; this chapter presents the key strengths of this research and outlines the specific contributions arising from the thesis.

8 THE DISCUSSION

8.1 Introduction

A number of research objectives are included in this thesis with an aim to contribute to policy, knowledge and methodology, the refinement of the SP techniques to inform benefit valuations and CBA within health care. Qualitative research is used in the first instance to identify the features of maternity care that influence women's decision making when presented with the choice of delivering in a CLU or MLU. This research is used to inform attribute development in a DCE and CVM. The DCE is used to identify women's strengths of preferences for different features of maternity care and to address policy issues and welfare measures. The CVM is used to calculate women's WTP for consultant- and midwifery-led care where two elicitation formats are adopted and compared to assess whether framing of the WTP task affects responses. The two SP techniques are also assessed to investigate the feasibility of the approaches to inform benefit valuations within CBA. Finally, a formal CBA is undertaken using data obtained from the CVM.

The findings arising from this research are discussed in detail in this chapter. Each study contained within this thesis is outlined separately. The qualitative research is discussed in section 8.2; the DCE in section 8.3; the CVM in section 8.4, and the CBA in section 8.5. The objectives contained within each study are re-iterated in each section where the findings are placed in the context of existing literature. Section 8.5 presents the limitations of the different studies contained in this thesis. Chapter 9 presents the key strengths of the thesis, and outlines the various contributions to

knowledge, methodology, and policy arising from the findings. Some concluding remarks about this research are presented in Chapter 9 also.

8.2 The focus groups: a discussion

A series of focus groups are undertaken to investigate women's preferences for alternative models of maternity care, as described in Chapter 3. In particular, women's motivations for choosing place of delivery when presented with the choice of delivering in a CLU or MLU are explored. To the author's knowledge, this is the first qualitative study to explore women's preferences for care in Ireland. The research evidence is used to develop attributes for the DCE and CVM; however, the findings provide important insights into women's preferences for care and subsequent motivations when choosing place of delivery. Therefore, the results carry important policy considerations, which are acknowledged in Chapter 9.

The primary aim of the qualitative research is to explore women's preferences for maternity care and subsequent motivations when choosing place of delivery. The study is therefore concerned with identifying women's views and opinions of maternity service provision in Ireland and their underlying preferences for alternative models of maternity care. Focus groups are used rather than individual interviews to ensure wide ranging ideas emerge and debate among participants ensues (Stewart and Shandasani 1990). This is an important consideration as the study is concerned with identifying the preferences of a range of women including first-time mothers and experienced maternity care users, as well as publicly and privately covered women. A thematic analysis is deemed the appropriate method for analysis as it captures patterns in preferences.

The thematic analysis generates three overarching themes: continuity of care from antenatal to intrapartum care, fears around childbirth, and freedom to exercise choice during intrapartum and postnatal care.

Continuity of care from antenatal to intrapartum care is an important consideration for women. This preference largely stems from safety concerns. Women feel that having continuity of care ensures that important issues regarding pregnancy do not *"slip through the cracks"*.[59] The need to repeat their obstetric history to a new health care provider at each antenatal visit and again during intrapartum care, concerns women. For that reason, some choose to receive their care privately where continuity of care is guaranteed. Women's preferred health care provider differs; some women prefer continuity of care with a midwife, while others prefer continuity of care with an obstetric doctor. Interestingly, some private participants reveal a preference for continuity of care with a midwife, but cite the inability of the public system to provide a sole midwife for the duration of their care as the main reason why they choose private care. While women's preferred health care provider varies, continuity of care is important to participants as it provides a real sense of security and assurance about their pregnancy. Hundley and Ryan (2004) found that continuity of care is important to women in a study conducted in Scotland, while the MidU (2009) study found that women appreciate, and derive satisfaction from continuity of care in a MLU (MidU 2009). This is also demonstrated in earlier research conducted in Scotland (Bostock 1993).

[59] Participant 9, multiparous, private; see Appendix B.2.

The second theme describes women's fears around childbirth. Women are primarily concerned about timely access to vital services. These services describe three sub-themes and include access/involvement of obstetric doctors during labour, access to pain relief, and access to neonatal services. Having an obstetric doctor involved in their intrapartum care is important to many participants, especially those who pay out-of-pocket for private care. These women consider the role of the obstetric doctor as superior to the midwife and feel that the presence of an obstetric doctor during labour provides a sense of relief and/or safety. However, this preference is not shared by all women. Some women associate doctors with adverse outcomes and do not want them involved during intrapartum care. Some women who receive their care privately also do not want to have the obstetric doctor involved in their care. The group regard the doctor as an *"insurance policy"*[60] for which they hope they never get value for money. Women are presented with the choice of delivering in a MLU where obstetric doctors would not be immediately involved in their care, although in the event of a complication they would be transferred to an alongside CLU and treated by medical staff. Some women are averse to the idea and cite transit time as their main concern. When informed that transit time would be minimal as the CLU could be accessed through a connecting corridor, many of the group's concerns are alleviated. Some women are content with the arrangement, remarking on its close resemblance to the public system.

The fear of pain during labour emerges in each focus group often without prompt by the facilitator. Both first-time mothers and experienced maternity care users, women are fearful of childbirth, and feel that having immediate access to epidural anaesthesia

[60] Participant 10, nulliparous, private; see Chapter 3, page 96.

provides a sense of comfort. There is a heightened sense of fear among first-time mothers, most likely arising from their inexperience, *"I'm just really terrified about the idea of pain"*.[61] When presented with the choice of delivering in a MLU where access to the epidural would be restricted, some women express a preference for CLUs, while others express a preference for MLUs provided the unit is adjoined to the CLU.

Having access to vital neonatal services, such as a paediatrician and a neonatal unit, is also important to women. Women are satisified to deliver in a CLU or MLU provided that neonatal services are provided on-site. Some participants reveal that they chose to deliver in CUMH because of the hospital's wide ranging neonatal services and reputation for care.

Fears around childbirth, in particular fears around timely access to obstetric doctors, pain relief, and neonatal services, dominate all four focus groups. Safety concerns during intrapartum care are identified throughout the literature (Byrne *et al* 2010; Hundley and Ryan 2004; Shahoei *et al* 2014). For instance, Byrne *et al* (2010) found women's preferred model of maternity care in Dublin is heavily influenced by childbirth safety issues. Women cite safety concerns for their baby as their primary concern when choosing place of delivery. Similar findings are obtained by this analysis, where safety concerns initially influence women's preferences for consultant-led care. Women's fears about midwifery-led care are lessened when they are informed that both midwifery- and consultant-led care would be co-located; some participants subsequently reveal a preference for care in a MLU.

[61] Participant 12, nulliparous, public; see Chapter 3, page 79.

The final theme describes women's preference to exercise choice during intrapartum and postnatal care. Maternal empowerment has become integral to maternity care in recent years (Kennedy 2010). With falling perinatal statistics, the focus has shifted from safety concerns for the mother and infant to account for other issues such as maternal choice and satisfaction. Two sub-themes are captured in this regard and describe women's involvement in decision-making during labour and choice of postnatal length of stay. Many women reveal that they would like to be actively involved in the decision-making around their labour with respect to pain relief and mode of delivery. Other participants are content to devolve decision-making to staff given their lack of medical expertise. In terms of postnatal length of stay, varying preferences emerge during the focus groups. Some women reveal a preference for a short postnatal length of stay, ranging from six hours to 24 hours. This group largely comprises experienced maternity care users. First-time mothers prefer to have an extended postnatal stay, citing inexperience and concerns about breastfeeding as the main factors behind their preference. However, regardless of their initial preference, women report that they would like to choose their postnatal length of stay after delivery as their preferences may change.

These themes reveal a considerable amount about women's preferences for maternity care in Ireland. In particular, they reveal the type of trade-offs women face when presented with the choice of delivering in a CLU or MLU. Given women's preference for continuity of care, which is assured in a MLU but not a CLU, and their fears around timely access to vital services, which are minimised in a CLU and heightened in a MLU, women face a difficult decision on where to give birth. For instance, women have to weigh up the benefit of assured continuity of care in a MLU against the cost

of reduced access to medical services, such as an obstetric doctor or epidural anaesthesia, which are immediately available in a CLU.

Informative discourse between the health care provider and woman in the presence of maternal choice is important in maternity care. Fears around timely access to vital services are a dominant theme in each focus group. These fears could be addressed with dialogue between the health care provider and pregnant woman about the risks associated with delivering in a MLU, and the length of transit time from the MLU to a CLU. For instance, the MidU (2009) study found that there is no significant difference between adverse outcomes in a MLU and CLU in Ireland and average transit time from the MLU to the CLU takes 0-15 minutes (Begley *et al* 2011; MidU 2009). Although 17 per cent of women delivering in the MLU are transferred to the adjoined CLU, these include minor indications, such as temporary transfer for an epidural upon maternal request (Begley *et al* 2011; MidU 2009). When women in the focus groups are informed that essential medical services would still be available on-site, their reservations about midwifery-led care relaxed.

The data suggests that women do not have a clear preference for either model of care, but rather a hybrid model of care which encompasses features of both consultant- and midwifery-led care. This hybrid model of care closely resembles the DOMINO scheme which offers continuity of care with a team of midwives in a community setting, with intrapartum care then provided in a CLU where women have immediate access to the full range of medical services (Kennedy 2010). This is an important policy consideration, which is addressed in Chapter 9.

The findings obtained from the DCE and CVM are presented in the following section (8.3).

8.3 The DCE: a discussion

A DCE is undertaken to identify women's strength of preferences for different features of maternity care and to address policy issues and welfare measures (Chapter 5). Given the flexibility of the approach to explore different phenomena, a number of associated objectives are contained within this study. This section discusses the findings arising from the objectives of the DCE.

The first objective involves examining the DRC format. An opt-out alternative is included in the DCE to improve the realism of the task to respondents (Anderson and Wiley 1992; Louviere and Woodworth 1983). To minimise the information loss arising from the inclusion of an opt-out alternative, this analysis adopts a DRC format. In the first instance, women are asked to choose between three alternatives: two experimental alternatives (Maternity Care Service A and Maternity Care Service B) and an opt-out alternative. This choice task is referred to as the unforced choice scenario as women are provided with an opt-out option. However, if women opt-out of the initial task, a follow-up question is included in the DCE where respondents are asked to identify their preferred alternative from the two experimental alternatives. This choice task is referred to as the forced choice scenario as an opt-out option is not included.

Use of the DRC format in the health economics literature is limited (Pedersen *et al* 2011); therefore, very little is known about the effect of the approach on respondents choices. Research to date suggests that follow-up questions are associated with greater

error variability or reduced choice consistency (Collins and Rose 2013; Giergiczny *et al* 2013; Pedersen *et al* 2011). This effect is examined in this analysis, where the results suggest that respondents' choices in the forced choice scenario do not conform to respondents' choices in the unforced choice scenario; that is, the forced choice scenario is associated with greater error variability. This finding supports recent research which demonstrates that choices made in follow-up questions are less consistent than initial choices (Collins and Rose 2013; Giergiczny *et al* 2013; Pedersen *et al* 2011).

An explanation for this effect might be that respondents lose interest after the initial choice task. After spending a considerable amount of time evaluating the available alternatives and selecting their preferred scenario, respondents are asked to repeat the process with one fewer alternatives on offer. It is likely that respondents' motivation to evaluate the subsequent choice task with the same rigour as the initial choice task is diminished.

The DRC format produces two datasets. The first dataset describes choices made in the unforced choice scenario, while the second dataset describes choices made in the forced choice scenario. This analysis investigates whether preferences are better specified separately or collectively. The collective dataset describes a pairwise combination of experimental alternative A and B, and excludes the opt-out option. This involves removing the opt-out alternative from the unforced choice scenario and replacing it with respondents' subsequent choice from the forced choice scenario. A standard CL model is estimated on the different datasets to investigate the best specification of preferences. The results suggest that the pairwise dataset estimates women's preferences better than the individual datasets. This is an important

consideration for the second objective of the DCE, which explores how preferences change given changes in underlying assumptions about respondents' choices.

Different discrete choice models may be used to analyse preferences. The appropriate model to use depends on the underlying assumptions about respondents' choices. A standard CL model is generally explored first, where it is assumed that the property of independence of irrelevant alternatives (IIA) holds across choice sets and preferences are homogenous across respondents. This analysis investigates both underlying assumptions.

In the first instance, the property of IIA is investigated. IIA assumes that perfect substitutability holds across each alternative in a choice set; that is, the choice probabilities for an alternative remain unchanged when a new alternative is introduced or an existing alternative is removed. A nested logit (NL) model is used to investigate the property of IIA on the unforced choice scenario. The NL model provides a useful experiment to investigate whether the choice probabilities for the two experimental alternatives differ to the choice probability for the opt-out option. It is hypothesised that alternative A and B compete more closely with each other than they do with the opt-out alternative. However, the results suggest that the property of IIA is not violated, meaning the choice probabilities for the three alternatives are the same across the choice sets.

The second underlying assumption, which relates to random taste variation, is explored using a flexible model. The pairwise dataset is used for this analysis as it is the best specification of women's preferences, as demonstrated by the first objective. A mixed logit (MXL) model is used to explore whether preferences vary across

respondents compared with a standard CL model which assumes homogeneity of preferences. Iterative modelling is undertaken to identify the appropriate specification of attributes. A MXL model that treats the cost attribute as fixed and the remaining attributes as random is found to be the best estimation of preferences. This suggests that the standard CL model poorly estimates women's preferences; rather than having fixed preferences for continuity of care, for instance, women have varying preferences for this attribute, including four other attributes (involvement of obstetric doctors during labour; access to pain relief; women's role in decision-making; and length of stay).

This is an important finding as this model is used for all subsequent analyses. For instance, it is used to identify women's strengths of preferences for the different attributes and calculate their marginal WTP for a specified level of each attribute. This describes the third objective of the DCE.

The third objective describes women's strengths of preferences for the different attributes included in the DCE. The model used to explore women's preferences is identified by the second objective. Reassuringly, each of the attributes is statistically significant, supporting their inclusion in the DCE and the results of the qualitative research. The hypothesised direction of the attributes is as expected. A negative coefficient is found on the cost attribute, implying a disutility associated with having to pay for maternity care. The remaining five attributes have positive coefficients, suggesting that women's ideal maternity care package consists of continuity of care with the same midwife from antenatal to intrapartum care, immediate access to obstetric doctors during labour, immediate access to epidural anaesthesia, an active role in decision-making, and an extended postnatal length of stay in hospital. However,

women's preferences for the different attributes vary, as illustrated by the MXL model which calculates the standard deviation of the mean utility score on each attribute (the reader is referred to Table 5.9 for reference). The attribute with the greatest heterogeneity in preferences is pain relief, with women having varying preferences for epidural anaesthesia and a birthing pool.

The relative importance of attributes is determined by the size of the utility scores, although it is best summarised using marginal rates of substitution (MRS) against the cost attribute. This identifies the maximum amount women are willing to pay for a specified level of each attribute. The most important attribute to women is continuity of care. Women are willing to pay €557.59 to have continuity of care with the same midwife from antenatal to intrapartum care. The second most important attribute describes having immediate access to obstetric doctors, with women willing to give up €514.14 for this service. Women are then willing to give up €418.18 to be actively involved in decision-making, while women are willing to pay €284.76 for epidural anaesthesia. For an additional hour in hospital after the birth of their baby, women are willing to pay €23.29. Hundley and Ryan (2004) found similar preferences for maternity care in Scotland, although the authors did not include a cost attribute in their DCE (Hundley and Ryan 2004).

The MXL model demonstrates that preferences are not fixed, but rather vary across women. Potential differences in preferences are explored within the fourth objective which tests the hypotheses that previous obstetric experience and geographic location influence preferences.

The economics literature suggests that preferences are driven by initial endowments of wealth (Thaler 1980); the health economics literature suggests that preferences are influenced by initial endowments of experience (Ryan and Ubach 2003; Salkeld *et al* 2000). For instance, Ryan and Ubach (2003) investigated preferences for a new prescribing system. The authors exposed one group to a new prescribing system, and another to an existing prescribing system. A DCE was undertaken to determine their strengths of preferences for the new prescribing system. The authors found that the group exposed to the new system valued this system more than the other group. This analysis investigates whether an initial endowment of childbirth experience in a CLU influences preferences. Experienced maternity care users are compared with first-time mothers who have never experienced childbirth.

A subgroup analysis is performed using a MXL model and MRS are calculated for each attribute. The results suggest that previous obstetric experience plays a considerable role in influencing preferences. For instance, women with a history of childbirth value consultant-led care more than first-time mothers. To have immediate access to epidural anaesthesia, experienced maternity care users are willing to pay €750.11. This contrasts sharply with first-time mothers who are indifferent between the epidural anaesthesia and birthing pool; the attribute is insignificant. For immediate access to obstetric doctors, experienced users are willing to pay €671.90. First-time mothers, on the other hand, are willing to give up €490.05 for this service. The results support existing literature, suggesting that initial endowments of experience influence preferences (Ryan and Ubach 2003; Salkeld *et al* 2000).

The health economics literature suggests that knowledge of a service's availability plays a considerable role in influencing preferences (Hundley and Ryan 2004; Ryan

and Ubach 2003; Salkeld *et al* 2000). For instance, Hundley and Ryan (2003) found that women delivering in Scotland in a catchment area where continuity of care during antenatal care is provided valued this service more than women delivering in a region where the service is not provided. The two maternity units included in the DCE present an interesting opportunity to explore this phenomenon in an Irish context. In CUMH, the only model of care on offer at the time of the study was consultant-led care. In the NMH, both consultant-led care and DOMINO care were provided. Given the midwifery-led nature of the DOMINO scheme, this analysis investigates whether preferences in the NMH favour midwifery-led attributes, such as continuity of care with the same midwife, compared with CUMH where it is hypothesised that preferences favour consultant-led attributes, such as pain relief.

A subgroup analysis is also performed using the MXL model and MRS are calculated against the cost attribute. The results indicate that women in the NMH favour midwifery-led attributes more than women in CUMH. For instance, women in the NMH are willing to pay €726.52 for continuity of care with the same midwife. Women in CUMH are willing to pay considerably less for this service, where an estimated WTP of €44.44 is calculated. Similarly, women in CUMH favour consultant-led attributes more than women in the NMH. For instance, women from CUMH are willing to pay €331.72 to have immediate access to epidural anaesthesia. Women in the NMH are indifferent between the epidural anaesthesia and birthing pool. The results are consistent with the literature, suggesting that geographic location, or knowledge of a service's availability, influences preferences (Hundley and Ryan 2004; Ryan and Ubach 2003; Salkeld *et al* 2000).

The next objective involves calculating women's WTP for different combinations of attributes, or packages of care using state-of-the-world models. Three combinations of attributes are developed to reflect care in a CLU, care in a MLU and DOMINO care. Care in a CLU describes discontinuity of care with the same midwife, immediate access to an obstetric doctor and epidural anaesthesia, limited involvement in decision-making, and 48 hours length of stay; care in a MLU describes guaranteed continuity of care with the same midwife, limited access to obstetric doctors and epidural, greater involvement in decision-making, and 24 hours length of stay; DOMINO care describes continuity of care with the same midwife, immediate access to an obstetric doctor and epidural anaesthesia, limited involvement in decision-making, and six hours length of stay.

While the DOMINO scheme is not evaluated in the CBA, it is included in this analysis for policy considerations. The results from the qualitative research suggest women's preferred package of maternity care closely resembles the DOMINO scheme. This analysis investigates whether the DCE generates similar findings to the focus groups.

Women's individual WTP for the three packages of maternity care are calculated using state-of-the-world models (Ryan *et al* 2008b). The results suggest that women value the DOMINO scheme the most, followed by care in a CLU and then care in a MLU. For the DOMINO scheme, women are willing to give up €1,112.32. This compares with €949.71 for care in a CLU and €725.31 for care in a MLU. The findings by the DCE are consistent with the qualitative research, which suggests that women want a hybrid model of care that encompasses features of both consultant- and midwifery-led care.

Ryan (2004) explains that these WTP estimates represent a measure of welfare change, or CV, when it is known that respondents will utilise the service with certainty. If multiple alternatives can be pursued, such as midwifery- and consultant-led care, then the welfare change must account for the fact that some women will utilise care in a CLU and others will choose care in a MLU. This is an important consideration for measures of welfare change as not all women benefit from the introduction of a MLU. Therefore, the utility of each package of care must be weighted against the probability of uptake. The sixth objective involves calculating the probability of uptake for care in a CLU, care in a MLU, and DOMINO care, as outlined below. These data are assimilated in the measure of welfare change.

Predicting market uptake for the two experimental packages of care relative to the existing service is an important policy consideration. It allows policy makers to model the potential costs arising from the introduction of a new service in a particular region, for example. As the utility of the DOMINO scheme is higher than the utility of the two major models of care, the probability of uptake is also higher and estimated at 38.5 per cent. This compares with 34 per cent and 27.4 per cent for care in a CLU and MLU, respectively.

These data are weighted against the utility of each alternative to obtain a measure of welfare gain used to calculate the welfare gain arising from the introduction of both services alongside consultant-led care. This measure of welfare change describes the final objective of the DCE. It involves calculating the welfare gain arising from the introduction of the two experimental alternatives alongside consultant-led care. The measure of welfare change is CV; this is the amount of money that needs to be taken from an individual to maintain that individual at their original level of utility after a

change in service provision occurs (Hicks 1939). The welfare gain arising from the introduction of midwifery-led care is estimated at €845.56. This estimate is larger than women's individual WTP for this model of care but less than the WTP for care in a CLU. The reason for this arises from the fact that the change in welfare only benefits some maternity users; some will substitute to the new service (midwifery-led care), while others will remain with the existing service (consultant-led care). Following the introduction of both experimental alternatives, the welfare gain is estimated at €1,509.39. Intuitively, this estimate is larger than the individual WTP for care in a MLU and DOMINO scheme, but not jointly, as some users will substitute to the DOMINO scheme, others to the MLU, while some women will remain with consultant-led care.

These policy analyses and measures of welfare change represent the first analyses of their kind within maternity care, to the best of the author's knowledge. A number of important policy and methodological contributions arise from this research and are discussed shortly in Chapter 9. The following section (8.4) provides a discussion of the findings obtained from the CVM.

8.4 The CVM: a discussion

A CVM is undertaken to calculate women's WTP for consultant- and midwifery-led care (Chapter 6). Given inherent methodological problems associated with different elicitation formats, two WTP questions are adopted in this thesis and compared to assess whether framing of the WTP question affects responses. A number of other associated objectives are contained within this study. This section provides a detailed discussion of the results arising from these objectives.

The first objective of the CVM involves comparing the demographic characteristics of zero and protest responders with positive WTP responders. The purpose of this objective is to explore whether potential differences in demographic characteristics exist between respondents that provide a positive WTP valuation against those that provide a zero WTP or refuse to provide a WTP answer. This is an important consideration in the contingent valuation literature if a large number of respondents provide a zero or protest response (Frew 2010a). Reassuringly, few zero and protest responses are obtained in this analysis. Across the open-ended and payment scale WTP questions, nine zero responses and 13 protest responses are given. Ideally, regression analysis is performed to identify the characteristics of zero and protest responders, however given the low number of zero and protest responses, such an analysis is not feasible.

The second objective involves calculating CV for care in a CLU and MLU. Two elicitation formats are adopted in this analysis: an open-ended WTP question and a payment scale WTP question. A marginal approach is also assumed where respondents are first asked to identify their preferred model of care and then how much they would be willing to give up to forego their least preferred model of care. The two major models of maternity care are the focus of the CVM: care in a CLU and care in a MLU. The measure of welfare gain is CV. This is the amount of money that needs to be taken away from an individual to maintain that individual at their original level of utility after a change in policy occurs (Mishan 1971). This is described as an *ex ante* perspective as the change in policy has yet to occur (Shackley and Donalson 2000). All positive WTP values are used to calculate CV.

Consistently, women are willing to pay more for consultant-led care than midwifery-led care. For instance, using data obtained from the open-ended WTP question, women are willing to give up €956.03 for the welfare gain associated with care in a CLU instead of a MLU. This compares with an estimated welfare gain of €808.33 for care in a MLU against care in a CLU. The payment scale design generates similar (although slightly lower) WTP valuations with care in a CLU estimated at €821.13 and care in a MLU at €795.06.

An explanation for the consistently higher WTP valuations for consultant-led care than midwifery-led care may be due to the price attached to a private package of care in Ireland. Women are familiar with the private system and the benefits it offers beyond the public system, such as continuity of care with an obstetric doctor during antenatal care. However, women are aware that during intrapartum care there is little to distinguish private care from public care in a CLU: women have immediate access to an obstetric doctor in the event of a complication and epidural anaesthesia if pain relief is required. Women may then value public care in a CLU as the next best alternative after private care. This conclusion is supported by the fact that women's WTP for care in a CLU is consistently less than the price of private care. Next to public care in a CLU, women may regard midwifery-led care as describing the next best alternative in terms of the advantages the system offers. While continuity of care is provided in a MLU, access to medical services is restricted.

These conclusions are supported by the findings from the DCE. In terms of the utility scores obtained from the MXL model, the DCE suggests that women place a high value on continuity of care with the same midwife in a MLU. However, the utility associated with delivering in a CLU where women have immediate access to obstetric

doctors and pain relief outweighs the utility of continuity of care. The policy analysis also supports this conclusion where the predicted uptake for a package of consultant-led care is higher than midwifery-led care given the perceived benefit or utility associated with care in a CLU relative to care in a MLU.

The third objective involves comparing the elicitation formats to assess whether framing of the WTP question affects responses. Two elicitation formats are adopted in this analysis to investigate whether framing of the WTP question affects responses. For instance, the open-ended question is generally associated with generating more zero and protest responses than other elicitation formats (Diamond and Hausman 1992; Donaldson *et al* 1997a; Frew *et al* 2003). As a cue is not included in an open-ended WTP question, the approach is also assumed to negatively influence WTP valuations (Frew *et al* 2003). Donaldson *et al* (1995) argue that this results in lower WTP valuations, especially when compared with the payment scale approach where a cue, or range, is provided. However, recent research suggests that the open-ended CVM and payment scale CVM generate comparable WTP valuations (Frew *et al* 2003; Grutters *et al* 2009).

Consistent with previous findings (Diamond and Hausman 1992; Donaldson *et al* 1997a; Frew *et al* 2003), this analysis finds more zero and protest responses within the open-ended CVM than the payment scale CVM. The reason for the higher number of these types of WTP responses is likely given by the absence of a cue in the open-ended question. Interestingly, the open-ended question consistently generates larger WTP values than the payment scale design. This appears to refute the argument put forward by Donaldson *et* al (1997b) who maintained that the open-ended question generates lower WTP valuations than the payment scale design. For instance, the open-ended

question estimates women's WTP for care in a CLU at €956.03. This is larger than the payment scale question for the same model of care, which is estimated at €821.13. However, the difference between the two values is statistically insignificant, suggesting that framing of the WTP question does not affect responses, contrary to Donaldson (1997b). Instead, the results are consistent with recent findings which show that the two approaches generate similar WTP values (Frew *et al* 2003; Grutters *et al* 2009).

The fourth objective compares CV across two demographic characteristics. CV is explored in terms of geographic location and previous obstetric experience. A significant result is found for geographic location. Women delivering in a region with access to both consultant- and midwifery-led care are willing to pay more for midwifery-led care than women delivering in a region with sole access to consultant-led care. A similar conclusion is obtained from the DCE where a subgroup analysis across two maternity units (geographic locations) finds that women delivering in the NMH are willing to pay more for midwifery-led attributes, such as continuity of care, while women delivering in CUMH are willing to pay more for consultant-led attributes, such as having immediate access to epidural anaesthesia. The findings obtained here are also consistent with the literature which suggests that knowledge of a service's availability influences preferences, as discussed already in section 8.3.1 (Hundley and Ryan 2004).

There is a significant difference between the WTP for care in a MLU among first-time mothers and experienced maternity care users. First-time mothers are willing to pay more for care in a MLU than women with a history of childbirth. The subgroups analysis performed within the DCE supports this conclusion, which demonstrates that

women with a history of childbirth favour consultant-led attributes more than first-time mothers. Again, this finding corresponds to the literature, as discussed in section 8.3.1 (Cartwright 1979; Ryan and Ubach 2003; Salkeld *et al* 2000).

While significant results are obtained, the findings are not uniform across the elicitation formats, and therefore should be treated with caution. For instance, the significant result for geographic location is obtained from the open-ended WTP question for care in a MLU, while the significant result for previous obstetric experience is obtained from the payment scale question for care in a MLU. The other WTP questions generate non-significant results. Nevertheless, the significant results obtained here are in line with earlier conclusions, suggesting that the non-significant findings may be the result of small sample size.

The fifth objective examines CV across other demographic information, in particular income, and investigates whether ability to pay is associated with WTP. The CVM approach is criticised for being intrinsically linked to ability to pay (Kenkel 1997), and much literature finds an association between ability to pay and WTP (Bateman *et al* 2002; Cross *et al* 2000; Donaldson *et al* 1997b; Frew *et al* 2003). However, the association is only problematic if differences in preferences exist across income groups, for instance (Olsen and Donaldson 1998). If preferences are similar then ability to pay does not distort the WTP results.

Correlation analysis is used in the first instance to examine whether an association exists between WTP and income. Two significant positive correlations are obtained. Women's WTP for care in a CLU and MLU is associated with income using data obtained from the open-ended WTP question and payment scale WTP question,

respectively. Women in higher income brackets are willing to pay more for maternity care than women in lower income brackets, suggesting ability to pay is associated with WTP. The distribution of preferences, however, is similar across both groups. Regardless of income, women share similar preferences for both models of care. Therefore, ability to pay, while associated with WTP, does not distort the values obtained by the CVM as preferences are similar across income groups.

The sixth objective involves predicting WTP using regression techniques. Regression analysis is useful for predicting WTP. It identifies the exact nature of the relationship between demographic characteristics and WTP, such as income and WTP. However, a minimum sample size of around 200 is required to reliably predict WTP (Mitchell and Carson 1989). This is considerably larger than the samples presented in this analysis. For instance, the open-ended WTP question for care in a CLU includes 58 observations, while the payment scale WTP question for the same model of care includes 71 respondents. This is too few data for regression analysis. An attempt to increase sample size is undertaken, which involves merging the open-ended WTP data with the payment scale WTP data; however, too few data are obtained for regression analysis. For instance, the merged data for care in a CLU includes 129 observations, while 177 observations are obtained for care in a MLU. (The results of the regression analysis are reported and described in Appendix C.1 for reference.)

While it is not possible to reliably predict WTP using regression analysis, the approach is not a requirement of the CVM. Small sample size is common within the literature, where studies restrict their analysis to descriptive and inferential statistics. For instance, Haefeli *et al* (2008) conducted a contingent valuation study on patient's WTP for differing types of spinal intervention. With 77 WTP observations obtained in their

analysis, the study focussed on descriptive and inferential statistics, similar to the analyses presented in this thesis.

While it is not possible to predict WTP using regression analysis, it is possible to investigate the characteristics of women that prefer consultant-led care over midwifery-led care. This is the focus of the seventh objective of the CVM, which identifies the demographic characteristics that predict women's preferences for consultant-led care using regression analysis.

Analysing the demographic characteristics of respondents that prefer one service over another is useful when WTP data contains noise. (Frew 2010b). In the context of earlier findings by the DCE and inferential statistics provided by the CVM, this analysis is useful in determining the extent of the relationship between preferences and demographic characteristics. For instance, the DCE suggests women delivering in a region with sole access to consultant-led care have a stronger disposition towards consultant-led attributes than women delivering in a region where consultant- and midwifery-led services are available. Other explanatory variables are included also, including previous obstetric experience, PHI, income, ethnicity, and parity.

In terms of geographic location, the regression results suggest that women delivering in a region with sole access to consultant-led care are 68 per cent more likely to prefer this model of care than women delivering in a region where both models of care are available. This finding supports the results from the DCE and other literature. From a policy perspective, this is an important finding as it suggests that the demand for MLUs may be initially weak due to unfamiliarity. The challenge then lies in informing women about the model of care and the services it offers. The qualitative research

presented in this thesis suggests women are primarily concerned about safety issues. Informative discourse then between the health care provider and consumer about the efficacy of the service and its proximity to essential medical services in the event of an obstetric complication may be acutely necessary for the successful implementation of midwifery-led care in Ireland.

The regression analysis also finds that first-time mothers are 44 per cent less likely to prefer consultant-led care. This suggests that women with a history of childbirth have a stronger disposition for consultant-led care as a result of their experience. Again, this finding supports the results obtained from the DCE which suggest experienced maternity care users favour consultant-led attributes (services) more than first-time mothers. The literature finds similar evidence with respect to initial endowments of experience (Ryan and Ubach 2003; Salkeld *et al* 2000), as discussed in section 9.3.1.

Women in the highest income bracket are approximately 52 per cent more likely to prefer consultant-led care than women from other income groups. In contrast, women with PHI are 35 per cent less likely to prefer consultant-led care than women without PHI. This difference in preferences seems counter-intuitive at first as PHI is often a useful proxy for high income. However, the majority of women in this study with PHI fall into the lower income brackets, relative to the highest income bracket. Therefore, the results obtained from the relationship between income and WTP are insightful and consistent with *a priori* expectations. In addition, it is assumed that many women with PHI and in the highest income bracket already opt for private care; although these women are not captured in this study as only publicly covered women are invited to participate. The other explanatory variables included in the regression analysis are non-significant, including parity and ethnicity.

The WTP estimates are subsequently incorporated into a formal CBA. The CBA is discussed next, in section 8.5.

8.5 The CBA: a discussion

A CBA is undertaken to evaluate the costs and benefits of consultant- and midwifery-led care in Ireland. The benefit estimates derive from the CVM; as discussed in Chapters 5 (section 5.3) and 7 (section 7.6), it is not possible to include the DCE data in the CBA as the benefit estimates cannot be compared directly with corresponding cost data.

The primary objective of the CBA is to determine the suitability of consultant- and midwifery-led care in Ireland for a low risk woman availing of maternity care. The perspective assumed in this analysis is the Health Service Executive (HSE) (third-party payer), and the timeframe is one year. This is a sufficiently long time horizon to evaluate all costs and benefits arising from antenatal, intrapartum, and postnatal care. Costs and benefits are estimated for a low risk woman seeking maternity care in Ireland, where costs are estimated to reflect the expected cost accruing to any maternity unit and benefits are estimated to reflect the welfare gain of any pregnant woman availing of maternity care.

Cost and benefit estimates derive from primary data collection. The cost of a package of care in a CLU is estimated at €1,102.72. For the same package of care in a MLU, the estimated cost is €682.46. These estimates represent the most up-to-date information on costing in maternity care in Ireland. The data are assumed to closely reflect the true cost of both models of care in Ireland as the estimates derive from

exhaustive micro-costing and gross-costing techniques. The benefit valuations derive from the CVM, which has previously been discussed in section 8.3.

Standard CBA decision rules are assumed within this analysis where each alternative is evaluated independently. As the marginal approach to benefit valuations is assumed by the CVM, a marginal cost is calculated for each model of care. For instance, the net benefit of midwifery-led care instead of consultant-led care is determined by subtracting the marginal cost of a package of care for a low risk woman in a MLU instead of a CLU from the marginal benefit of midwifery-led care over consultant-led care. The alternative is deemed desirable if a positive net benefit is produced and undesirable otherwise (Mishan 1971). The same decision rules are used to evaluate consultant-led care.

The base case analysis suggests that both consultant- and midwifery-led care are cost-beneficial in Ireland provided women are provided with their preferred model of care. This result is supported using benefit valuations derived from the open-ended WTP question and payment scale WTP question. The greatest net benefit is produced by midwifery-led care and estimated at €1,228.56. In contrast, consultant-led care produces a net benefit of €535.80. When median values are assumed in the CBA, the results remain unchanged for both models of care. Median values are useful when the data are positively skewed (Pearce *et al* 2006), which is the case for both elicitation formats.

Probabilistic sensitivity analysis (PSA) is undertaken to examine the existence and extent of uncertainty in the input parameters. The results are expected to be sensitive to changes in length of stay costs, for example, which are the main driver of costs for

both models of care. For instance, a package of care in a CLU is estimated for a 2.1 day postnatal length of stay. At an estimated cost per bed-day of €373, as determined by the Ready Reckoner (HSE 2013), length of stay costs account for approximately 70 per cent of the total cost of this package of care. While this estimate is informed by nationally representative data on postnatal length of stay in Ireland, the potential length of stay can vary across women. As illustrated in the focus groups, women have varying preferences around length of stay. Some women prefer shorter periods of stay, whereas others prefer extended periods. Variation in this input may have a considerable impact on the estimated cost of this package of care. Similarly, length of stay costs also account for the largest contribution of overall costs for midwifery-led care. While a 1.07 day postnatal length of stay is assumed in the analysis, any variation in this input is expected to affect the estimated cost of this package of care given the considerably high cost of a postnatal bed-day.

Ten thousand Monte Carlo simulations are performed to examine the existence and extent of uncertainty in costs and benefits. Across all iterations of the PSA, both models of care are cost-beneficial, supporting the results obtained from the base case analysis. These findings carry important policy implications. For instance, under standard CBA decision rules, the positive net benefit produced by consultant- and midwifery-led care suggests that both models of care are desirable as long as women receive their preferred model of care and should be undertaken. If only one alternative can be pursued, then the results suggest midwifery-led care should be undertaken for all low risk women as the model of care reflects the most desirable allocation of resources. However, restricting choice in this way is controversial and it conflicts with key government policy which aims to improve rather than restrict maternal choice at

hospital level (DOH 2015). The issue then for policy makers is whether multiple alternatives can be pursued within the current budget constraint. The policy implications are further discussed in Chapter 9. The limitations associated with this study and the other empirical analyses presented in this thesis are outlined in the next section (8.6).

8.6 Limitations

This section presents the limitations associated with this thesis. These limitations are outlined for each study, and areas for further research are identified where applicable.

8.6.1 *The qualitative research: some limitations*

There are limitations associated with the qualitative research. For instance, the total number of participants in the focus groups is smaller and the rate of opt-out is higher than anticipated. The views and opinions of women who did not participate including non-English speakers (who could not participate) may differ considerably from the views and opinions of the sample. In addition, the rate of uptake among private participants is disproportionately larger than among their public counterparts. However, these weaknesses are somewhat offset by the thematic analysis which reached data saturation for the given sample.

This research invites women who had already declared a preference for secondary care to participate in the study. The views and opinions of women who prefer home birth care are missed in this analysis. However, in Ireland, less than one per cent of women opt for a homebirth (NPRS 2013). In addition, the preferences of women who live in a catchment area where both models of care are provided are missed in this analysis. It is possible that the preferences of women who have experienced midwifery-led care

differ to the views presented here. Future research could explore potential differences in preferences between these groups in an informal setting. Nonetheless, a major strength of the qualitative study lies in the range of demographic characteristics that are obtained in the focus groups. In particular, the preferences of both publicly and privately covered women are obtained and analysed.

An inherent weakness with qualitative research lies in interviewer bias (Kvale 1994). This is the extent that the researcher introduces their own biases in a study. This may arise in an informal setting such as a focus group where the researcher can influence the direction of the focus groups and participants' responses (Kvale 1994). To minimise interviewer bias, a topic guide is developed in advance of the focus groups following an extensive review of the literature. The topic guide serves as a prompt in the focus groups, where participants are allowed to stray from the guide to ensure wide ranging ideas emerge. The transcripts are analysed by two researchers to minimise potential bias and ensure similar themes are drawn from the data. Another limitation in this regard arises from the potential bias arising from the profession of the researcher. As a health economist, training in qualitative research was undertaken in advance of the focus groups to ensure further interviewer bias did not arise due to inexperience.

Since the findings of the research are consistent with other studies, it is assumed that interviewer bias is not present in this analysis.

The limitations associated with the SP techniques are presented in section 8.6.2.

8.6.2 *The SP techniques: some limitations*

Two SP techniques are assumed in this analysis, each containing their own weaknesses. These weaknesses are presented separately below. The limitations associated with the DCE are outlined in section 8.6.2.1, and the CVM in section 8.6.2.2.

8.6.2.1 *Limitations arising from the DCE*

There are a number of limitations associated with this study. First, the response rate to the DCE was lower than anticipated at 28 per cent, and contrasts sharply with a 60 per cent response rate achieved during the second pilot study. The response rate in CUMH (36.5 per cent) was noticeably higher than the NMH (19.5 per cent). In CUMH, the same steps were undertaken in the main study to ensure recruitment matched earlier efforts. Three reminder letters were distributed to women and a mobile text message service was provided upon final correspondence if any woman wished to request a new copy of the survey. It was not possible to distribute any reminders to women in the NMH due to an unforeseen staff shortage problem which emerged after the initial survey was distributed. This may explain the unusually low response rate from the NMH (19.5 per cent). While sample size is small, it is sufficiently large for analysis of discrete choice data. Lancsar and Louviere (2008) maintain that a sample size of 20 is sufficient for discrete choice analysis. Ninety-six observations are obtained here.

As mentioned in Chapter 4, non-response bias may be an issue with the data; however, it is impossible to determine the extent of this bias as the participant characteristics of the sample frame are not obtained in this study due to ethical issues. Therefore, it is

not possible to compare responders with non-responders. Nevertheless, it is reassuring that similar findings to the qualitative research are obtained here.

The DCE was piloted on a number of occasions. It was distributed across four different maternity units alongside the main CVM where it was intended to serve as the main DCE. However, the results obtained from this analysis were treated as an additional round of pilot testing as issues with collinearity and non-significance were encountered. The survey could not be re-distributed in three of these four maternity units (CGH, OLOL, and St. Luke's), resulting in a considerable loss of data on women's preferences in these regions. For instance, two of these maternity units contained a MLU (CGH and OLOL). While the preferences of women availing of this model of care are absent from this analysis, it is assumed that they are synonymous with the preferences obtained from the NMH as this study demonstrates that knowledge of a service's availability influences preferences. Therefore, these preferences likely would have favoured midwifery-led attributes, such as continuity of care, which are already described by the preferences of women from the NMH.

While the literature suggests that respondents can cope with up to 16 choice sets, tiring after nine, the task at hand may have discouraged some respondents from completing the survey (Pearmain *et al* 1991; Ryan 1999). One respondent completed three tasks, writing that she tired of the choice sets at the end of her booklet. Overall, the completion rate was generally high at 85 per cent.

The use of a MXL model to estimate preferences is rising in popularity in the health economics literature (De Bekker-Grob *et al* 2012), although there are certain methodological issues surrounding the flexible model (Hensher and Greene 2003).

The criterion for specifying an appropriate distribution for the parameters is not well defined. Similarly, there are no guidelines on the number of parameters that should be treated as random, and which parameters should be specified as random (Amaya-Amaya *et al* 2008). However, this analysis adopts an iterative modelling approach and compares various models with different random attributes and specifications of the cost attribute to identify the best specification of women's preferences. The model that best specifies preferences includes five random attributes and two fixed attributes (an alternative specific constant (ASC) for alternative A and cost) where the cost attribute is normally distributed.

Policy analysis is assumed in this study to predict market uptake. Ideally, the entire market would be modelled where some women utilise care in a CLU, care in a MLU, DOMINO care, and some women do not use any hospital service. Data on non-users may be obtained in a DCE through the inclusion of an opt-out alternative. While an opt-out alternative is initially included in this analysis, it is replaced with data from the DRC format as the pairwise dataset provides the best specification of preferences. Therefore, it is not possible to model non-users in this analysis. Data on the unforced choice could be used to include this group for policy considerations. However, there are problems with the way the data are used in this analysis. For instance, the opt-out alternative is not modelled in a meaningful way other than through the use of an ASC. This is because the reference category for each attribute describes an alternative level of care, rather than the opt-out option. It is possible to re-code the variables with the opt-out option specified as the reference case. By applying this method considerable information on the original reference categories is lost since it is not possible to create and model dummy variables for each of these categories due to issues with

collinearity. This is a limitation of the DCE design, however, the impact on predicted probabilities is assumed minimal as less than one per cent of the obstetric population do not consume hospital care (NPRS 2013).

Finally, the DCE cannot be incorporated into the CBA. The DCE boasts numerous advantages over the CVM as the approach identifies optimum service configurations and predicts market uptake (van der Pol *et al* 2010). The DCE presented here demonstrates the usefulness of the approach to provide meaningful WTP estimates using state-of-the-world models and more robust measures of welfare change using CV. These measures of welfare change account for the proportion of women that actually benefit from the provision of midwifery-led care, for example. However, a DCE must be developed to correspond with cost data. For instance, the attributes in a DCE must reflect a corresponding cost input. In addition, data should be collected using a resource use inventory where the cost of a service can be compared directly with the benefit of that service for a given patient (McIntosh 2006). While it is not possible to use the DCE data in the CBA, the results presented here suggest that a DCE is a feasible source for benefit valuations and can be used within the economic evaluation methodology.

The limitations associated with the CVM are presented next, in section 8.6.2.2.

8.6.2.2 *Limitations arising from the CVM*

The major limitations of the CVM arise from the small sample size. For instance, one of the objectives of the approach is to compare zero and protest responders to positive WTP responders, however too few zero and protest responses are obtained for regression analysis. For instance, nine zero and 13 protest responses are obtained in

total. It is reassuring that few women provided a zero and protest response, suggesting women felt comfortable answering the WTP question. However, it is likely that if the sample size was larger, more zero and protest responses would have been obtained, allowing for a meaningful comparison of the demographic characteristics of zero and protest responders with positive WTP responders.

Small sample size limits the scope for analysis of positive WTP responses also. Non-parametric tests are assumed in this analysis to compare across demographics, although few significant results are obtained, contrary to *a priori* expectations. For instance, WTP is expected to be associated with income; however, a significant result is only found using the open-ended WTP question for care in a MLU and the payment scale WTP question for care in a CLU.

Regression analysis is also limited; the sample size is too small for meaningful prediction of WTP. Regression analysis is useful in determining the exact relationship between the demographic characteristics of the sample and WTP, although it is not a requirement of the approach.

Another weakness of the study arises from the lack of information obtained on the motivations behind women's WTP. Whether a zero, protest, or positive WTP response is given by respondents, some follow-up questions could have been included in the survey to explore how women approached and responded to the task. For instance, if a zero or protest response is given, respondents could have been asked to explain why they are refusing to provide a positive WTP response. Such a follow-up question could have provided important information on whether women are refusing to participate because they feel they pay enough in taxes already; they are not comfortable with the

payment vehicle; they do not understand the task; or another reason. Where positive WTP valuations are provided, women could have been asked to explain how they arrived at their maximum WTP. This type of follow-up question might have been useful in determining whether the price of private care influenced women's WTP valuation; financial circumstances; the expected cost of care; or another reason. Follow-up questions were not included in the CVM due to the complexity and length of the survey; the WTP questions were included in the MAMS booklet alongside the DCE. With 16 choice sets included in the DCE, the survey was already considered cognitively burdensome. While it is not possible to determine how women evaluated the WTP question, it is assumed that respondents understood the task and approached it similarly given the comparable estimates generated by the two elicitation formats for two different models of care.

The limitations of the CBA are acknowledged in section 8.6.3 (below).

8.6.3 *The CBA: some limitations*

There are a number of weaknesses associated with this analysis. For instance, a CBA is employed to evaluate the costs and benefits of care in a MLU and CLU. Consistent with welfare economics, the natural perspective is a societal perspective (Mishan 1971). However, a third-party payer perspective is assumed in this analysis. To explore the costs and benefits accruing to society, other relevant cost and benefit considerations are required. On the cost side, a consideration of society's valuation of an obstetric doctor's time could perhaps be included. On the benefit side, a consideration of the general population's WTP might be useful to capture societal WTP values. While the use of patient values is supported in the literature (Shackley

and Donaldson 2000), a combined sample of user (patient) and non-user (general population) values might be more relevant within a broader perspective (Frew 2010a; Ortega *et al* 1998).

While the cost estimates derive from primary data collection and represent the most up-to-date cost information in Ireland, the cost estimate for midwifery-led care does not include the capital cost of building a MLU. Instead, the estimate is based on the assumption that existing infrastructure is utilised to provide midwifery-led care. Inclusion of capital costs may increase the cost estimate for care in a MLU, although the impact is assumed minimal as the capital cost is estimated as an equivalent annual cost. For instance, the MidU (2009) study calculated the capital cost of building a MLU in Ireland. After the building was depreciated and the cost was equivalised by the annual throughput of the unit, the resulting capital cost per woman was €34.75 for CGH and €53.56 for OLOL. Therefore, the cost is assumed marginal.

The question of efficiency is addressed in the CBA with respect to the two major models of care; that is, whether care in a CLU and MLU is cost-beneficial. While the results presented in the DCE suggest that the DOMINO scheme is the preferred package of care in Ireland, this service is not evaluated in the CBA as detailed resource use information for this model of care is not available, while benefit valuations for this model of care are not obtained from the CVM. Further research is required to address whether an expansion of this service would be cost-beneficial.

8.7 Conclusion

This chapter provides a detailed discussion of the results presented in this thesis, and includes a discussion of the limitations associated with each study. A number of

research objectives are included in this thesis with an aim to contribute to knowledge and methodology, policy, the refinement of the SP techniques to inform benefit valuations and CBA within health care. The data sources presented throughout this thesis derive from primary data collection. Qualitative research is undertaken in the first instance to identify the features of maternity care that influence women's decision-making when presented with the choice of delivering in a CLU or MLU. These features are used to develop attributes and attribute levels in the DCE and CVM. The DCE is then used to identify women's strengths of preferences for the different features of maternity care and address policy issues and welfare measures. The CVM is used to value maternity care and these date are incorporated into a formal CBA. Cost estimates included in the CBA are derived from primary data collection.

The key strengths of the findings presented in this thesis are discussed next, in Chapter 9.

9 CONCLUSION

9.1 An overview

Maternity care in Ireland is the empirical focus of this thesis. Presently, consultant-led care is the dominant model of maternity care in the country. Women availing of care at hospital-level are restricted to choose this model of care if they live outside of the northeast of Ireland. Women living in the northeast catchment area may choose between care in a CLU and care in a MLU provided they are considered low risk for obstetric complications. Both models of care are described in detail in Chapter 1. Briefly, consultant-led care is provided in a hospital setting by a team of midwives and doctors where the full range of medical services is immediately available, including obstetric, anaesthetic, and neonatal care. Midwifery-led care is also provided in a hospital setting, although care is provided solely by midwives and the full range of medical services is not immediately available, but can be accessed through an adjoined CLU. Midwifery-led care is a relatively recent development in maternity service provision in Ireland. It was introduced in 2004 on a trial basis pending the results of a RCT and CEA. Despite the potential cost savings arising from an expansion of this model of care, as illustrated by the MidU (2009) study, there remain only two MLUs in Ireland. Recently, there has been an increased interest in developing this model of care outside of the northeast of the country (Condon 2015; Culliton 2014; DOH 2015; KPMG 2008).

To date, the majority of research has focussed on the clinical and financial aspects of the different models of care (Begley *et al* 2011; MidU 2009). There is a paucity of

research on women's preferences for these models of care, and whether midwifery-led care would be utilised alongside consultant-led care (Byrne *et al* 2010). The only CEA that has been undertaken on the topic used a cost per normal birth as the outcome measurement (MidU 2009). From a policy perspective, this type of outcome measurement and economic evaluation methodology is poorly equipped to deal with issues of resource allocation relative to SP techniques and CBA. The WTP method provides more meaningful information on the benefits of health and health care, which may be compared directly with all other health conditions and services, while CBA provides a framework for the efficient allocation of resources in terms of social desirability. In spite of their comprehensive ability to inform public policy, the approaches remain under-utilised in the health economics literature.

This thesis contributes to the refinement of the SP techniques and CBA methodology. Given the dearth of information on benefit valuations within CBA, two SP techniques are assumed in this analysis, including a DCE and CVM. Both approaches rely on qualitative research to inform attributes and attribute levels. A series of focus groups are undertaken to develop attributes and described in detail in Chapter 3. The qualitative research provides important information on women's preferences for maternity care, which is relevant to public policy. Using data obtained from the focus groups, a number of attributes are developed to inform the DCE and CVM, which are outlined in Chapter 4. Both SP techniques are primarily concerned with eliciting WTP valuations for use in the CBA, although a number of objectives are contained within the approaches which contribute to public policy and the refinement of specific methodology. The results of the DCE are presented in Chapter 5, while the research findings of the CVM are outlined in Chapter 6.

Chapter 7 then focuses on the CBA. Data obtained from the CVM on women's WTP for care in a CLU and MLU are incorporated into the CBA. The economic evaluation is introduced in this chapter where benefit valuations and cost estimates are outlined. Costing data derive from primary data collection and represent the most up-to-date information on the cost of a package of maternity care in Ireland.

This chapter outlines the key strengths of this research and presents the specific contributions arising from the research evidence. First, in section 9.2, the main findings of the thesis are summarised. Section 9.3 then outlines the key strengths of these findings, while section 9.4 presents the specific contributions to knowledge, methodology and policy. Section 9.5 concludes this chapter and thesis.

9.2 Thesis findings

The main findings from this thesis are as follows:

1) Qualitative research is undertaken to identify women's preferred model of care and subsequent motivations when choosing place of delivery. Three themes emerge from the focus groups. The themes include: continuity of care; fears around childbirth; and freedom to exercise choice. Women do not have a clear preference for consultant- or midwifery-led care, but rather a hybrid model of care that encompasses features of both models of care. This hybrid model closely resembles the DOMINO scheme.

2) A DCE is then undertaken to examine women's strengths of preferences for different features of consultant- and midwifery-led care. Five attributes are included in the DCE, as informed by the qualitative research. These attributes

include continuity of care with the same midwife; involvement of obstetric doctors during intrapartum care; access to pain relief; involvement in decision-making; and length of stay. A sixth attribute describing women's WTP for maternity care is included to capture monetary valuations of the different models of care. A discrete choice model that allows preferences to vary across respondents is the best specification of preferences. The most important attribute to women is continuity of care, followed by involvement of obstetric doctors, involvement in decision making, access to pain relief, and length of stay.

3) A recent innovation in DCEs, referred to as dual response choice (DRC) format, is adopted in this thesis to explore whether the format provides a viable solution to minimise information loss when an opt-out alternative is included. The results presented here support the use of the DRC format in the DCEs. While choice consistency is reduced in the follow-up choice scenario, a merged dataset of the unforced and forced choice scenarios represents preferences better than the individual datasets (unforced and forced choice scenarios).

4) The literature suggests initial endowments of experience and knowledge of a service's availability influence preferences. Both factors are tested in this thesis using data obtained from the DCE. Women with a history of childbirth in a CLU are more likely to favour this model of care. Geographic location (knowledge of a service's availability) also influences women's preferences, where women delivering in a region with sole access to consultant-led care favour this model of care over women with access to both consultant- and midwifery-led models of care.

5) The DCE is further used to address policy issues and welfare measures. Using specific combinations of attributes that describe consultant-led care, midwifery-led care, and DOMINO care, the policy analysis suggests women's preferred package of care is DOMINO care. The probability of uptake for this scheme is 38.5 per cent. Consultant-led care is the second preferred alternative with an estimated uptake of 34.0 per cent, followed by midwifery-led care at 27.4 per cent. Welfare analysis suggests that women's WTP for consultant-led care is €949.71. For the welfare gain associated with midwifery-led care, women are willing to give up €845.56. The results of the welfare analysis demonstrate the usefulness of the approach to inform benefit valuations within CBA.

6) A CVM is subsequently employed to calculate women's WTP for consultant- and midwifery-led care. Two elicitation formats are adopted and compared to investigate whether framing of the WTP task affects responses: an open-ended WTP question and a payment scale WTP question. The results suggest that there is no statistically significant difference between WTP values elicited from the two elicitation formats. Women's WTP for care in a CLU is estimated at €956.03 and €821.13 using data obtained from the open-ended and payment scale CVM, respectively. For care in a MLU, women's WTP is estimated at €808.33 and €821.13 according to the respective open-ended and payment scale CVM.

7) The data obtained from the CVM are used to identify the characteristics of women that prefer consultant-led care over midwifery-led care. Women delivering in a region with sole access to consultant-led care are 68 per cent more

likely to prefer this model of care than women delivering in a region with access to both consultant- and midwifery-led care. Women in the highest income bracket are 52 per cent more likely to prefer consultant-led care, while women with private health insurance are 35 per cent less likely to prefer this model of care.

8) The SP data are examined to assess the validity of the study design and WTP estimates obtained. When compared with the private market, the validity of the SP data is confirmed. As a private package of care costs approximately €3,500, women's considerably lower WTP for both consultant- and midwifery-led care, which is publicly provided and indicative of their revealed preference (RP), the data are assumed externally valid.

9) A cost analysis of consultant- and midwifery-led care is undertaken using primary data collection. A package of care in a CLU that covers antenatal, intrapartum, and postnatal care is estimated to cost the Health Service Executive (HSE) €1,102.72. The same package of care in a MLU costs €682.49

10) Using data obtained from the CVM on benefit valuations and cost estimates derived from primary data collection, a formal CBA is undertaken to investigate the desirability of the two major models of maternity care in Ireland. Using net benefit analysis, both consultant- and midwifery-led care are cost-beneficial provided women receive their preferred model of care. The greatest net benefit is produced by midwifery-led care, estimated at €1,228.56, suggesting this model of care should be implemented over consultant-led care for low risk

women if only one alternative can be pursued. However, restricting maternal choice in this way conflicts with a key objective of government policy that aims to improve choice at hospital level. Ideally, both alternatives should be undertaken where a positive net benefit could be generated, utility could be maximised, and the overall objectives of key government policy could be achieved. The results of the CBA are supported by probabilistic sensitivity analysis (PSA).

The following section outlines the key strengths of these findings.

9.3 Key strengths of the thesis

Four empirical projects are undertaken in this thesis. A qualitative study is employed in the first instance to identify the features of maternity care that are important to women when choosing place of delivery. The focus groups provide women with the opportunity to discuss their views of and preferences for maternity care in an informal setting in Ireland. The study provides important insights into women's preferences for consultant- and midwifery-led care and demonstrates the features of care that matter most to women when choosing place of delivery. Three themes are generated from a thematic analysis of the focus groups. The themes describe women's preferences for maternity care, and are consistent with findings obtained elsewhere. For instance, safety concerns during childbirth are identified throughout the literature (Byrne *et al* 2010; Hundley and Ryan 2004; Shahoei *et al* 2014), and supported by this analysis.

While sample size may appear small, qualitative research does not rely on large samples to obtain meaningful information. Instead, the quality of the data is informed by the analysis, such that sample size is largely irrelevant once the data reaches a point

of saturation (Barbour 2001; Mays and Pope 1995). With 19 participants, across four focus groups, saturation is achieved in this analysis where no new information is being obtained from participants. This is a major strength of the results presented here, which are further supported by the literature.

Another strength of the qualitative study lies in the range of demographic characteristics that are obtained in the focus groups. In particular, the preferences of both publicly and privately covered women are obtained and analysed. There are noticeable differences between the two groups in terms of their preferences for pain relief, for instance. However, the groups share a similar preference for continuity of care. A striking finding obtained in this analysis is that many women opt for private care because the public system is unable to assure continuity of care. This is an important finding from a policy perspective as market uptake for midwifery-led care and/or DOMINO care might benefit from private patients substituting to the new service(s) where continuity of care is provided, and women do not have to pay for the service.

The qualitative research is used to inform two quantitative studies of maternal preferences: a DCE and CVM. A major strength of these quantitative analyses rests on the qualitative research. Rather than developing *ad hoc* attributes to elicit maternal preferences in the DCE and CVM, focus groups are used to identify the features of maternity care that are important to women when choosing place of delivery. Qualitative research is regarded as the most reliable method for attribute development (Coast 2011). The significance of these attributes in the DCE supports the use of qualitative research to inform attributes, and reinforces the findings obtained in the focus groups.

A key strength of the DCE lies in the DRC format which includes two discrete choice tasks. In the first instance, an opt-out alternative is included alongside two experimental alternatives. Respondents are asked to select their preferred alternative from three options. A follow-up question is included which evaluates the two experimental alternatives and is presented to respondents that select the opt-out alternative in the initial choice scenario. Inclusion of an opt-out alternative in a DCE is often associated with a considerable loss of data (Brazell *et al* 2006). Without a follow-up question, the DCE contained in this thesis would have lost considerable data on women's strengths of preferences for the different attributes as the opt-out option was selected across 29.9 per cent of the choice tasks. Instead, these preferences were captured in the DRC format.

Another key strength of the DCE lies in the use of a flexible model to estimate preferences. The underlying assumptions of the standard CL model are explored in this analysis. While the property of IIA holds within the unforced choice scenario, the assumption of random taste variation is violated. The MXL model shows that women's preferences are not fixed, but rather vary across five attributes. For instance, women have varying preferences for continuity of care, although the attribute with the greatest heterogeneity in preferences is pain relief; some women are primarily concerned with having immediate access to epidural anaesthesia, while others are indifferent between the injection and birthing pool. This is supported by the subgroup analysis which shows that experienced maternity care users value epidural anaesthesia more than first-time mothers.

The DCE supports the qualitative research presented in this thesis; this is a major strength of the approach. The focus groups suggest that women do not have a clear

preference for either consultant- or midwifery-led care. Instead women would prefer a package of care that offers features of both models of care. Women want continuity of care with the same midwife from antenatal through to intrapartum care, and then to deliver in a CLU where the full range of medical services is provided. The DCE supports this finding in terms of women's strengths of preferences for the different attributes. It is also confirmed by the policy analyses which compare women's preferences for care in a CLU, care in a MLU, and DOMINO care. For instance, women's individual WTP for DOMINO care (€1,112.32) is greater than women's WTP for care in a CLU (€949.71) and care in a MLU (€725.31). Accordingly, the probability of uptake for DOMINO care is greater than the two major models of care. To the best of the author's knowledge, the policy analyses and welfare measures represent the first application of this approach within maternity care. The results demonstrate the usefulness of the approach to inform benefit valuations for use in CBA.

A major strength of the DCE and CVM arises from the validity of the WTP data. Across two SP techniques and three elicitation formats, women's WTP for care in a CLU is consistently higher than women's WTP for care in a MLU. The WTP valuations are externally validated when compared with private care in Ireland, as discussed in Chapter 6 (section 6.3).

The CVM is used to inform benefit valuations of maternity care for use in a CBA. A major strength of this analysis lies in the data collection. The data sources informing both costs and benefits derive from primary data collection. As mentioned above, the CVM provides a monetary valuation of maternity care and is distributed across a number of maternity units to provide an all-encompassing view of women's

preferences. Cost estimates derive from an extensive micro- and gross-costing technique, which involved developing a resource use inventory that examines all staff inputs during the production of maternity care, among other resource use inputs. The cost estimates represent the most up-to-date cost information on antenatal, intrapartum, and postnatal care in Ireland, and are assumed to represent the cost accruing to any maternity unit in Ireland.

While there are a number of key strengths associated with each of the empirical projects contained in this thesis, the key strengths of this research lies in its contribution to knowledge and policy. These contributions are outlined in section 9.4.

9.4 Contributions of the thesis

Contributions to two specific areas arise from this research and describe (1) contributions to knowledge and methodology, and; (2) contributions to policy. The contributions to knowledge and methodology are presented in section 9.4.1, followed by the contributions to policy in section 9.4.2.

9.4.1 *Contributions to knowledge and methodology*

A number of key contributions to knowledge and methodology arise from the DCE, CVM and CBA.

In terms of the DCE, an important methodological contribution arising from this research relates to the DRC format. This is a relatively new development within the health economics literature, therefore very little is known about the effect of the two stage decision process on respondents' choices. Two important findings are obtained from this analysis. First, choices made in the follow-up question are less consistent

than choices made in the initial choice scenario. This difference in error variability likely arises from a waning interest to evaluate the subsequent choice task with the same rigour as the initial choice task. Qualitative research could be used to explore this phenomenon. Identifying the reasons for the lack of consistency in the follow-up question might help improve the design of the DRC format in the future.

Second, preferences are better estimated collectively rather than separately. This involves merging the datasets by replacing respondents' opt-out choice in the unforced choice scenario with their subsequent choice from the forced choice scenario. This finding supports the use of the DRC format to minimise the information loss arising from the inclusion of an opt-out alternative.

The DCE also provides an important contribution to knowledge. The literature suggests that preferences are driven by experience and geographic location (Hundley and Ryan 2004; Ryan and Ubach 2003; Salkeld *et al* 2000). For instance, the health economics literature suggests that initial endowments of experience influence preferences (Ryan and Ubach 2003; Salkeld *et al* 2000). This finding is supported in this analysis which shows that initial endowments of childbirth experience in a CLU influences women's preferences in favour of consultant-led attributes. The literature also suggests that knowledge of a service's availability influences preferences (Hundley and Ryan 2004). This is also supported in this analysis where a comparison of women's preferences across two geographic locations shows that knowledge of a service influences preferences. Whereas women in CUMH prefer consultant-led attributes, women in the NMH favour midwifery-led attributes.

With respect to the CVM, a number of important contributions to knowledge are also made. For instance, the study provides new information on framing of WTP questions. Two elicitation formats are adopted within this analysis, including an open-ended WTP question and a payment scale WTP question. The formats are compared to investigate whether framing of the WTP question affects responses. Whereas previous findings suggest that the payment scale question generates higher WTP valuations than the open-ended WTP question (Donaldson *et al* 1995), recent research suggests that there is no difference in WTP valuations across the two techniques (Frew *et al* 2003; Grutters *et al* 2009). This study supports this finding; there is no significant difference between WTP valuations generated by the open-ended and payment scale approach to the CVM.

Another important contribution to knowledge relates to preferences, in particular the extent that preferences are influenced by geographic location and previous obstetric experience. The effect is demonstrated in the DCE literature, and supported by the DCE presented in this thesis, as discussed in section 8.3.1. However, the extent of the relationship is unclear. This analysis predicts the relationship between the two factors and women's preferences for consultant-led care using a probit model. In terms of geographic location, the results suggest that women delivering in a region with sole access to consultant-led care are 68 per cent more likely to prefer this model of care than women delivering in a region where both consultant- and midwifery-led care are provided. Initial endowments of childbirth experience also play a considerable role in influencing preferences, where first time mothers are 44 per cent less likely to prefer consultant-led care than experienced maternity care users. These results support the

findings of the DCE and contribute new information to the literature on the extent of the relationship between the two factors and preferences.

Finally, the CBA contains an important methodological contribution relating to the use of SP data to inform benefit valuations, which has already been discussed in Chapter 6 (section 6.3). Briefly, this study finds the WTP valuations elicited for maternity care are valid, and their use in the CBA is justified. The economic evaluation is often overlooked in the health economics literature due to the complexity of the task. Ideally, RP data would be used to inform benefits within CBA methodology, although the presence of market failure in health care implies health services are generally provided free at the point of use through collectively funded health care systems (Donaldson and Gerard 1993). The methodology subsequently relies on SP data to inform benefit valuations. While SP methodology is hypothetical, this research finds that the technique is valid and can be used within CBA in the absence of RP data.

The specific contributions to policy are outlined below, in section 8.4.2.

9.4.2 *Contributions to policy*

To the best of the author's knowledge, the qualitative research represents the first time women are consulted about their views of and preferences for maternity care in an informal setting in Ireland. The study provides important insights into women's preferences for consultant- and midwifery-led care, as illustrated in Chapter 8. In particular, the research demonstrates the features of care that matter most to women when choosing place of delivery. The important policy consideration arising from the research evidence is women do not have a clear preference for either consultant- or midwifery-led care. Instead, women's preferred package of maternity care describes

features of both consultant- and midwifery-led care. This hybrid model of care closely resembles the DOMINO scheme, which offers continuity of care in a community setting and intrapartum care in a CLU.

While there is an increased interest in developing midwifery-led care in Ireland, the results from the focus groups suggest that MLUs would only be utilised if established alongside CLUs, rather than as free-standing MLUs. Women are primarily concerned about safety issues during childbirth and want to deliver in close proximity to consultant-led services so that in the event of an obstetric complication, essential medical services may be easily accessed. The issue for policymakers is whether MLUs should be expanded or the DOMINO scheme be made available across all maternity units in Ireland.

The DCE provides important information in this context. In the first instance, the results of the DCE correspond to the qualitative data, which suggest that the preferred package of care in Ireland is DOMINO care. The policy analysis supports this finding and estimates that the DOMINO scheme would be consumed the most with 38.5 per cent of the obstetric low risk population utilising this service. The demand for care in a CLU and MLU is lower, estimated at 34 per cent and 27.4 per cent, respectively. This is an important contribution, which suggests that the demand for midwifery-led care would be weaker than both consultant-led care and DOMINO care. If decision makers are keen to develop this service in Ireland, then the current information asymmetry about midwifery-led care will have to be overcome, as demonstrated by the CVM.

The CVM provides an important policy consideration relating to the potential barriers that exist for the successful implementation of this model of care in Ireland. The results obtained from the CVM suggest that women delivering in a region where the only model of care on offer is consultant-led care are 68 per cent more likely to prefer this model of care than women delivering in a region where both consultant- and midwifery-led models of care are provided. This suggests that demand for midwifery-led care in these regions may be initially weak. A similar finding is obtained from the qualitative research where women were initially averse to the idea of delivering in a MLU. This aversion stems not only from safety concerns but also a lack of knowledge about the service. When women are informed about midwifery-led care and the services it provides, as well as its close proximity to consultant-led care, their reservations about the unit are lessened with some women declaring an interest in this model of care. If policymakers pursue midwifery-led care in regions where it is not currently provided, then an important consideration for the successful implementation of this model of care is how the information asymmetry between the pregnant woman and health care provider can be overcome.

While this thesis finds that women's preferred package of care mirrors the DOMINO care, this specific scheme is not evaluated in the CBA. The economic evaluation addresses the question of efficiency with respect to the two major models of maternity care and provides important information on the worthwhileness of these packages of care. Whether midwifery-led care should be developed in Ireland depends on the objectives of policymakers. The net benefit analysis suggests that both consultant- and midwifery-led care are cost-beneficial provided women are offered their preferred package of care, with the greatest net benefit produced by midwifery-led care. The

results are further supported by PSA which varies each of the input parameters across 10,000 Monte Carlo simulations to examine the existence and extent of uncertainty in cost and benefit estimates. The results suggest that midwifery-led care should be implemented over consultant-led care if only one alternative can be pursued. However, as mentioned previously, a key objective of the National Maternity Strategy is to improve maternal choice rather than restrict it. Therefore, a policy which pursues only one alternative perpetuates the problem currently experienced by women availing of maternity care outside of the north east of the country where this group are forced to choose consultant-led care. In this scenario, women would be forced to choose midwifery-led care instead. Ideally, both consultant- and midwifery-led care should be undertaken where a positive net benefit could be generated, utility could be maximised, and the overall objectives of key government policy could be achieved. The issue for policy makers is whether both alternatives can be pursued within the budget constraint. Moreover, whether policy makers should develop midwifery-led care or DOMINO care depends on the efficiency of the DOMINO scheme. Further research could explore the costs and benefits of this model of care.

The following section (9.5) concludes this chapter and thesis.

9.5 Conclusion

A number of research objectives are included in this thesis with an aim to contribute to knowledge and methodology, policy, the refinement of the SP techniques to inform benefit valuations and CBA within health care. While these objectives are fulfilled, future research is inevitably warranted to develop the findings presented in this thesis. For instance, this thesis supports the use of SP techniques to inform benefit valuations

within CBA. However, both approaches remain under-utilised and require further research to develop these methodologies within health care. Both user and non-user values could be explored in future research and compared to assess whether these differing perspectives affect the results of CBA. This presents a challenge for DCEs which require patient level data to inform costs. The DCE could be developed to reflect cost inputs, but administered to the general population to capture benefit valuations. In addition, a broader perspective consistent with the underlying theoretical framework for CBA could be used to provide comprehensive information on socially desirable uses of resources.

The current structure of maternity service provision presents an interesting opportunity to undertake this research project, where the results carry a number of important policy considerations. While there is an increased interest among policy makers to develop midwifery-led care in Ireland (Condon 2015; Culliton 2014; DOH 2015; KPMG 2008), the results presented here suggest that women's ideal package of maternity care encompasses features of both consultant- and midwifery-led care and closely resembles the DOMINO scheme. An expansion of this scheme, rather than midwifery-led care would generate greater utility among women consuming maternity care. If policy makers are keen on developing midwifery-led care in spite of the above conclusion, the results suggest that this model is cost-beneficial but would only be utilised when co-located with consultant-led care. In addition, in order to maximise throughput, an information asymmetry about midwifery-led care may have to be overcome as the model of care is initially introduced. This thesis suggests that informative discourse between the health care provider and pregnant woman may help to minimise this asymmetry and reduce any potential reservations women may have

about midwifery-led care. Finally, the results presented here suggest that an expansion of midwifery-led care alongside consultant-led care would be cost-beneficial, maximise utility, and secure key government objectives outlined in the Strategic Framework for Reform of the Health Service (DOH 2012) and National Maternity Strategy (DOH 2015).

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APPENDIX A.1

Topic Guide

1. Introductions

2. During your labour, how important is the midwife to you? For example, would you like to have the same midwife for the duration of your labour or do you mind?

- What about a team of midwives, some of whom are not known to you?
- Would you like continuity of carer from antenatal care to care during labour?
- Would a shift system bother you? (i.e. the midwife caring for you clocks out at end of shift regardless of what stage you have progressed to in labour and new shift midwife(s) take over)
- How many antenatal visits?

3. How important is it to have a doctor involved in your care during labour?

- Medical staff are present/readily available if complications arise/ you would have to be transferred to another unit during labour to see medical staff – what if unit was next door? (i.e. in a facility attached to the unit you're giving birth in)

4. How important is the homeliness of the hospital setting to you?

- Would you prefer a home-like setting to a clinical setting, or do you care?

5. During your labour, how important is access to pain relief to you?

- Would you mind if you had to be transferred to another unit for epidural? What if unit was next door? (i.e. in a facility attached to the unit you're giving birth in)

6. Would you like to be involved in the decision-making around your delivery, or are you happy to leave that to the staff?

- What aspects of decision-making are important to you: pain relief/ operative intervention etc.

7. How important is the attitude of your health care provider (midwife/doctor) to you?

- Relaxed; listening; attentive

8. How important is it to have access to neonatal services? Such as a paediatrician, or a neonatal unit?

- would you prefer to have them on site, or in another site where your baby would have to be transferred? What if the site was attached to the building you're delivering in?

9. Following your delivery, have you a preference for how long you'd like to stay in hospital?

- up to 6 hours after giving birth; 24 hours; 2 days

10. Now, I'd like to ask you a tricky enough question. I'd like to find out how much value you place on maternity care. One way to do that is to ask you what would you be prepared to give up in €s in order to receive the type of maternity care that you want. Of course, maternity care is free and will remain free. This is just a way of measuring how much value you place on the type of maternity care that you would like.
There are no right or wrong answers – it really depends on the type of care you want and how much you value maternity care. Think of it like an auction.

11. Is there anything else that you would like to add before we finish?

APPENDIX A.2

A.2.1 Focus Group Transcripts

A.2.1.1 *Focus group: session 1*

Date: Wed 01 Aug 2012

Time: 13.30

Location: Boardroom, Fifth floor, Cork University Maternity Hospital

Number of participants in attendance (excluding facilitators): Five

Facilitators in attendance: Two

Name of facilitators present: Christopher Fawsitt & Dr. Jane Bourke

Transcribed by: Christopher Fawsitt

I: Ok, so let's get started, and I suppose we should start very informally with some introductions. If you give your name, and whether this is your first pregnancy, or whether you have given birth before.

1: I'm [participant 1], and I'm from [place]. This is my first baby, and I decided to come to Cork to have it. And I'm due in December, and looking forward to it.

2: My name is [participant 2] and I'm half Slovak and half Irish at this stage! This is our first baby, and, well, it's two babies really, we're having twin boys. We're due 7th December, but it may be due earlier than that due to complications with multiple pregnancy.

3: My name is [participant 3] and this is my third pregnancy. I have a boy and a girl. I'm due in December, and that's it.

4: I'm [participant 4]. This is my second pregnancy. I have a three year old and I'm due in December.

5: I'm [participant 5], and mmmm this is my fourth pregnancy. I have three boys. They're six, four, and two. And I'm due in December.

I: Ok, well I guess, first and foremost, what I'd like to find out is how important is the role of the midwife to you during labour. And I guess what I mean by that is that, in Ireland, we've got a system where for the duration of your labour we have continuity of your carer. So the midwife will be with you for the duration of your labour. How important is the midwife to you? I mean would you like to have just one midwife, or a team of midwives, or would you be happy with a shift rotation where one midwife clocks out at the end of her shift and another one clocks in?

3: I guess it's nice to have continuity. It's really nice to have the same person from the beginning and see it through. But, obviously, if they come to the end of their shift, I'd understand if they had to go and someone elso come in. And, mmmm, I don't know if there is a contingency person that sometimes stays on, I'm not too sure. But I think the midwife is very important, I mean they run the show really.

4: I think if there's no complications it's fine for them to switch over. You know if there's nothing majorly going wrong or whatever it's always ok for one to go away. They're always as nice as each other anyway, I have found. So I don't say there would

be much difference if one went out and another one came in. But kind of like once they're there, there's someone there with ya all the time, that kind of helps I think.

I: So it doesn't bother you then that they're unfamiliar to you, that you don't know them?

4: No

2: I'd say I'd prefer to have one person and one person only just for the familiar point of view, and she would probably put me on ease more if I saw the same face coming to me every day. But like I know it's not possible, so then I suppose you'll be taking into consideration the limited amount of them. So I wouldn't want to see a different midwife every single day, put it that way. You know, if there's three of them coming in then you're kind of familiar with them and comfortable with that.

5: Yeah i'd agree, you know with the changeover. Because I know on my first pregnancy I had, I was nearly delivering my baby and then they had to change. And it's ok because you're so engrossed in what's happening that I didn't really mind the changeover, it's ok, I think.

1: I don't have any expectancies with regards to the continuity, but other friends having babies and stuff, it's the midwife is the, you know, the only person there at the birth, so you're in safe hands. But we've chosen the midwife-led clinic now for the third scan, so that to me is a sign that things are ok, that we were sound enough to do that. I think if I saw a consultant coming in, I'd be a bit scared, because they come in for emergency issues, you know if something is wrong..

I: And that's an interesting point too, I mean, how important is the role of the doctor or consultant to you during labour?

3: I think in an uncomplicated labour there's not much of a role for a consultant, and obviously if you're private, you pay for the consultant to be there, but mostly it's the midwife really who does most of the work, and, mmmmm. But obviously, if there's any sign of any problems then the consultant needs to be there.

4: Yeah, I agree with what she [participant 3] said.

2: I don't know, I think I might be a little delusional because this is my first time, so I don't really actually know what labour's like. But, because I started freaking out that I have two babies on the way, I said that I wanted to go private. And I hope to god it's safe, so I'm putting all my hope in the guy [consultant], and I hope he's going to do his best. So, to me, he will definitely be important, just as equally as important as the midwife.

5: With twins particularly...

2: That's it precisely. I suppose it's a kind of safety.

I: Some different views there really. But I guess it does come down to, you know, in the event that some complications arise that you'd want the consultant present. But supposing that the consultant was in a different facility or a different unit, how would you feel about being in a unit like that where you'd have to be transferred to see the consultant? So, having your labour where there are no consultants present, but, where, if you needed one, you could be transferred.

3: I'd be nervous about the transit time if I had to be transferred, because when things go wrong they can go wrong very fast. I suppose I'd like someone to be there very very quickly. I'd be very nervous if I had to be moved, just in the delay between being moved and...

I: So, it's really about distance then? So what if it was a unit attached to it?

3: Yeah it would depend on the time, I wouldn't worry, but the transit so much as the risk that if it took a long time that it could have an adverse effect on the baby. But no I wouldn't mind if it was a different location within the hospital. I mean the most important thing would be the baby, you know I wouldn't care if I had to be moved just so long as the baby would be ok, you know.

1: Yeah, I'd agree with that as well.

I: In certain hospitals around the country they've rolled out this scheme called the Domino scheme, is anyone familiar with it?

ALL: [No]

I: Well it's a scheme where the hospital and the GP provide combined care for the woman, where the woman can opt to have her GP present for her labour. What I'm wondering is how would you feel about having your GP present for your labour?

1: I don't think mine would come this far [from address to CUMH] for me anyway!

All: [laughing]

1: I don't know. See with my practice in [address], I don't even get to see my GP. It's probably the same here. I mean you expect to see your GP, but you're given a slot and

if your GP is available then you get to see that GP, and it's kind of the same attitude here. You know I would like some continuity in some sense, but you know with shifts and that.

2: It wouldn't be that important to me really because between the obststerician and the GP I'd have everyone in there!! So I'd say no.

5: What's the GP's role, I mean are they actually involved in delivering the baby?

I: I'm not too sure to be honest, I mean I think it's down to the woman and how much she wants the GP to be involved. Really, it will be the midwife's responsibility, and the GP will be present.

5: So it's the midwife and the GP present?

I: Exactly.

4: I don't see the point in having the GP there, it'd be like having an orgy of people there like! I don't see the point in having her there at all.

3: One doctor about the place is enough!

5: The less the better.

I: Ok, great

I: Now, just in terms of the room, what I'd like to know is how important is the actual layout of the room to you..

4: That is the least of your worries!

All: [Laughing in agreement!]

I: Ok, so having a hotel-like room with a couch and TV is the least of your worries?

2: I have never actually seen a hospital room before, so I don't know what the rooms look like. Now all I know is that I would like a little bit of privacy. That's, that's all I can say on the layout, just make it as easy to reach and have whatever you need as near as possible.

3: Is it the room where you're in labour or the room where you're staying afterwards?

I: The room where you're in labour.

4: Well, here they're a very spacious area.

5: Yeah, they're grand yeah.

4: Yeah my Mam said it's like a spa treatment compared to when she was having us like. She said look at the room like, there used to be four other people in with us!

5: Yeah at least no one else is in the room with you.

3: And now there's a toilet in the room. In Finbarr's Place you have to go down the corridor!

5: It's the little things!

I: Ok, so the room is a minor issue?

All: [Yeah]

I: Now, how important is access to pain relief to you? Like the epidural? Do you think about it?

4: Yes

I: Any or all?

A: Any and all!! Especially for your first.

3: There should be access, and then it's up to the woman to decide. You know, I think it would be nice to have access to everything and then you could decide what it is that you want as you go along.

I: Ok. Now suppose you were in a different building, again one that was attached to the unit you're delivering in, and in order to receive the epidural you'd have to be transferred to that building. How would you feel about that?

3: So, you're in one building and if you decide to have an epidural they have to move you to another building?

I: Yes. I mean would you be happy to deliver in a unit where you know you have no access to the epidural, but if you decide you want it you can be transferred to the next building.

4: I think you'd go to the edge of the world if you're in enough pain for the epidural!

3: Yeah, if you know it's there...

4: And if you've enough time and you're not too far gone, and you think, right, it's there. I don't think it matters where you go for it.

I: Ok, but basically you wouldn't want to be miles away anyway.

4: You'd probably prefer for them to come to you anyway, I suppose. You know, if there in the next building and they're not pregnant then surely they should walk to you!

Rather than you going out to them and then traveliing back then. So if they're not too busy, you'd expect them to come to you.

5: Ideally, you would like it to be available where you are, where you don't have to travel.

2: I think it's hugely important now! Once again I have no idea, but it's like I'm 16 and pregnant and I imagine I'd be screaming the place down! I just say that I have to imagine it as pushing a bowling ball through your pelvis!

All: [Laughing]

2: I just can't imagine going without it [epidural]. So, that's kind of how it is in my head, I'm just saying please god, just let me have access. Then again, maybe I'm delusional again...I don't know!

I: Ok great. Right, well I guess my next question then is around decision making during your labour. What I'd like to know is how involved would you like to be around any and all decisions regarding your labour. Or would you like to leave all that to the medical staff? Or would you like to have some say?

5: I would definitely like to have say.

I: With anything in particular?

5: Well, with regards to the pain relief, I suppose, yeah. I suppose every aspect, you'd like to have some say. I suppose normally here you do have a say, so you'd expect to have a say.

1: I don't know what to expect really. I mean is it the case that you'd even be listened to?! You know I don't even know what to expect, even with the room and stuff, I have no idea what's going to be in the room , you know?! You know I'd like to have a say, but I'd like to educate myself a bit better before, you know, as in so I know what's going on. But I presume the antenatal classes will tell us a lot about that sort of thing, you know.

3: I'd like to have a say, I'd like to be kept informed. Yeah, definitely.

2: I'd say it's hugely important once again because I believe that it is very, one of the most emotional time for a woman, and painful to go through in her life. And I think once they're included in the decision making process then it makes it very easier. You know to go through it and to be basically be at ease with it as well, and I suppose in terms of, I don't know, a C-Section instead of natural labour, then right, I know that they know better than, for example, I do, right, but at the end of the day I still have to say yes. But I'm much more comfortable with C-Section than the natural labour for this decision [twins!], you know. You know, I think that the whole trend is changing now, like my sister is a midwife based back in Slovakia, and she was saying up to this point this year, 63% of women went for a C-Section, and it was all based on them deciding they want to do it that way. They were obviously, you know, informed about the pros and cons about everything, but like they were saying look it's the twenty-first century and I don't want to put myself through pain like that, you know. So, I think that I would love to go that way as well. But I'm not saying strictly go with C-Section, I'm saying to have actual space to say what I want to say, and say right I would prefer this than that.

4: I think they kind of know what's best though. Like I know when I went with my first I told them that I don't want to know anything, I don't want to have any decision, just ignore me and just do what ye have to do because I'd prefer to be ignorant to some of it like. But I just think at the end of the day they're not going to do something for no reason, they're going to do what's right for the baby, or they're going to do what's right for you like, I just can't see why they wouldn't do that like. Now some of the decision making, like the pain killers now and all that, yeah, but other stuff, once they're doing it right, I don't mind like. It wouldn't bother me.

I: Just on that as well, have you given much consideration - and this might be minor again - to the attitude of your healthcare provider, so you're midwife or your consultant. Do you expect them to be a certain way? Relaxed, attentive, listening? Is that important to you during your labour?

3: I suppose you'd expect them to be a certain way. Yeah, you would expect that.

I: Do you give it much thought?

3: Not really. I suppose individual people are going to be very slightly different in their approach, but I know that they're just human and, you know, some way sympathetic. You know I hadn't really thought about it too much, I haven't had a bad experience, I haven't come across anyone who has been, in a way, or that I wasn't happy with at any stage in previous labours and deliveries, so I didn't really think. I kind of assumed that everyone would be nice.

2: You know I believe that as a professional they should, and I suppose in terms of a professional being, I don't, caring and sympathetic and all that carry on, that needs to be there. I mean I'm panicking all the time so far, I mean if someone is standing next

to me and they're panicking, you know?! So what you want is someone calm and nice and easy. But I think that's part of the training they do anyway.

I: Ok, does anyone else want to share anything on that? You expect them to be professional?

All: [Yeah]

I: Speaking of access to things again. How important is it to you to have access to neonatal services in the hospital, like a paediatrician, have you given that any thought, or is that an issue? I know it's all available here to you in CUMH, but is it important to have that here?

3: It is very. I mean I had my first baby in Finbarr's and I suppose the Bons would have been the hotel-style, or hotel of choice or hospital of choice, but I decided to go to Finbarr's. And it was fairly primitive, but the reason I decided to go to Finbarr's was because the neonatal support was there and if there was a problem in the Bons they'd have to put you in an ambulance and bring them to another hospital, again wasting time. So it's very important to me. I'm thrilled that everything is on site here. You know because it's so important that people are there when you need them in an emergency, you know. And if your baby has to go to the neonatal unit, then you're not in separate hospitals, that you can just come in and see them. [name], my last baby, was in neonates for a week, and it was nice just the next morning to get up and go straight down and see her, not to be stuck in another hospital where you couldn't see them.

I: Ok, so it's important to have them on site?

3: Definitely, yeah.

1: You know we decided to come to Cork because, I mean there's a maternity hospital in Tralee as well, but if there's something seriously wrong you'd still have to come to Cork.

I: So for neonatal services you'd have to come to Cork?

1: Yeah.

I: So was that part of the reason for coming here?

1: Yeah that was a good part of the reason for coming here.

2: That's definitely something I would consider as well. Taking into consideration my situation, there's a good chance that they will come out as premature, and so on, and so on. So I think it's hugely important as well to have it all on site. You know the staff here have been a big help like, you know. Like I've heard of cases where the girl was in one town and the kids were in another town and it would be too hard not to see them at all for two weeks or whatever you know. You know once you that little luxury then it's great.

5: I think it's really important as well having experienced it, and needing a paediatrician straight away. Yeah I think it's great to have it on site. Yeah because both of mine were sick when they were born so, yeah it's definitely important.

I: Now I have to ask, how much of an issue would it be if it was on site but in the next building, would that be something that you'd be comfortable with?

1: Well, I think you'd be prioritised so it would be ok.

2: Well as long as you don't have to travel.

I: Yeah, well, it would be on site so you wouldn't have to travel.

3: As long as you'd be able to go and visit, that there wouldn't be a restriction where you couldn't go outside, so I'd say it would be ok.

I: That's brilliant. Right, have you given much thought to after your delivery, and how long you'd like to stay in hospital after your delivery?

1: I couldn't, mmmmm, I actually don't want to now....

All: [Laughing]

1: Mmmmmm, about a day! I don't know. Actually, do you know what? My head is in the sand, I actually don't have a clue...

I: Well most women will stay for two days on average after giving birth. Would you have a preference for two days, or less, or more? Or would you like to go home as soon as possible?

5: yeah, I'd like to go home as soon as possible once everything is ok.

I: Ok, there are some schemes around the country that offer women to go home in as few as three to six hours after giving birth? Is that something that you'd like?

5: Yeah that is.

4: I think you'd worry about the baby a bit though. Because they check the baby the second day and I think there's a test on the third day as well, so you'd have to bring it back to get checked again. I don't know, I'd be a bit panicky about the baby. But I do think that three days is too long. By the third day you're so tired because you're not

sleeping and you don't know what's going on, but obviously the tests are important and there's a reason why they're keeping you in this long like. Whatever about yourself, I think if you're able to go. But the baby is the most important thing like.

I: Now supposing it's a complication free delivery and there's no problems or anything like that, and you're given the go ahead to go home in as few as three to six hours. Would you be comfortable with that and then come in the next day for a check up?

4: One night anyway, I'd definitely stay one night! But three to six hours is a bit steep like!

I: But have you got your own preference for how long you'd like to stay?

4: Overnight, I suppose.

3: I think I'd agree actually with overnight. I think depending on what time, I mean if you had the baby in the morning then maybe by the evening. But if you had the baby in the evening , you don't know what...you know it would be nice to settle down for the night. But I suppose then being in a ward full of babies it might be very hard to sleep so I suppose from that point of view it might be nice to get home, especially if you had kids at home, you'd kind of miss them you know.

4: Yeah, yeah.

5: Yeah, I think on your first, that would be very short.

3: I think so, I mean there's a security around the midwives and I mean they help you with breastfeeding or whatever.

4: Yeah, and you don't know what's going on with yourself either then on your first, I think

5: Yeah, otherwise I'd be happy to go home in three to six hours, definitely.

4: So maybe not for your first baby, but...

5: Yeah, for your first baby I think you should stay three nights, especially if you're inclined to breastfeed because it's so hard to do.

2: I think it will be a scheduled C-Section for us, so the question of what we want is completely out for us. For me anyway, I wouldn't feel comfortable going home after three to six hours because I have no clue of even how to bathe the baby at the moment, I'd go home and be like baby do it yourself like you know! So I suppose I'd have to have some sort of, I don't know, guidance there for afterwards. Now I'm not saying three/four days: a day, day and a half max, two days, whatever. You know you have to feel kind of comfortable I suppose, baby's health is the first thing anyway like. But it's amazing how fast the woman wants to go like, you know my sister said that there are certain minorities in Slovakia, kind of ethnic minorities where ladies just give birth to the child and in three/four hours they've gone home, just to be in the house right, to do a bit of cooking and hoovering and then come back again, and do the same the following day! So, I'm just saying it's amazing how various women like to do it, isn't it?! Just make it, and come back!

3: Do they leave the baby?

2: Oh they leave the baby in the hospital like! Like they'd have 15 kids at home, so she'd go home and cook the dinner and feed them and come back again, she doesn't care like!

I: Ok!

I: Ok, so I'm a little conscious of time and I have one question left, well, two questions left. In the end I'm going to hand it over to you and you can tell me if I've missed anything, or overlooked anything. So, I guess my last question then is a little tricky. But really what I'm trying to find out is how much value you place on the type of care it is that that you want to receive. So, you've come in here now today and you've talked a little about what's important to you and what's not basically. So I guess you have an ideal package in your head of the type of care you'd like to receive and what I'd like you to do is put a value on that package. And one way to do that is to ask you how much you would be willing to give up in €s, or money, to receive that package. So how much you would pay for that package opposed to the package you wouldn't like. Now for different women this will be a different value because some women opt to go privately and can spend anywhere in the region of €3,000-5,000. But that includes the consultant and the cost of the consultant. But some women won't even want the consultant present, so the value of the package will be much less than that. So, I guess what I'm asking is how much value would you place on the type of care that you like, in €s, and then maybe you can give me an idea of what that package is, whether it is with the consultant or not.

3: That is tricky!

I: It is tricky! One way to think of it is that you're at an auction and you're trying to place a value on a product that you like and if you had to give up money to get it, how much would you be willing to give up? Now I know maternity care is free and it will remain free, I'm just trying to gauge how much value women place on their particular type of care.

1: I suppose you'd pay anything. I mean if there was something wrong, it's an invaluable service, you couldn't put a price on it. I mean if everything is going fine, yeah you might meet a private consultant and pay €3,500 and that's fine and you have your baby and that's the price for that. But if something was wrong, I mean, geez, it's very hard to put a price on it. If it's the case that you could still get the care and if there's a chance that you could sell your house if the baby's going to be ok, you know, you just couldn't put a price on it.

3: I suppose we're very lucky with the new hospital that a lot of the issues that we talked about that we don't have to deal with them. I mean the public system is really quite good and I suppose the package of care that you get, public or private, isn't that different, you know. I think we're very lucky, well I have been anyway. But it doesn't matter whether your public or private really, if your public and you have complications then you have your consultant, and, you know, you end up seeing your consultant more often and you end up having the same standard of care as private. So, if we were in a situation where we had all of those situations, where we didn't have the neonatal unit and everything was in separate buildings and you didn't have access to pain relief, I mean you could put that....to go from one to what we have now, you'd pay anything, you know. But we're lucky in what we have now and I suppose it's hard to put a value on it because a lot of the time it is free! I don't know if that makes sense?! I suppose

what I'm trying to say is that I'm happy with my ideal package which is really what we have...So I can't really think of anything that I'd improve or change from what I've experienced anyway.

I: So your ideal package is as it is?

3: Yeah, pretty much.

I: Ok, and if you were to put a value on as it is...?

All: [Laugh]

4: God, it's hard to just put a number like, how much is a five-star hotel like, do you know?! You can't...I couldn't put a number anyway!

3: Well I suppose if it's a choice between having the bad package and this, then I'd pay anything! I mean do you want a number?!

I: Please!

All: [Laughing]

4: A number for what like, how many days are you here? I mean what happens?!

I: Well whatever your ideal package is...you know Patrice's ideal package is as it is now today.

3: I'd pay €10,000 now if I had it!

I: €10,000?!

3: If i had €10,000 yeah, but I'd pay anything!

I: Yeah I understand.

3: That's assuming I had the money! I'd pay anything! I mean you could look at the private fees and say ok, fine. If the private system was that much better then you'd pay the €3,000 or €5,000 and you wouldn't bat an eyelid if it meant that you had a better chance that your baby would be delivered safely, you' pay anything. I mean I'd pay anything.

4: Pay the private, whatever it is to go private, if private was better, the best, you'd pay that. I don't know, I mean you still can't put a figure, but I suppose it depends what you can afford as well.

I: I wonder would it help if you thought about it in terms of how much it costs the health service to provide the service. I mean could you put a value on how much it costs them to provide the service, you know in terms of staff, resources, building.

1: But we're already paying it in taxes every year!

I: Yeah, yeah, I understand that! That's why it's free and it always will be! I know it's a tricky question and I apologise for confusing you.

1: If it's €3,500 for a private consultant, and that gives you what 10 scans or something and the consultant. So I suppose it would be more expensive for the public system because you've got your midwives and your, I mean does the hospital pay for your epidural everytime you have one regardless of whether your public or private, so presumably it would be more expensive...so, €5,000!

I: Ok, great, thanks very much for giving us a figure!

4: Yeah, five [€5,000]

3: Yeah, I couldn't afford ten [€10,000]!

4: For twins, maybe!

All: [Laughing!]

2: I'd say it would be absolutely stupid to say that money doesn't matter in these days. But we had a very complicated road to take to get where we got, and fortunately we were lucky enough to go the natural way and, basically seek out the professional help, so we actually decided that once we got to where we wanted to get I said I don't care about the costs. I literally said I don't care about the costs. I says, look I know money is important for us with everything, and if something goes wrong in the end it's very hard to go and try and fix it, so I said prevention in our case is more important actually than correction in the end. So taking into consideration how much we have paid so far, put in digits, it would definitely be more than €6,500. You do what you got to do. So absolutely if the help is out there and it's available then you have no other choice but to go with that help.

I: Ok great, thanks. Does anyone else want to share on that?

All: [No]

I: Alright, well that's it. That's all my questions for you. I'm going to hand it over to you now, and you can let me know if there is anything that I have missed or if there is anything that you feel strongly about that we haven't discussed here today.

1: Geez, it's all ahead of me!

All: [Laughing]

5: You've covered everything really.

3: Yeah

I: Ok, so that's it, thank you.

[End]

A.2.1.2 *Focus group: session 2*

Date: Tues 07 Aug 2012

Time: 10.00-11.00

Location: Boardroom, Fifth floor, Cork University Maternity Hospital

Number of participants in attendance (excluding facilitators): Three

Facilitators in attendance: Two

Name of facilitators present: Christopher Fawsitt & Sarah Meaney

Transcribed by: Christopher Fawsitt

1: Hi, I'm [participant 1], and this is my first baby. I'm 18 weeks. I'm originally from Limerick, but I'm living in Cork as I went to college here.

2: Hi, I'm [participant 2]. I'm from [address] here in County Cork. This is my fifth pregnancy. I have three kids that are alive. My second pregnancy, it was, the baby had encephelopathy so she obviously passed away after she was born. So this is my fifth pregnancy.

3: Hi, my name is [participant 3]. I'm from Brazil, but I live in [Cork]. This is my first pregnancy, and I look forward for a long time to have a baby! So, that's it.

I: Ok, great, thanks [participant 3].

I: Ok, so to kick it off, let me ask you, first and foremost, about the midwife, and the role of the midwife. How important is the role of the midwife to you during labour? And I guess what I'm wondering is that, here in Ireland we have a system of one-to-one care with the midwife for the duration of labour, and what I want to know is have you got a preference for who the midwife is, would you prefer to know her, would you be happy with a shift rotation system in operation where one midwife clocks out at the end of her shift and a new midwife clocks in? Or how about a team of midwives, some of whom are not known to you? Have you got a preference for, or an expectation of, the role of the midwife around your labour?

3: So, if I can choose, I prefer the midwife as part of...when I start to go to the hospital in the first few weeks I prefer to be her to go into labour. If I have a choice, I prefer no change because it's more comfortable, you know, from the beginning. But the fact is, I was changed already. I started to go in Mitchelstown, and here I have two different ones the first time I come in, and I think I come in here twice and have two different ones. I don't feel comfortable because I have to explain everything again.

I: I understand. So, you'd like the same midwife all along?

3: Yes, if it's possible.

I: And how would you feel about it if that midwife was to clock out during you labour and a new midwife would come in?

3: You know, that is what I say, I no feel comfortable you know, I no feel comfortable.

2: I think my experience, especially in the last pregnancy...because I was induced, so I was taken into the first room, which I think was the induction room, but I actually knew her because she was from [address] anyway, but that was fine. But I would have preferred if she had moved on to the actual labour room with me because she, I suppose, was advising me on the pain relief. And then when I progressed on to, I don't know, five or six centimetres, I was moved in to the labour ward and it was a different person. And because I have a history of previous pregnancies and one not going accordingly, the whole thing is explained again and, you know, when you're in the throws of labour, you don't really want them to be explaining the whole palaver again. So I would certainly think that the person who is in the induction room, and some people don't have to be induced at that time, but if the same person stayed with you from induction to labour. Now, there was another pregnancy and there was a shift change during my first or second pregnancy, yeah I think it was my first, and yeah that would throw you as well because... now, I suppose midwives can't stay for twenty hours, which I was, they can't obviously stay, but it still throws the person.

1: I'm totally ignorant now because this is my first pregnancy. But I kind of think that I would like to know the person, but maybe on the day I wouldn't care, but right now I think I'd like to know the person. As well, I suppose yeah, I mean, it would be nice to think the same person would stay with you the whole time but realistically if someone goes on for twenty hours then that can't happen like, you know.

I: Ok, so moving on from the midwife, let's talk a little bit about the doctor or the consultant. How important is the doctor to you in terms of your labour? Have you got a preference for having a doctor involved in your care?

2: Again, because this is my fifth pregnancy, and we had gone private for the previous four, we decided to go public this time because I'm not working and just financially...we went public this time. The previous times you'd meet the consultant, obviously the same consultant every time you visit. This time, this pregnancy, because I've been here, this is, I suppose, I'm going this evening, wil be my third or fourth and you don't really meet a doctor, you know I've met nurses and I've met one understudy who I didn't feel hugely confident about I know it's not possible for every person who goes public to see the consultant every time, but, I don't know, I just think that personally I'd prefer the way the private system works because you get to see the same person and they're there when you actually give birth as well. Now, I suppose they're only there for the last five minutes and it is the midwife that does the work up to the very last, the consultant then is gotten on the phone if you're progressing quickly...and "quick come, this person has paid you however many thousand euro!" But, still, I'd still prefer, and to be confident that the person that is scanning you, kind of, knows what they're looking for, whereas, I suppose this guy I got a couple of weeks ago, who I wasn't hugely confident that the person knew, and I'm sure that she probably did, but I was just like, oh my god. So yeah I think that the consultant is very important.

1: I think I'm the same. I mean I've gone privately this time but obviously it's my first, and I'm quite nervous about the whole labour part, so I would want a person, and I mean we've paid him a lot of money, so he'll be there because I've a lot of trust in him that he's the expert on the day. He'll be there and he's going to tell me what's going to happen.

3: This is my first baby and I no go privately, I go public. And I'm very confident with the midwife. I don't really know if the doctor stay or not. Because if they, that's what

I say, if the midwife is the one that's part with me and go to the end, then maybe she'll know more than the doctor, you know! I don't know should the doctor stay.

I: Ok, that's great, some mixed views there about the role of the doctor. And I guess what I'm trying to find out is the role of the doctor during you labour, and as [participant 3] said there you have great confidence in your midwife, and [to participant 1] it's important for you to have the consultant there because it's your first baby. But suppose there is no need medically for the doctor to be there, the plan is that everything goes accordingly. How would you feel about having your baby with a midwife where the doctor is available in the building next to the unit you're delivering in, and should a complication arise you could be transferred to the building where the doctor is.

1: I'd be fine with that. I mean if everything went to plan, then I mean it sounds ok, I don't think I'd really mind.

2: I would mind, I think. Again, especially if I had gone private. I suppose what we were hoping to do this time if it was possible, which it's not, but I think it was before, if you could pay like €2,000 to get the consultant to be there when you actually give birth, as opposed to the €4,000 you pay to get them to scan you all the way up along, it's the birth part that I'm most concerned about because things do go wrong and it's a split second decision, and I feel that it's the consultant...now I know that they don't deliver as many babies as the midwives but, I don't know, I mean with the pregnancies that I've had and the labour's that I've had, when they come in they take charge and, I don't know, it's just you even respond maybe better to them, so it would be hugely

important. I wouldn't be happy if the consultant was in a completely different building because things can go wrong in a second and...

1: Timing

2: ...it's timing. And for me definitely, I would want him there.

3: That is what I said before, you know. [Referring to the fact that she doesn't see need for doctor]

1: I suppose I'm not thinking, but when [participant 2] says timing I'm going yeah, I'm thinking I didn't think of that...

2: Yeah, but, yeah I have gone through it that, I don't know, it's kind of strange having two sides here. But because this is my fifth pregnancy that like, I don't know...

1: I think I was thinking that I could just stroll across...

2: No because it can't be that quick like!

1: Yeah that's true. I think for me anyway because it's new to me that for me it's good to have Helen's perspective because I would never have picked timing there, like you know, I suppose I think it's all nice and calm, which it probably isn't!

All: [Laughing]

I: So consultant in the building then?

1: Yeah.

I: And not miles away?!

1: Not on the golf course!

All: [Laughing]

I: No, you'd hope not!

I: I guess another question is how important is the homeliness of the room you're delivering in to you? I mean in maternity units like this one they're quite clinical, but there are maternity units out there that offer hotel-like rooms. Is this important to you?

2: Not to me anyway. No, I think the more clinical the better..

I: Because you feel safer?

2: Yeah, absolutely. Like, I don't know, I mean the two of ye are probably watching 'From Here to Maternity' and those home births are like nightmare stuff! For me, like my first two were over in the Oranville, which was a much older hospital, and me, I was in one bed, and the other girl who was delivering as well, was in another bed, and there was just a curtain between us. So, no you don't want that either! But no, the more clinical the better because it's just, it is a clinical thing, and it is a huge thing, so yeah...

I: So you don't want the homely feel?

2: No, definitely not.

1: Yeah, I think the same.

I: Is it that it provides a sense of safety? I mean you're not going through it for the home-like experience?

1: I suppose I work in pharmaceuticals, so everything is sterile and a clean environment, so if I'm going in to give labour and it's like a hotel I'm going to be thinking Jesus! So, yeah I think a clinical environment would be better.

3: yeah, I think the same.

I: Ok, that's great. Now, here's an important question...how important is access to pain relief for you?!

2: Oh, gosh!

All: [Laughing]

I: Next question!

All: [Laughing]

I: Ok, so huge?!

1: Yeah, I have to be sure it's there!

2: Yeah, it's really important. But it's a pity that one doesn't know before how a particular person is going to react to the epidural. Because I got the epidural for my first, put me to bed for my second because it all happened really fast anyway, but with the third I wanted to get the epidural, well I think the whole deciding not to get it wasn't really, you know, when I decided I was going to get it, and the guy came in and he spent maybe 15 minutes trying to get the needle in over whatever way it has to go in over your spine and whatever. And he couldn't get it in and I was getting contractions and and I couldn't sit still because I was in labour and you can't really sit still. And he couldn't give it to me in the end. And as it happened it was the sorest part of me after because he had been prodding too much. And then because it was too late for pethidine, yeah the pethidine injection, I don't know, yeah it is really important.

But it is a pity that you can't be assessed before if you're suitable for the epidural or not, but you can't anyway. But this time, I suppose, with this pregnancy and the last pregnancy, I've decided that I'm not going to get the epidural because whatever way my spine is, he told me after, that it just isn't suitable to get the needle in, so I'm not getting it.

All: [Laughing]

3: I hope the whole process can read my mind! I realise that I don't actually think about the labour!

All: [Laughing]

I: So it's important anyway?

3: Yeah, it is, yeah.

I: Ok, now I'm going to play a little bit of the devil's advocate here and say, suppose you had access to pethidine and gas and air, but if you needed the epidural you would have to be transferred to a building attached to the unit you're delivering in. How would you feel about that? It's just for the epidural, you have your gas and air, and your pethidine, but you'd have to be transferred for your epidural.

2: You know, labour isn't anyone's finest hour and if one had to be transferred, you'd obviously be going on a lift and through a public area in the throws of labour...no.

I: But suppose it's a clinical area, and you're not going through the public domain.

2: No, I'd still say no because you'd...you don't want to be moved from where you are at all, going from a sitting position into lying on a bed isn't the easiest thing to do when

you're in the huge throws of labour, so lying on a bed and being transferred over to another building would be a no, certainly for me anyway. Because you do leave your dignity at the door with you, so you kind of want to keep a little bit of it. And you say you wouldn't be going through a public area, you would certainly meet people on the way and I know all those people would be used to it, hearing women in labour, but the girl that's – the person that's going through the labour – for me it would be certainly no.

1: I don't like the sounds of it either!

All: [Laughing]

3: I wouldn't be too comfortable with that, no.

I: Ok, that's great. Now about your role, or involvement in the decision making around your labour, how important is that to you? I mean to be consulted about particular decisions, like pain relief, do you want to be consulted, or do you want to leave that to the medical staff?

2: I think it's important to make the decisions yourself, because you're the person that's going through the pain. But I think it's very important for the midwife to advise on the timing aspects, because it can go too late to get pethidine, it can go too late to get the epidural, and it's really important, I feel, for the midwife to say, ok, now is the time, make a decision now. And your pain level is at, say, five, and it can go to a ten, and your midwife can tell you ok, you're only half way there and it's going to get so much worse and now is the time to decide, then you're obviously making the decision yourself, but you're equipped with the information, because the pethidine is great but you have to get it so much before, you know you're kind of in the throws of labour,

and then the fact that it wears off in the two hours it would be great again if the midwife could tell you exactly how long you're going to be. Yeah, I think the timing aspect is very important.

1: I think the same as that. You know, with this being my first baby, I don't know if it's going to be ten hours, or twenty hours or whatever, and suppose I think I'm at the end of it and the midwife with all her experience, or the doctor, say well actually, no, you're only half way there like. And I feel I'm in agony, then I think that the timing will be important for me, for them to say to me look you're only half way there and if you're in that much pain then maybe you should get something and now is the time for you to make that decision.

I: So, informed then?

1: Yeah, because I think with my first I don't know what I'm doing and, you know, so I'm counting on them for their experience and, you know, 'look make your decision now'.

I: So, to be somewhat involved, informed and consulted?

1: Yeah, yeah. I'm sure, maybe I don't know, that every pregnancy is different, you know with a second baby that you'd have an idea of what's going to happen or what the pain was like, but for the first one like, it's going to be completely clueless like.

3: I think sometimes, I don't know, how's my pain you know, sometimes I think it's at the top, it's just not, it's just in the middle! So, I don't think I'm able to get the stages right so I think I need the clinical and I need the timing and the midwife to tell me.

I: Ok, so again, to be somewhat involved, but to be informed, that's really important?

3: Yeah

I: This is a simple question, perhaps a foolish question, but how important is the attitude of your healthcare provider, so your midwife or consultant, to you? Do you need them to be relaxed, listening, attentive, have you given it much consideration? Do you expect them to be a certain way?

1: I think for me I would like them to be, and I know they probably hear a lot of nonsense from people with their first baby, but I know that they do it how many times a day, all year, but you know this is your first time doing it that you don't know what you're going through that you'd hope they'd be understanding, and you know, not sympathetic, but I don't think that. But, you know, look it is your first one you don't know what's happening to you so I'm here to support you and guide you and not just get on with it. Like you know, I have generations of doing and but I know that myself, but I've never gone through it myself, so I think a little bit of support and understanding. Like you know, because, and I don't know about you Fernanda, but I'm very, very scared about it. But that's just me, and I've talked to my doctor about that. But others may not be so nervous, and I understand that, not everybody's the same giving birth beacuse pain tolerance and how they feel about it is different.

3: I think that too. I want somebody calm,and someone who is patient if possible. First of all because of the English you know, it's so difficult! So I really look for somebody more quiet, you know, understandable.

2: Well I think, friendly, but not overly friendly, you know not too familiar, but I think that comes down to my personality in general, you know, and not just midwives. Yeah, friendly and professional, but not overly.

I: Ok, great. Now, access to neonatal services, such as a paediatrician or neonatal unit, is it important to have them on site? Because some maternity units don't have them on site, while some have them in a different building. How would you feel if it was the next building, or is it important to have them on site. Would you pick a maternity unit because it had such services?

2: If the baby was really sick, and if it had to go to a neonatal unit, basically that is what you're talking about, yeah?

I: Yeah, basically, yeah.

2: I think it's important to have it on site. But, like, I suppose, depending on how sick the child would be, the centre of excellence is where you'd want the child to be if they're really sick, so if you've delivered in somewhere that isn't the centre of excellence, then of course, I think that you'd want your child to be where the centre of excellence was. So, yes and no.

1: Yeah, I think I'm on the same wavelength, you know. I think Cork obviously has a great reputation I suppose, I haven't really thought about that because I've always thought Cork is a great hospital.

I: I mean Cork has all those services on site.

1: Yeah, like, if I was giving birth, like, if I stayed at home in Limerick and something, you know, didn't go well, or god forbid, you know, how would the baby be transferred to Cork or Dublin. So obviously I'd be like, definitely like, you'd want him in the centre of excellence.

2: Because it is stressful. My sister had her first and he had to be transferred from Tralee, she had him in tralee, and he had to be transferred to Crumlin. And he was anoint even before he was taken, like from Tralee to Dublin is a huge journey and they weren't even allowed go in the ambulance with him. So it was hugely stressful. At least if he was transferred from the labour ward up to neo in the same building, you know, the transition would be much, much easier. So I would think, I think it is very important.

3: It isn't safe, you know. Because, when I below, is a big hospital like that, but I have some speaks with my cousin and she have to transfer to another state. You know, is close but like 35 minute drive but the baby die in the way, so I think it would have to be in the same building, it's more safe.

I: It's important obviously, and it's a little bit of yes and no.

1: I think, you know a friend of mine had twins, and they had to go to Dublin, they were born in Limerick and they went for a [inaudible], so they were very premature. You know, and a lot of her family had to go back to work, and the babies were fine, but she had to spend a lot of time in Dublin, in the hospital, and her husband had to go back to work eventually for financial reasons, so you're up in a county that you might not know anybody, you know, you're in hospital accommodation, and you're on your own all the time. So, it was very hard, like you know, if the services happen to be in the wrong building, and I suppose it's case specific as well, but it was very hard on her, you know.

I: Sure, I can imagine that.

I: Now, following your delivery, what I'd like to know is have you got a preference for how long you'd like to stay in hospital afterwards? I mean, on average, women will stay in hospital for two days, but would you like to stay longer, or shorter?

3: I would prefer to stay longer. Yeah, becasue my house is too stressed! I have three expert brothers, that no live with me, but they are so excited now, so when the baby is born they will be more excited. So I think when I stay in the hospital I will take care of him more myself and it will be quiet and relaxed, and not hard. I don't do something I can't stop, so I prefer to stay longer.

I: How much longer, 3 days?

3: Yeah, three, four days! It's a good break!

2: Yeah I'm the same, three more days. I suppose when you're private you're pretty much paying for three days anyway, so...

1: Is that three nights?

2: It's three nights after your delivery. Like you're fully entitled because the hospital will probably charge the health provider anyway. And even if the delivery goes fine, which my last pregnancy went fine, we had a girl at half four in the afternoon, half two actually, and they came in that evening and they said do you want to go home in the morning, and I said NO, I don't! But yeah they would have let me go no problem the following morning. And I was like, no I'm going to stay for the three nights because it's paid for anyway and I'm staying for the three nights. And then they came in again the day after, they obviously wanted the room back, and if I had have been public...this time I'd say I'll be out the door after if everything goes fine, you don't have a choice,

if everything goes fine. But the baby is so new, and I don't know, I think it's the second and the third, especially the third day because you're feeling maybe the worst on the third day after the birth and, if you're breastfeeding the milk is adjusting backstage and the baby may not react the way you want it to react, so I think it's really important to stay the three days. But, most, it's usually not. Now, like the day after, if everything has gone fine, you could be home even that evening depending on what time you deliver, they'd ask you even if you wanted to go home that evening...No, for me, no because, and as well, I suppose if you go home and if you have other kids at home, or regardless if you do or you don't, you're on your own and you're cooking or cleaning and the other kids are like can I kiss the baby and you're like no!! So, I think three days, like I'd love three days this time but I know it won't happen unless something goes wrong and I don't want something to go wrong. But the three days is just to relax and just to concentrate on the baby and getting the breastfeeding kind of going so.

1: Yeah, I think I'm kind of the same.

I: 3 days?!

1: Yeah, yeah!

All: [Laughing]

1: And counting!

All: [Laughing]

1: I think just maybe for support and questions like. I suppose it's all going to be all so new that like, you know, holding the baby and something, it's crying like, at least you can just ask the nurse is this normal, or is this right, or am I doing it right? You know

just for that extra bit of support. And especially for me like because I don't have family in Cork, so I'm really going to be on my own like. So I think that extra day will be really good for me like.

I: Yeah, I understand, because it's your first as well...

1: Yeah and maybe if I had parents around or whatever, you know, but I don't have that here in Cork.

I: Ok, great. So 3 days, 3,4 days even! So, not 3-6 hours then, no?

All: [No!]

I: Because some hospitals do offer that!

All: [No!]

I: Ok, so no preference for that.

I: Right, I'm going to change tack a little bit now. I'm going to give you a choice card, and I'm going to ask you to have a look at it and pick between these three different packages of care. Then I want you to tell me which is your most preferred option, and which is your least preferred option. So, let me describe it a little bit for you. You've got three packages there, A,B, and C, and on the left hand side it is just the topics, or issues, or services that we've talked about today, so the role of the midwife/ doctor, access to pain relief. And each package is described differently under each of these services, so in Package A you could have one-to-one care with a midwife, whereas in Package B you could have a team of midwives. If you need a more detailed description of each aspect of care, I have provided that on the right hand side in italics. If you have

any questions, you can ask, and I'll give you a couple of minutes just to look down through it, and tell me which one you prefer, and which one you least prefer.

[Participants took five minutes to examine choice card and reveal preferences]

3: Some may prefer A, and some B!

2: Yeah.

I: Ok, so which package do ye prefer?

All: [A]

I: And least?

All: [C]

I: Ok, great. That's kind of what I was hoping would happen. I configured it in such a way that ye would go for A and not C. So, you have your preferred, then your second, and then the package you least prefer. And the reason I did that is because I want to ask you a tricky question now. And what I'm trying to find out is that, well I'm trying to put a value on each of these different packages of care in terms of money, or euros. And what I want to find out is how much you value each of these packages of care. One way to think about that is how much you would be willing to give up in euros/money. Now maternity care is free and always will remain free, unless you go privately. And I'm not saying that you should ever have to pay for the public system. I'm just trying to gauge how much value you place on it, and one way to do that is to just ask you how much would you be willing to give up in money for that package. So, I guess what my first question then is since you all chose maternity care package

A, how much would you be willing to give up in euros to get that package, rather than package B?

1: Do you want us to break it down per heading, or overall?

I: Overall.

3: If you're going to go private Christopher, how much is it around?

I: It can range from anywhere in the region of €3,000 to €5,000, and this is pretty much what I have painted here is the private package, pretty much. Now there is not every package there.

3: Can I mix the package?!

I: At the minute, no! We'll come back to that afterwards.

I: Have I explained myself well enough?

1: Yeah

2: I'm not entirely sure if you have explained yourself, like this is the private package, and I suppose because the public package isn't described in either package C or B, so like, you have decided to go private, and I have decided to go private in previous pregnancies, I think it very much depends on where you are financially. Because if I was still working now I would definitely have gone private because I want the care, so financially, I think you pay if you could. Because the public package isn't described here, it's very hard to put a value on it because it depends financially where the family is at.

I: Ok, so you've got an idea of the private package, and you'd be willing to pay that, so could you put a figure on that and assume that this is it, maternity care package A - this is your private package. How much would you be willing to pay, ignoring for a minute ability to pay, is there a value that you would place on that?

2: I still...

I: I mean you've gone privately before, so...

2: I have, I mean my eldest is seven, so it was eight years ago, and the difference between eight years ago and now is crazy. The level of care is no different, but it was...we paid €1,500 eight years ago for private care and it was in the Oranville [maternity unit in Cork], but that's because this place wasn't built anyway, and then we paid €3,500 two years ago to go privately, and it was going to be €4,000 if I went privately with this pregnancy, so you know, we paid over €10,000 between...and it's gone up either €500 or €1,000 each year, and the level of care hasn't gone up! It's very hard!

I: I know, it's very hard...I'm just trying to play the devil's advocate really!

2: I think €2,000 is, you know...I think if there's one or two people working, €2,000 is a sum you could come up with, even if you balanced it out over the ten months pregnancy, because it's not nine months, it's ten months. And if you were to put the money away each week, and if the payment plan, you know, if you could suit yourself, rather than paying half it at week 12 and the rest of it at week 16, then I think €2,000.

I: Ok, great.

2: I think if it had been €2,000 this time and the fact that you get back the €600 or €700 from your healthcare provider anyway, €2,000 for, if it had have been €2,000, we'd have definitely gone private. But €4,000, it's too much like.

I: Ok, great, thanks a million for putting a value on it.

1: But you know the consultant, and I've gone privately, and you pay whatever it is to your consultant, but your bill is going to be a lot larger because your healthcare provider, and I don't know if I'm wrong in saying this now, but your Quinn or Laya, you know your nights in the hospital is going to be extra, so that's a thousand euro, could it be?

2: In my case it wasn't. Your healthcare provider doesn't pay that.

1: But that's the value of giving birth you know, it's not just your doctor, there's hospital charges, the epidural, so it's going to be a lot more than the €3,000 or €4,000 you give to your doctor. So, when you look at it that way, it's a lot of money and you're not paying all of it, your healthcare provider is. So next year your premium will go up anyway because it's so high like, you know. So you know what [participant 2] says, €2,000 may be more than enough for the whole thing for me.

2: And you include your health care evaluation in that?

1: Yeah, like you hear stories about how much your bed costs for the night and you're like, oh my god, I could have stayed in the Four Seasons for that! So, you know, you're like, what was I paying for! And I know like, I wouldn't care what it was if I could afford it, do you know, because you would do anything if you could afford it to ensure

that everything goes well and is safe, you know. It sounds outrageous some of the charges in the hospital, like you know. Ask me in February!

All: [Laughing]

3: I know now Ireland is suffering from finance problems, we are too! But I don't know, I think it's too much care and you go to keep them alive, so I think €2,000 is nothing. I know I don't have it, but when I think about the whole system and so many people involved, and it's your life and the baby's life, and if something happens you know. I think something like three/four thousand. But the way I want, I would change some things from A and B! I f I have money, I would pay €500.

I: Ok, thank you [participant 3].

I: Right so, since we've got a value on that package, what I'd like to do is get a value on maternity care package B. How much would you be willing to pay for maternity care package B, rather than package C. So, ignoring package A for a minute, suppose your only option is B and C. Now remeber that maternity care package B doesn't have the doctor, and it doesn't have neonatal care services on site, so it's not going to be as expensive as maternity care package A. But at least it's not like C, where if you have a complication you don't have to be transferred via ambulance for five miles.

1: So are some hospitals cheaper, their care package, that don't have neonatal on site?

I: Well, I mean, you'd imagine the cost for the hospital would be cheaper if they didn't have some services.

1: Is that the case?

I: Well I'm just saying imagine that that is the case, that it's not as expensive as maternity care package A where you have medical staff and neonatal services. Is there a value you could put on B, rather than having to choose package C?

3: I think that package C is so...I don't know what is the word, but is so [inaudible], you know. It's too, it's no, I don't want to say professional, but you don't feel woman, you know? They just say they don't care too much, just give the birth and go...

1: Yeah, just give birth and go again.

3: So, if I putting package B I can, €2,000. I can put in package C €500 or something like that! Maybe nothing. You are going to pay for that in your taxes, or something like that, you know.

2: Again, I think if there was a difference of €500 between them, you wouldn't even consider package B, it would have to be hugely cheaper to go with Package B or C, either of them. Because there's a huge difference, so I don't know. I couldn't put a value on it because I wouldn't choose it. I wouldn't even consider either of them. You know, if the three packages were available and if you were financially viable to pay for them, I wouldn't even, regardless of the price, I wouldn't consider them. So, again, they're no value to me.

1: Yeah, I think C should be a free service.

I: Yeah, ok, let's assume C is free. So to pay for B, would you be willing to pay a couple of hundred?

2: You're obviously, we should be discounting the public system here in Ireland, we should be ignoring that?

I: Yeah ignore that for the minute. These are your two options, B and C, and C is free, but it's not nice, what would you be willing to pay for B, just so you don't have to go for C?

2: I suppose if the value €2,000 was put on A, then €1,000 for me would be on B. It would depend on what the value of A was.

I: And I suppose it's a very difficult question because you're coming in here with your preferences for A, so it's very hard to come up with a value for package B, but for some women, that would be their ideal package. So I understand it's very difficult.

[Long pause]

I: Really what I have done here is paint consultant-led care and midwifery-led care, but all of you have a preference for consultant-led care.

I: Ok, great, thank you for answering those questions, and I know they're tricky but I really just needed to get an idea of some values. So, I've asked you everything that I thought was important, and I didn't want to assume anything so I had to ask everything. But in your opinion, is there anything that I'm missing that is important to you as you approach your due date? Is there any other aspect of care there that I overlooked?

2: I'm going back to the same thing that I was talking about earlier. I think if there was, if the consultant offered a delivery service, if you could attend the public clinic for your check-ups, and unless something was going wrong or unless you had a complicated pregnancy, I think they could offer a package that they were there at delivery and charge, whatever, for it, I think a huge amount more people would go that route as opposed to the whole package. You know, you're only going to see your

consultant probably four times, four or five times throughout the pregnancy. So if you were to break it down and you only see him for like five minutes, you know, take an hourly rate like, they're on colossal money, so if you could just, for me, it's important for me just to have them there for when the baby is being delivered. So, I don't know, that's not available anymore, that was available a couple of years ago, but it's not anymore. So, they don't seem to want to go back to that either. That, for me, would be the most important.

1: Yeah, I kind of agree with [participant 2]. For me, we just have a medical history in the family, so having the consultant, meeting him now and going through that with him and he's going to do some extra stuff. That's very important to me, you know. I would probably be a bit worried that if I went the public route I'd be a bit worried that I'd get someone different or it mightn't be written down or it mightn't be looked at [referring to family history], so you know I feel he's the guy I'm meeting every time and he knows what he has written down, and he's doing X, Y, and Z for me. And being present at the birth, if he can, is obviously very important. But to make the last excuse, he knows our medical history and he's there for me; that's very important, you know.

3: Same.

I: Ok, thank you

[End]

A.2.1.3 *Focus group: session 3*

Date: Thurs 16 Aug 2012

Time: 11.00-13.00

Location: Boardroom, Fifth floor, Cork University Maternity Hospital

Number of participants in attendance (excluding facilitators): Seven

Facilitators in attendance: Two

Name of facilitators present: Christopher Fawsitt & Dr. Leanne O'Connor

Transcribed by: Christopher Fawsitt

I: Ok, so let's get started, and I suppose we should start very informally with some introductions. If you give your name, and whether this is your first pregnancy, or whether you have given birth before.

1: My name is [participant 1], and this is my second pregnancy. And I have a little girl, and she's three. And I'm living in [address], but I'm from [address].

2: My name is [participant 2]. It's my first pregnancy and I'm from [address].

3: My name is [participant 3], and this is my second pregnancy, I have a little boy, he's two on Sunday. And I'm originally from [address] but I'm living in [address].

4: My name is [participant 4] I'm originally from County Limerick, but I'm living in [address]. And this is my first.

5: My name is [participant 5], and I'm originally from Ecuador, but I'm living in [address- Ireland]. And this is my first pregnancy.

6: I'm [participant 6] I'm living in close to [address]. This is my second baby, I have a 15 month old girl, and I'm from Slovakia, not Irish!

7: My name is [participant 7], and I am from Algeria, but I am living here in Ireland. I had two miscarriages before, and this is my first pregnancy.

I: Thanks [participant 7]. I guess what is most important with maternity care is the midwife. And my first question to you is just how important is the role of the midwife to you during labour? I mean here in Ireland we've got a system of one-to-one care for the duration of labour with the midwife, and what I'm wondering is how important is the midwife to you....would you like the same midwife for the duration of your labour, or a team of midwives?

2: Does that depend on the experience of the midwife?

I: That depends on you.

2: I think that depends on the experience of the midwife, and because it's my first pregnancy, I'm not even sure what the role of the midwife versus the gynaecologist is in the labour ward; that hasn't been explained to me, I don't understand it. I'm not sure what the role is, but I would think that it would be down to the experience of the midwife. If it was a trainee midwife, then I wouln't want just one. But if it was an experienced midwife, then I'd prefer the same one throughout, rather than explaining and re-explaining. Like it's your GP.

1: I suppose, you know, the reality is that your midwife has 12-hour shifts, and you're going to be in labour for longer than 12 hours, then you're not going to have the same midwife because they have a life. But then again at the same time consistency of care is always good. I also feel from my first pregnancy that it depended on the midwife and I found that sometimes midwives work differently so it was good when I got another midwife because she worked a little differently to the first midwife that I had, so that changeover I think was positive for me. And I did have a changeover of midwives with the labour. I started with one person and I ended up with someone else and that didn't have any negative impact on me. Either way, I suppose, they were as experienced.

I: Great, so the shift system didn't bother you? It actually worked a little bit in you favour.

1: Me personally, no.

2: But did that mean that you weren't happy with the first midwife?

1: Yes in that I felt that the first midwife was very much 'this is your first pregnancy so therefore you are not going to be having this baby for another X amount of hours', so...

2: She wasn't as proactive..

1: …she wasn't as proactive. And I also felt that with the epidural, there came a point where I really wanted the epidural, but I was only one centimetre, and I was only one centimetre hours and hours later. And she was very much by the book, she was a young midwife - not that I'm saying that that has any bearing on it - but she was saing no, you have to be three centimetres, whereas when the other midwife came in - it just happened that the first midwife went on her break and another one came in - I just said look, you know, it's been hours and nothing has happened, I'm still only one centimetre. And she was back within ten minutes and said 'you have to judge it on a case by case basis, we'll give the epidural' and I was dialeted to nine centimetres within a few hours. You know, so, I just felt that that changeover was a positive thing from my point of view in that it was someone else who was willing to offer a different perspective on the whole thing, you know.

4: My biggest fear is not getting the epidural on time, so if there's a midwife in there and she's saying 'oh hang on, you'll be fine, wait until you're so many centimetres'; she doen't know my level of pain. She's telling me from the book that I've to wait until I'm three centimetres. But if she wasn't going to give me the epidural then I'd be asking for someone else because I've heard horrific stories of people not getting it in time and then they're at nine, ten centimetres and they're saying they can't get it now, so that is my biggest fear, so I've heard people say that as soon as you come in start screaming for the epidural which I am going to do!

2: And I mean you don't want to be in that position, you're vulnerable enough as it is. And at that time you shouldn't have to be coming in here, thinking that I have to be

screaming for the epidural because nobody will be willing to give it to me. Jesus, I think that's horrific!

4: I've heard rumours that you have to wait until you're three [centimetres] and they just won't give it beforehand.

2: So if they're not as proactive as what [participant 1] had and give it on a case by case basis.

1: And it's not that, I suppose, when I came in first that and the first bit of pain I was in that your one said to me that I need the epidural now. This was like, you know, I was induced at nine o'clock in the morning, and this was four o'clock in the morning and was I still one centimetre, so it's not like I was...

2: ...literally you were almost twenty-four hours in labour!

1: Yeah, so I felt from that point of view that, possibly, maybe, and you know I'm not a midwife and I'm not a doctor so I'm not in a position to understand it from their perspective, but maybe that it should be judged on a case-by-case basis, and look 'this girl, although she's not three centimetres, she's been here for X amount of hours and now maybe we should look at the possibility of an epidural', or even bring in somebody else about it. But that it's very much by the book, and it's your first pregnancy, and generally first pregnancies take longer, you're only one centimetre, you need to get to three, but I think sometimes you need to think outside of that, and the other midwife was willing to do that.

3: I agree with all of what ye said, you're exceptionally vulnerable for your first pregnancy and, indeed, even subsequent ones because you forget. And you're placing all of your faith and trust in this person's hands and I think it's really important that the midwife remembers that 'yes it's their job' but we need more than that when you go in the door. You want them to be nice to you, just, you know, you know nothing and they know everything, and telling you what's going on. Like I had a student midwife in with me and she was lovely, and she told me everything: 'we're going to be doing this now because of this and this now because of this' and I knew that she was telling me because she had probably just learned it, it was new to her, and she was doing everything, you know. Then, the more experienced midwife, ironically, was less inclined to give me information because, I suppose, she was so used to it, and I missed the student midwife when she left! I felt that she was telling me what was going on and she was lovely, and I felt very comfortable, and very safe. Not that I didn't feel safe medically, but the more experienced midwife, I thought she was less inclined to tell me what was going on. And my husband was less inclined to ask questions as well because we didn't know should we be, I mean are we allowed to! Because you know, you just know nothing about those practicals, about the way things work, you're not told how it happens, this is how it works, you know this is normal, this is not, and whatever, so you're kind of constantly on tenderhooks. The shift change didn't bother me at all. It was the way that I was treated and handled and whether I felt comfortable enough to ask questions or not. And one thing I would say is that I don't know people's uniforms in this hospital, I don't know who is who. I don't know whether you're a domestic, or whatever word you want to use now - I worked as a domestic in the Bons when I was in college and that was the politically correct term at the time so I don't

want to be offending anyone - but I don't know who is who when they walk in the door, so I would like to be addressed, you know, I'm here, it's my baby and it's my body you're going to have a look at...so who are you, what are you going to do to me! Like my little boy, Matt, had a couple of injections into the top of his head, five times, you know at no time was I actually told this is what it was for, now I might have been told but sure, look, I had an epidural and I was completely as high as a kite - you need to be told things lots of times! - so I think communication, you know, just once the midwife, or whoever's walking in the door to me to say 'this is who I am, this is what I do, this is what I'm here for, it's completely normal that I'm here, I'm supposed to be here, I'm here with every other woman, nothing to be worried about, this is what you can expect me to do, this is what we're hoping the result will be, we'll tell you if that doesn't happen'...Just keep me in touch because I just felt, literally, that I was a beached whale up on top of the bed and people were just doing things to me!

2: And you'd no control?

3: Yeah, I mean like let them off, like I have full faith in everything that they're doing right, but I'd just like to know what they're doing, you know that sort of thing, like I had good experiences but I felt like a child and I was in my thirties having my first and I was like can I ask questions or can I not. And you know my husband was afraid to ask questions too and neither of us are shy people! But that's the only thing.

7: Sometimes they say that they'll do this and that for you, but after that, it has completely changed. In my second miscarriage she come to me and she told me we will do that and that for you and it's nearly Christmas time and after that, normally I

would be in operation with anaestitheist and everything because the baby it's a little bit bigger than normal, but after that when there is too much people there, he will do that normally for me without asking me [having a natural delivery when clearly she needed Caesarean], and it's so hard for me. I tried to have why you show me before and I had to ask for the operation and she told me no, that there are too much people, we will not do that for you, so it's so hard for me you know with this second time.

6: For me, first labour took like 26 hours, so I saw a lot of people I don't remember. But it was, it started like slow because I wasn't dialeting so well, then they tried gas and air, bath, and anaesthitecs or whatever, and then we were discussing with the midwife and she was saying 'ok it's not looking so well for me [participant 6]' to take another four or five hours to wait and not to open more, so she was saying like maybe the epidural would be the best for me to take. But I have to say, Ok I have given birth here in Ireland, but from my friends giving birth back home, it's completely different, especially the midwives, we don't have such a thing only doctors, but the approach they're [midwives] really, really, really nicer. Because you said that they were not that nice, if I can somewhat compare, I had a feeling after the birth that I really wanted to hug her, she was really nice, it was like a friend because she spent the most important time with us, even though after the doctor came anyway because he had to. But I have to say it was the approach and afterwards with the breastfeeding and everything I felt so, so, so at home. I didn't feel like I was bothering them, even though I was bothering them! So it really depends if the person. If everything is going well, you're happy, they're happy, you're happy. I don't know, I was happy.

I: and did you have the same midwife...

6: No

I: So many?!

6: Yes, many! Well before we were just waiting so I didn't have so much to do with them, they were just saying 'ok, we're waiting!' I wasn't abandoned like, you know, I was with my husband, so for the most of the time we were together, and they were there reading their magazines! Like there was nothing really to do for them! And you know with the epidural after sleeping for 12 hours or whatever time it was, and afterwards it was like ten minutes and she was out, it was like, you know, it was just done like! So I have to say I had a really good experience and I hope I'm not afraid this time, but it might be different. But I'm happy so far.

5: Well I have no experience because, you know, this is my first pregnancy, but everytime I go to the hospital for a check-up, I feel like they just don't listen. If I say something like 'oh yeah, like my legs are going bonkers, or, I have - something else that I have is [inaudible clinical word!] moles - but if I say something like that they are like 'ok', but they don't say anything like ‘that is normal’. You know, I have to go and search the internet to see if it's ok, you know.

I: Is this the midwife that you deal with or the doctor, or both?

5: Both. Because I told the doctor too I have a problem, you know that my doctor in the dentist told me that I have something on my gum and she said the next time you

go to the doctor just ask him, and I ask him and he say, 'oh let me see', he was sitting that distamce [distance from one side of the boardroom table to the other] and he say 'ah that's ok'...he didn't even come closer you know, I don't know. At least in my country they are always like worry, they touch you, they feel you...here they don't even see you every time that you call! Sometimes I feel like...

I: And are you dealing with the same people every time?

5: No,

I: And do you like that, or does that bother you?

5: Kind of. Because the first girl that I got, she was really good, talking to me, she was explaining few things, it was my first time so I was like, oh, but then the second one, not really. She wasn't interested at all. I thought that I was going to get the same girl because they said that every Thursday it's the same people there and lahdidah! But no I didn't, but I would have loved to.

I: So you would prefer that?

5: Yeah

I: And would that be universal around the room.

7: I think the same midwife, it's nice because it's not nice every time to speak your story every time so if you see the same then she knows what you have and what's the problem, and what's up. I think it's nice.

1: I suppose, I went privately for that reason. Because I felt I didn't want to be going in every week to see somebody else, somebody different, and to get a different - it's not that you'd get a different level of care - but I suppose as you were saying you have to rehash your whole history and I think sometimes, and I'm not saying that this is the case, but my thinking on it is that somethings might slip through the cracks, if you're not seeing someone who knows your history and who is aware of your medical history, and has seen you every X amount of time then.

6: I think the worst part just before labour is those check-ups in the hospitals is kind of like messy. They're just going 'go here, and go there, and ok, wait here, somebody will call you here', and you spend like four hours waiting for a two-second scan that says it's ok, it's fine, without anything else. You need to ask if it's going to be a girl or a boy, or any measurements, or anything, which is normal in my country, and it's every month and usually twice if all going well. I know there are many pregnant women and not enough doctors, or I don't know what's actually the real problem is, or if there's a problem, or if it's normal here in Ireland. Or how it was ten years ago maybe, not even that much care. This is, for me, I need to go private as well to check actually to be on the safe side, like I'm ok, it's all fine, I'm going well, it's as it's supposed to be, otherwise I would be worried maybe more [as in if things weren't going well she feels that to provide some comfort and assistance she'd be better off having gone privately, but all is ok for her for now].

4: Two weeks ago I was in for my check-up and I have had extreme tiredness since seven weeks and I kept telling them this over and over again. I said it at 10 weeks, 12 weeks, 14 weeks, 16 weeks. I'm 33 weeks and it's still really bad. And when I went in three weeks ago, I was telling the nurse at the nursesdesk you know when are you going to check my bloods and my blood pressure and all of that, and while I was trying to explain to her she just continued writing, just going down through a checklist, and I was watching a girl across the way who was also trying to tell a nurse that something was wrong with her and she wouldn't listen and the girl eventually broke down crying and then the nurse sat down, dropped her pen, and listened to what she was saying. So she got her point across, so I came out and like next time I'm just going to start crying because they're just not going to listen. So when I went to my GP Tuesday, something similar happened. I was sent into the antenatal nurse rather than the GP, and she was just flicking through the computer again and I was like can you just listen to me, so then I threw on the waterworks because I was just sick of it and she listened and she done some extra tests, and it turned out I have an underactive thyroid. And it's been weeks, and they've only copped it now. Like all along they were going 'oh don't mind the tiredness' and brushing me off and telling me that 'oh that's all part of it, wait till your baby arrives', but I just new myself and from my mother as well who had gone through so many pregnancies that this was not normal, like falling asleep at traffic lights, my words were slurring, I physically couldn't keep my body upright in the afternoon. I was like this is not normal, so it was only on Tuesday that the antenatal nurse said that we should take a deeper look and then they done the tests and now the doctor is ringing me, like three times yesterday, once this morning, they're very worried and all because they should have copped it a long, long time ago. I did tell

them in the maternity hospital each time I went in and they were like 'oh don't worry about it, that's all part of it, wait till the baby arrives, get some sleep now'; all that. I felt I was relieved when I heard there was something, something kind of explaining it and now they can give me something. But then once I found out I got really cross afterwards, going they should have copped this a very long time ago, and I'm going public so I don't know if that's why they may or mightn't have taken as much notice. So I don't know, this is my first one.

2: Well you shouldn't have to cry to get attention, to get someone to listen to you, to get attention. I mean that's just ridiculous...

4: And the reason that I broke down, I mean it was quarter past nine when I went in for my appointment, I was after being in bed for 12 hours solid at that stage and the first thing she said to me was I look absolutely exhausted, and I'm like 'oh my god, I'm after 12 hours sleep and you're telling me that I still look exhausted!' So that's when she started to listen but I just didn't feel as if I had to do that so fingers crossed for the next one I'm kind of thinking maybe if I went private, I might have better care. I don't know. Some people tell me there's no difference, but, I'm not too sure.

7: I think here they give to you longer appointments from 20 weeks and 30 weeks, or 34 weeks, and in this long time everytime you think 'is the baby good, or not good because sometimes you don't feel him move', so you think everything is stop so you need to go to the private scan, so I think if you do it every four weeks or five weeks it's better for the mother because if you feel 'ok I think the baby will be ok, or shouldn't be ok' but if you don't feel ok I think this is ideal [i.e. scan every four to five weeks].

Also, every time he give you the time of ten o'clock, the scan at ten o'clock, and you have to wait until one o'clock, sometimes my husband he needs to go back to his work so he will spend all day in his van, so it's better if you are told 'come at one o'clock', it's better than ten o'clock, you don't need to spend all this time here.

[Question 2 – role of the doctor]

I: Ok, great. Now I'm going to fast forward a little bit now because we're not going to get too bogged down with antenatal care, but I got a pretty good image that you'd like like consistency of carer and perhaps more antenatal care. But let's fast forward to during labour. And I would like to ask you is how important is the role of the doctor, or the consultant, to you during labour.

1: I would say crucial. For my own self-assurance, or reassurance. And that's not taking from the role that the midwife has, but when I was in, and the midwife that I had for the actual labour was fantastic and like yourself she was a student nurse and she was fantastic. But all the time I was thinking 'when is he coming', you know, 'I hope he gets here before because', you know, I felt there was an added sense of...

2: ...safety...

1: ...safety, or reassurance when he was there. Because he was the person that I had seen, you know, he knew me and I felt that, although that's the training that the midwife does and again I'm not trying to take from that, but for me, if I'm to be honest, I was much more relaxed once I knew he was there.

4: Was he in there the whole time??

1: No.

4: The midwives mainly?

1: The midwives mainly. She did most of the work and then, for my little girl [name], her heartbeat started to slow down, and it was at that point then that they said they were going to call, and she told me exactly what was going to happen, that she was going to call the consultant now and he was going to come down because the heartbeat was slowing and they needed to get her out.

I: So it was obviously necessary?

1: Yeah, yeah. So, I definitely did feel that sense of being more at ease, or that I felt, not that I felt that he was in more control of the situation, but when you're vulnerable like that, I felt that I wanted the person who was most experienced, and that was him for me.

2: I have no experience of, obviously, labour, but I think my idea of it is that he's like an insurance policy! I buy insurance when I go on holiday, so that's my view of it. Hopefully everything willl be fine and he'll need not to touch me, but just in case, you know, in case the heart beat slows or whatever, there will be somebody there; safe hands, tha't's the insurance policy. And if everything goes swimmingly, and I don't

need to see him, brillliant. You know, hopefully it will pop out, but, you know, I may be being too optimistic!

All: [Laughing]

2: But that's my view of it, I don't know what he will have to do, but I want to know that he will be there if he's needed.

I: That's a nice way of putting it: an insurance policy.

2: Yeah, exactly, I mean you hope you don't ever have to cash in on him!

All: [Laughing]

2: But yeah, it's like anyway you pay your house insurance, but you hope it [anything] never happens!

1: Yeah, yeah. But I wanted him there, whether he was needed or not...

2: ...yeah, yeah...

1: ...so it wasn't just for that insurance policy; I wanted hime there. It didn't matter whether a midwife was able to carry out exactly what he was able to do.

2: My idea is that he won't have to be there unless he's needed there towards the end for the actual delivery. So, like, you know, for all intents and purposes I'd be, you know what I mean, a public patient because it would be the midwife that's doing the majority of the work, and fingers crossed that would be fine. Do you know what I mean, is that, am I wrong in saying that?

1: Mmmmm, I'm always under the impression that he'd be there for the delivery...

2: ...for the delivery, yeah, but like the midwife could do it as just as well, you know, if everyhthing was fine...

1: ...oh yeah, yeah...

4: ...yeah, I've heard that if the doctor wasn't there, you know, everything's going swimmingly. And if he's called in then it's kind of like something, maybe, might need to be double-checked, like the heartbeat of the baby, or whatever.

2: I think he has to be, yeah.

I: Well if you go privately, I mean it's his business to drop his head in every now and again.

2: Yeah, just to make sure everything is going well. But I have heard stories of, you know, like you with the - who was it with the epidural who didn't get the epidural at three centimetres?

1: ...yeah, yeah, me...

2: ...yeah, yeah. Yeah, you know, until the gynaecologist came in, you know, that my friend was so worried because she was two centimetres, no way getting the epidural, simply not, until the gynaecologist came in and was like, you know, 'why haven't you got the epidural' and she was told she couldn't and, you know, a big who hah with the midwife, and then the midwife swapped off and another one was brought in because she had refused to give the epidural. So, for me, from that point of view, but my idea of it is that he is insurance, I mean, I don't know, I'll see how it works out.

3: Yeah, he'd be hugely - I went private with [son's name] and again this time and the consultant that I went with was recommended to me because two of my sisters worked with him, they're both midwives, not currently...

2: [Laughing]

3: Yeah, not currently working with him, so you're fine, I'm not taking offence! But, you know, I just feel, and I'm going to be crude and say this, you're paying thousands of euros for a consultant to monitor you during your 40 weeks, and, you know, you're dishing out three thousand euros within the first two visits; it's hugely important to me then that that person realises that I've paid you now and I'm paying you for your service and experience, and I think I would be hugely upset if the consultant wasn't there for the birth of my child, I feel that's when I need the most, I mean the GP can monitor, you know, the other things, during the pregnancy, and do your scans and the midwife

can do all of that, and I'm not taking from the role of the midwife, my sisters would kill me if they did, they reckon they've got more experience than some consultants! But I just feel that I was fortunate that Matt was born at four o'clock during the day and I knew that my consultant was going to be there. You know, so I knew that it wasn't if it was the middle of the night, you know, I don't think I ever discussed it with him what would happen, would he be there, or would he not, or whatever. Not that everyone is entitled to their time off! So,from my experience was that he came in and out regularly during the time I was really happy with that, my midwife constantly rang him for everything, telling him what stage I was at, you know, and they were discussing things, not that it was passed on to me too much, but at least I knew that she was speaking to him and that he was aware of what was going on, and he always told me I'm fine. You know, he'd come in, check, tell me what stage I was at, 'I'll be back at such a time', then he'd come back at that time. And he came back at one stage and I hadn't progressed beyond nine centimetres so I had to go for an emeregency section. So I had gone through all of that, 24 hours of labour, and no natural birth, and, you know, I was just delighted that he was there for that because...

2...to make the call...

3: ....yeah, because I was stressed, I was exhausted, I hadn't slept since seven o'clock the previous morning, my husband was drinking coffee like it was no...! And I was looking at him and going, 'oh really, are you tired?!'

All: [Laughing]

3: And, you know, I have to say the consultant was just great. I didn't worry at all, at all, at all, at all! You know, I just said he's here and he knows what he's doing and he's a great team of people and they told me what was happening. At that stage, even though I was so out of it, I was signing consent forms, and I was there 'I just hope that you're in control!' But for me, you know, I just kind of feel that I'm paying for a premium service, it's quite expensive, you have to budget for it, it's not like it's easy to come up with that kind of money and I just feel that, you know, I want him to be there, and if I'm going to be in labour, I want the consultant to be there and deliver the child...

2: ...a consultant, or your consultant?

3: ...my consultant. Because I've paid you three thousand euro, it's a phenomenal amount of money.

I: So, is it really for a safe pair of hands?

2: Well, you know, I've met my consultant, and he knows my story, and I trust him and we've built up a relationship. And this is my second time now, so even, and I'm not saying we're buddies, but, you know, he knows my story, and he's familiar with my previous history. It's the security yes, but I feel a little bit separated from some stories from the public, from going publically, because I just feel he's my man, you know. And he'll be there and I feel that he should be there. But like I've said, I've never sat down and said if I go into labour and I need you at twelve midnight and you're not working, what happens then? Who, I mean, who, what will happen then? And I'd feel a little hard done by because I chose him out of all the consultants that were available

and he was recommended, and he's the best as far as I'm concerned. You know, I think I would feel very upset then, you know, if a stranger came in when I'm at my most vulnerable. Like I mean when you go in for a section, you know, you're completely exposed, not that that's, I mean physically you're completely exposed and not that that's on your mind, but you're kind of going at least you've seen me before, and I' feel a tad bit more comfortable with you. And you know, it was awful becasue I wasn't expecting to have a section and I don't know, I just don't know how I'd feel if he wasn't there, probably I'd be a little resentful, when I needed you the most, so you know, and I know that's making it sound very cut and dry, but you know at the end of the day, you're kind of going as long as the baby's out safe that's the most important thing, you know.

I: Ok, so, so far the consultant is crucial. Does anyone feel differently?

2: They wouldn't have trained so long, so hard, and have a different title if they weren't crucial. Like what is their function if they're not?

I: Well they're just crucial in the case of an emergency…

2: [interrupts me!]…but that's the problem. Like you can't diagnose an emergency situation at any point even in the labour, until it's there.

I: But the midwife is fully trained to recognise those signs and...

2: ...but that's the difference: recognise, not act..

I: …no, recognise, then inform…

2: ...yeah, yeah, and isn't that the basis of it. What is, you know, like there's a distinct role and a distinct training and distinct function for a reason.

I: Sure, but there are many people out there now that would say there's no role for the doctor during childbirth, that the midwife is capable of handling anything, almost anything, with the obvious exceptions. Does anyone feel that way?

5: You still need the doctor, you know. I think that, especially, it's like, like six years ago I had [inaudible clinical condition], it's like a little thing in my [she gestured with her hand, but I can't remember what body part she intimated], I told them that and the doctors say that I cannot give birth naturally because of the scar that I have, blah, blah, blah. But they never say anything about it, you know, so I've been reading and some doctor say 'oh yeah, you can have natural', or another say 'you have to have a c-section like that'. But here, you know, the doctor or the midwife, it looks like they don't care, you know, so next time that I'm going to the doctor in September, I really want to see him and ask him what's going to happen, because they haven't asked anything really and I'm like what's going to happen on the day that I give birth, the uterus is going to break or something because of that operation that I've had before, but it looks like they just don't care. But at the same time, I feel like I need him there in case that something happens because of my previous history.

I: Ok, thanks [participant 5]. Right, I'm just wondering how would you feel if the doctor is available on site, but in a building attached to the unit you're delivering in.

How would you feel about that? He's close by, but he's in the building next to the unit you're delivering in. He's available in the case of an emergency

1: So he's not going to intervene, only in the case of an emeregency?

I: Yes. I mean, it's going to be pretty clear for anyone going privately that they're not going to be too comfortable with that since they're paying for a service. But if someone is going publically, how would people feel about that?

6: It is actually like that. I mean unless there is a problem, the doctor won't show up. So it's only in the midwife, and the doctor is somewhere in the building on call, like he's not with you in the room unless there is something going wrong. So it is like that now.

2: But would they have seen you at any stage during your labour? Or do they arrive on the scene and need a full history?

I: No they wouldn't have anything, they would just come along. Really what I'm getting at is if it was a midwife-managed unit, attached to a consultant-led unit, like CUMH, so you're doctors would be working in the consultant-led unit. How would you feel about being in a midwifery-led unit?

3: But it's all about the way the system works. I mean you just accept whatever way the system is, and if that was they way it was,well, that's the way you'd just have to accept. I mean I would have great faith in midwives, you know, my sisters are

midwives and they're fantastic, and when it came to questions I would ask them questions all of the time and they're very knowledgeable, and I'd have to say if they were sitting in front of me I probably would be comfortable to deliver with them, but I think it's all about reassurance. I mean, you know, I suppose, the fact that we have public and private in Ireland is just, you know it's awful to say, but it just minimises your belief in the midwife, you kind of feel , well if you work here, why do we have the consultant in the first place, you know, why do sometimes they deliver, and not the midwife, and it undermines them. And it's wrong, you know, I think, it's wrong, I mean my sisters have delivered thousands of babies, you know, and won gold medals and whatever else! And I would have huge confidence in them but it's just the way the system is, I think that if it was reformed, you would accept it and you would trust in the system that it would work and that they have the best inetentions of the mother and baby at heart when it's being decided and it's not about about money.

2: So, would you be happy with a midwifery-led unit, even though you were paying for private, if that was the system that was decided?

3: Like, you know, at the moment, I was told that if I couldn't get my consultant, I could go with his team of doctors if I went publically, but I didn't know anything about their level of experience, and, you know...

2: ...so you wouldn't be happy then..

3: ...well, I think now that the fact that the two options exist, it'd be very hard to say what I'd be happy with, but I was happy to stay in the room with the midwife, but as

soon as something, I needed to have the reassurance that somebody else was monitoring as well, I suppose, it's just to make sure that everybody is doing what they're supoosed to be doing and that it's being checked by seniority. So, I do think that it is something that if it was part and parcel of the system, you would accept it.

2: But would you be happy with it? I think they're two different things.

I: Well, I think you've signalled your preference already going privately that you wouldn't pick the midwife-managed unit...

2: ...yeah, yeah...

3: ...but if there was nothing else available to you, well then..

2: ...but you wouldn't be happy with it, you'd just be willing to go along with it...

3: ...but you'd know no different is what I'm trying to say. I mean you wouldn't know the experience of going privately...

2: ...but there would still be consultants, just doing a different job, it's just that you wouldn't be able to pay for them, you know what I mean...

3: ...but they'd just monitor and never go in until there was a problem. And that should be the way it is, otherwise you are minimising...

2: ...yeah, now you're differentiating...

3: ...the midwives.

I: Ok, I'm going to try and calm things down a little bit here and make it very simple, so I've got a simple question for you and it's just on the homeliness of the room. How important is that, or is that an issue at all? I mean would you prefere a hotel-like room, or a clinical setting?

A: The delivery room or the after..

I: ...the delivery room.

1: I suppose I heard about the 'home-away-from-home' room that was availble. It's not often available. But when it came time for it, for the labour, I didn't care, as long as everything was ok. But sometimes I feel that maybe, dim-lighting, or somethimg that makes it less clinical is nice, but not ultimately a priority, for me.

4: I never heard of the home-away-from-home. So I'm not too sure what to expect of it...

I: ...well things like couches, tv, lighting, just the layout of it, very hotel-like.

6: I don't think that [inaudible amongst laughing]...

All: [Laughing]

3: ...could you avail of it, I don't know!

I: I'm just wondering is this something that you would have thought about?

All: [No!]

1: Well, I know for a lot of people it is important because my friend gave birth, she has four children and she - her first two - gave birth at home because that was important for her. but for her third pregnancy she couldn't give birth because of complications from her second baby, so it meant she had to go to the hospital. But it was important for her that she got the home-away-from-home room so, I suppose, the whole ambience, and the environment was important in terms of her whole experience of giving birth, but it wasn't for me.

6: I wouldn't like, if someone wanted to give birth at home, I would be sick like, oh never, never ever like! I wouldn't be ever sure in time for someone to get to me if something went wrong. No, at least for me, it doesn't make any difference. Maybe I feel more comfortable with all hospitals, thing is I know...

I: ...so very clinical then, yeah?

6: Yeah I know that they have everything I need in case they need it. I don't have time to think about those kind of things!

7: I think that if your baby is ok, then you don't care.

[Question 4]

I: Ok, great. now, this seems to be a big issue, even so far, and that's pain relief, and access to pain relief.

4: Yes!

All: [Laughing]

I: So, it's very important?!

4: yeah!

I: And all types of pain relief?

4: No, just the epidural. Well I heard gas and air works for people, and it makes other people sick. But I just think that the epidural is in there, and it can be topped up to a certain stage, like when you have to start pushing, it's more reassuring, for me anyway. I'm just really terrified about the idea of pain relief, like it would be the one thing when I was choosing between public and private, I was speaking to the GP and I said is it true that when you're public they only top you up once. And she said no that's not true, so that's why I went public. I would have gone private even though financially we're

kind of stretched. But that was the one decision, can I get as much pain relief as I can if I go public and she said yeah, so I was like, ok.

I: So it's crucially important to you then [participant 4]?

4: Yeah, definitely.

6: It's important to know that you have a choice. Like you know they will try things and if it's not working they will try more to help you at the end of the day. But even though the epidural is good, has a lot of less negative, like yeah, some women doesn't want to get it, even though they're taking it at the end of the day. But it depends maybe on the opinion of the woman, or of the situation, if it's like a two hour labour what for? But if its a 26 hour labour then obviously, you don't have that kind of strength at the end, so I think it's just the case-on-case, it's different. Just to have it in hand, ok I can get it, if I need it.

3: Once you're told the point of no return, you know, you're getting to the stage now where you have to make a decision and thereafter you have to stick with it, whatever you've decided.

2: The fuzzy head [inaudible, but all start laughing]

2: But, I mean, you know. I think it was five o'clock in the morning when I had my epidural, but I was told that the anaesthistist is, one guy is going off his shift and another guy is coming on, you know 'have you thought about it?' And it got us chatting,

you know, myself and my husband, will we go for it or not - well I had decided that I was anyway - but I had enough after eleven hours of it, although I'm a lightweight...

2: ...I don't think that counts as lightweight!

All: [Laughing]

3: But I really appreciated them telling me, you know, you've got a while here to think about it and how do you feel and I was quite happy then because I wasn't rushed. You know, I think that was hugely important, I kept on saying to the midwife, you know, tell me now when I'm coming up to the point of no return. I kept on reminding her just in case she'd forget!

2: I didn't even know it has a point of no return!

4: It's eight or nine centimetres, isn't it?

3: Oh I didn't know what it was, all I knew, well no it's a bit bigger, well I don't know actually I'm not too sure, it doesn't matter, I'm not going to quote anything just in case. But it's hugely reassuring.

I: So access is important then?

3: Yeah, hugely!

I: So Suppose then again, going back to this idea that access to the epidural is in a building that is attached to the building you're delivering in. Now, I know some people feel very strongly about it, so obviously you wouldn't be in that sort of unit to begin with. But knowing that the epidural is available in the next building, that if you wanted, you could get it, you just had to be...

2: Is that not what is currently done now? I mean the anaesthitist has to arrive..

I: ...yeah, but in this case you'd actually have to be transferred to the next building. Now, it would be a connecting building, I mean you'd be walking from one corridor through to the next.

2: And would you be wheeled back?

I: Well you would finish your deleivery in that building.

4: I'd prefer it all to be in the one location.

1: Well, I would have been wheeled anywhere to get the epidural!

All: [Laughing]

1: Yeah, it wouldn't have mattered if I had to walk through mines, I would have done it if it meant that at the end of it that there was going to be light at the end of the tunnel!

3: But sometimes getting from, I mean I started off in one room and my contractions got really bad, and I had to walk down to the delivery suite and it took a long time to walk down there. And even though I was offered a wheelchair, at the time I said 'I'm grand', but you know it was in the middle of the night and i didn't want to be screaming in the middle of a contraction and I don't know, I think it kind of depends where you're at, obviously if they can get you there quickly and there has never been a problem and we can get you there in two minutes, or five minutes, I suppose if everything is just structured, you kind of say 'right, I'll go to another building' then but you'd want to have faith that they'd get you there easily, like if you need...

2: ...or in a lift!

3: ...yeah, or just, I don't know. Yeah but it's just knowing that they're there, wherever they are. I hadn't a clue where the anaesthistist was, I didn't care where he was, as long as he was going to come to me or I was going to come to him, you know, so it wouldn't bother me.

1: But I don't think it should be necessary that you should have to go to another building to get an epidural.

I: Ok, great…any last thoughts on access to pain relief?

1: I suppose, again just thinking back, from the point of view that I mentioned earlier that it being very much by the book. I suppose, I rememeber I kept asking the midwife will you please just check to see how many centimetres I'm gone so I can get the

epidural and she wasn't very willing to do that because ‘no it's your first pregnancy and it's going to take another bit longer to get to where you want to be’. So, again, I suppose it's access to the drugs, or whatever. But I did find that definitely, the epidural aside, they were very good at offering alternatives like the pethidine or the gas and air and were very good at talking you through what is available and what you do have access to, but I suppose at that stage the ultimate is the the epidural! And it wasn't like that for me before I went into labour, I was never one to say 'I'm definitely getting the epidural', I was very much 'look, we'll see how things go, I'll judge it when I get there and see how far I can go myself ',but that didn't happen for me so, although it wasn't a priority prior to labour, it certainly was when I got in there.

2: I feel like that, I feel like I'm trying to be more broadminded about it because it doesn't always take, or you might miss it, so I don't want to feel like 'oh jesus, I can't do it if I don't have it', but at the same time, and as you said, you want to have access to it if you do need it.

6: It needs another doctor, so they need to call them and you need to wait, and my only negative experience was with him. He wasn't nice at all! But I was happy at the end of the day, he did it, but he was supposed to [inaudible - better, maybe?], it took a while actually, him to come and to do it properly, or I don't know, not properly, I mean it wasn't working in the first time, and then it was working too much and I couldn't move at all in the bed. I don't know, then it was somebody else to blame for something else like, you know, it was another person again in the whole thing. But yeah, in the end it was good, all went well and it was fine, so it's maybe also how things go.

[Question 5]

I: Ok great, thanks [participant 6]. Ok, well I guess this has come up a little bit now already and that's your role in the decision-making around your labour and how involved you'd like to be in it. Is that an important aspect of care to you? Obviously you want to be kept informed, but do you want to make all the decisions?

6: No, no. I was completely, I mean, I trust the people around me because I don't know anything about it. So, if they tell me it's no possible to get the epidural there is nothing, I mean I couldn't be angry at them or something like, you know. So, no, I don't want, I wouldn't be, like to be to have a responsibility if something is going wrong, like on my behalf actually, if I say 'no I don't want it' or 'yes I want it' even though the doctors say 'no, I wouldn't recommend it', so I would just do what they told me to do. I don't want to be thinking about those possibilities.

I: So you're happy to leave it to the medical staff, they're the professionals at the end of the day?

6: exactly, yeah. Somebody else to blame!

All: [Laughing]

7: Because I think that doctors know more than me, that they know everything, they know my situation. So I mean I can't make the decisions in these situations because I am in distress, I am in pain, it's too much things to think about, so I leave it all to the doctors, it's better for me.

2: And that's why I think information is important, like you were saying [participant 1], like because you are so vulnerable, like you don't have the capacity to make those decisions, and you're entrusting yourself to somebody else. So you should be kept informed then, you know, like 'we've decided to do this because', you know. Because you can't make those decisions yourself or you don't want to because you're not able. And whoever is making those decisions on your behalf should be telling you about them, I think.

1: Before my first baby, there were a lot of, some, people that I work with had babies and were doing a sort of care plan, is it?

2: Like a delivery plan?

1: ...yeah, kind of a delivery plan. And I had gotten a copy of it from another girl that I work with and I was going to do one myself because that was what was recommended, that you'd be then have control over whatever decisions, or certain decisions. And as I was looking at hers and I thought, you know, there was stuff like I don't want a caesarean unless absolutely necessary or I'd like a,b, and c, and I don't want pethidine. But I felt that as I was reading it I was assuming that whatever decisions the doctor or the medical staff want to make are going to be in the best interests of you and the baby, and they're going to inform you about it, so I didn't bother doing that plan. I just left it like everyone else, saying 'here, I was at the mercy of the medical people who knew best.' Afterwards though, I felt was when I wanted to make more decisions like, and I'm not sure whether this is relevant or not, but, like

skin-to-skin contact, or, you know, little things like that, as opposed to the medical stuff that I would have left in their hands.

I: Ok, great. Very briefly then, and this may not be an issue or maybe it is. But do you expect your healthcare provider, so your midwife or your doctor, to act a certain way? What attitude do you expect them to have? Or is that an issue? Or do you expect them to be relaxed, attentive, listening? I know there have been some bad experiences here, so any thoughts?

4: I think the one that gives the information, like [participant 3] was saying, would be definitely one that I would like to have [referring to the student midwife who kept [participant 3] informed all the way through]. I don't want someone in there who is saying nothing and just looking at charts. Do you know, kind of making you feel at ease I think.

3: Reassuring.

4: Yeah, reassuring. Like with people with who it's their first experience they don't know any better so like, and the midwife is probably around her, I don't know, 500 delivery, and they're a bit bored of it, but they have to rememeber that it's your first time, so they have to just keep giving you the information and reassurance and telling you whether everything is on track or not, or if something is, that they notice is, wrong that they can prepare you for it, even before it gets to the stage of complete emergency, where a doctor or consultant needs to make a decision on caesarean, or whatever. But yeah, I think informative.

1: I think that is what you hope, but I think sometimes you go in with different expectations and whether it is right or wrong, I have different expectations of the doctor than I would the midwife. And in certain respects, I would expect that the midwife be more open to answering questions and discussing stuff, and the doctor is held up there on a pedestal and he's only going to give you the bare minimum. I'm not saying that was my experience, but certainly sometimes that was the expectation that because of his level of experience and because of his status in terms of the pecking order and the hierarchy within the hospital, the expectation is that they are possibly going to be, or have, a certain manner. Whether that's a positive or negative thing; more often than not, I suppose sometimes consultants can be accused of having a manner that is not patient friendly,. So I suppose, although you'd hope that the doctor or the nurse would be open to questions, giving information and be, I suppose, nice! The expectation of, you know, the consultant, isn't always, I mean, that's not always the case.

2: You know as you said earlier about, you know, can you ask questions, feeling like that is just so wrong. If you're made to feel like that, then that's not right I don't think. Like you should feel, as you said, it's your body and people coming in and having a look or having a poke or whatever, and like you're totally vulnerable. And like, I know my husband would be useless at asking questions! So, if you're made to feel like you can't ask, and you're already uncomforatble about asking, then you're going to have no information, and you're going to be sitting there like a lemon for all intents and purposes. You know, and, I think that's wrong, I feel totally vulnerable about the whole thing. I just think I'm going to be at the mercy of somebody else and if I can't ask

questions I would just be so disappointed, and upset, I would be so upset about it. And if information wasn't good for me. You know, and I've heard stories like that, you know about [inaudible - but she's basically saying stories about staff being short with women, ignorant even.], like you know 'that's not of consequence at this time' or, you know, 'we told you a while ago that you're three centimetres', whatever. Alright, 'you might have told me then but I'm asking again', so just say three centimetres or no centimetres, or whatever it is, rather than...and I know they're busy and, you know, everyone is busy, but as I said, you know, it's your.

3: It's your personality, well, I suppose, not your personality, but you know some people are people, they're good with people, others are not. And I think if you're in the medical profession and you're dealing with the public, then that's something you should really think about before you go into the job because...

2: ...if you're not a people person...

3: ...yeah, it's...It's you're so emotional, your hormones are everywhere, you know, your body is not your own it's theirs, and the baby who has taken over! And, you know, I just found that some midwives are just lovely and I felft so relaxed, you know whether that translated into the baby feeling relaxed or not, I don't know, but it had to have some sort of connection but, you know, when we feel comfortable with people you're more relaxed yourself, you trust, you build up a relationship with them, abeit only a couple of hours that they might be in there for their shift or whatever. But it's hugely important and I know afterwards my son, I breastfed my son, and he happened to be lactose intolerant so he cried constantly in the hospital, so I was afraid to ring the

buzzer with some midwives because I knew they were going 'oh for godsake' and I knew that that was on their face when they'd walk in the door, 'what's wrong with her now like, i mean did no one ever tell her that like this is how they cry' because, you know!

All: [Laughing]

2: ...you laugh now, but I'm sure at the time you felt so...

3: ...yeah , I felt so upset, I was so upset. I was being manhandled, my boobs were belonging to everybody else, they were all manhandling! And I was just there going 'oh, I can't do it, just be nice to me, I don't know what I'm doing, you do, help me, and be nice about it when you're helping me'!

2: ...yeah like, have your bitch outside the door, but like you know, if we're frustrating then do it on your own time!

3: ...yeah, like this is your job and if you can't be nice to me. And I didn't even know if I could ask for someone else to come in and be nice to me! Because you're just so vulnerable, and that's really all you want, just to know that if you've a problem, it'll be sorted, and that's what we're here for, and that's our thing. And I'm not asking for, you know, Mary Poppins, but just rememeber that it might be your first time, this, you know the next time, it's only my second time, you know it's not like I do this all the time, so you just want people to be considerate, and polite, and you know, at one stage I had just put [her son] back to sleep and the midwife came in and myself and my

husband we're going 'oh he's just got to sleep', and we were so proud of that! And she slammed the door and said 'I don't believe in being quiet', and I was kind of going 'oohhhh, don't wake hime', and to me that was the most important thing because we had successfully put our first child to sleep, major achievement, and she just ruined it! So that was my only time where I wish I could have turned around and had the confidence to say 'please be civil, please be nice to me, I'm reall vulnerable, I'm all hormonal, I've just had a baby, I don't know what I'm doing, I want to be comfortable enough around you to ask for help and not fleshing inside the room going I better not ring the bell, you know, because they'll kind of think I'm not capable'. Whereas one midwife came into me and said 'oh for god sake, don't mind, you can ask for help at any time, the woman next door is after having three and she's always ringing the bell, and that's what we're here for', and I was so happy when she walked in the door to me, it was refreshing. But then there was another lady and I was afraid to see her coming in...

2: ...my sister had a baby

3: ...you just want them to be nice.

2: ...yeah I agree. And not to misinterpret this, but there was kind of an air of bedlam around the rooms and there are midwives in and out, and there's crying, and if there in there it's for a second and they're shouting at something, from the door nearly, and you're like 'what did she say' and she'd say 'oh, feed them, change them, wash them, i don't know, whatever it was', but, you know, I blame the government for that because they're totally undestaffed, under-resourced, and while I do appreciate that I know that

come Januray time I will be lined up, buzzing [bell], I won't care! But I think the resources, they're so overworked, underpaid, no resources, and at you're most vulnerable time you need them to be the model midwife which noone can be 365 days of the year, you know what I mean?

3: Yeah, or else make it very clear: this is what you can expect of us, yeah and anything outside of that, you know, I'm sorry we'd love to be able to provide it but it's just not going to happen, don't be alluded!

2: Yeah, when I was there now with my sister, and she was very upset one day, crying and all that stuff, and she asked if I could stay a little longer, but actually one of the midwives went to security downstairs to ask me to leave and he said, quote: 'it doesn't matter whether you're public or private, you have to go' and left. And I was like, what a pig, how ignorant, you know. Those sort of things and, you know, my sister was so upset, and she was after having the baby, this is the kind of thing you kno going in there that I expect people to be good to me, and I've been told that midwives are rude and you just ignore it, and you do your best with the crying and all the rest of it, but buzz like mad!

All: [Laughing]

2: ...yeah but I expecct her to be rude to me, but that's wrong you know. That is my, and you know there are some fabulous ones, but it's pot luck whether you'll get one or not!.

2: And it's not fair either because you're entitled to have your own personality like. But I really do think that at the start of it all you're told that this is what you can expect from someone, and whoever you're going to meet and everybody that you're going to meet, yeah. Make it clear cut so that you're not under any illusions as to the care, and I just wanted to say that it's not that I had a bad experience, it's just that we all have to be professional.

I: Ok, great. Now I'm conscious of time, it's just going on half twelve, and there are still a couple of things that I haven't covered. Is anybody in a rush?

2: I need to be gone by one.

I: Ok, anyone else?

All: [No]

I: Ok. I guess I have three more questions, two anyway. Very briefly, and I guess this is an important issue: access to neonatal services. How important is that to you? I mean, knowing that they're on site. So having a paediatrician on site, or a neonatal unit. Is that an important issue for you?

2: Yeah, if there is something wrong. Definitely. I mean the gynaecologist won't have anything to do with that, so if there is something wrong, then the neonatal unit is going to be vital, I presume.

I: Ok, great, thank you. So it's important to have them on site?

2 & 1: yeah, yeah.

I: How about if they were in a building next to the unit you're delivering in?

2: Once it's efficient, and transport is ok, then yeah. I mean, I would expect them to be separate.

4: Are you building a separate building, or something?!

All: [Laughing]

I: That would be telling!

All: [Laughing]

5: I'm kind of worried now because I thought that they're all here?!

I: Yes, CUMH has everything!

5: Oh, ok!

1: It's all here, it's all here!

I: Basically, the way it used to be was that you'd have several hospitals here in Cork and some didn't have neonatal units, while some did. And I guess what I'm wondering is if you had a choice between these different hospitals, would that be a motivating factor behind choosing one hospital over another, you know having access to a neontal unit?

All: [Yeah, yeah!]

All: [Laughing as participant 5 got a little bit of a shock, but is relieved now as all telling her everything is in CUMH!

I: Yes, it's all here! Ok, very briefly again - this is my second last question - have you given much thought to how long you'd like to stay in hospital after you've given birth?

6: Two days is like, at the moment it takes like, after natural birth, two days for me, it's kind of like not enough!

I: It's not enough, ok so you'd like more? Ok, that's good...

6: Maybe it's because in my country it's much more longer, so maybe if I tell them ok I was only in two days and not even, it's like 'oohhh', like you know [referring to the fact that her firends were stunned that she was only in hospital for two days after giving birth]. But all went good, so for me, it doesn't really, it's hard to say, but I would expect it to be longer. But I don't know if it's because there are not enough beds or doctors or whatever. Or why it is only two days, I don't know why.

4: I think the longer the better.

7: I think when the time you feel ok, and it's takes more than two days feel ok because if you are sent to your house nobody will help you, so if you go to the house you feel you can't do everything yourself, so more than two days.

I: Ok, thank you [participant 7].

2: If the midwives are nice I'll stay as long as they'll have me! I've heard different things talking to friends, you know. Some people would say stay as long as they will keep you, and then others would say get out. You know, somebody even said to me, don't wash your baby in the hospital, you know, wash the baby at home and, you know, just because, I don't know, the facilities and things like that. It's just different people's interpretations of the service, so I don't know, I have no idea how long I'd like to stay.

1: I think it might come down to personality as well. Certainly for me and my personality, I would be a bit of a worrier. So the consultant asked me 'do you wan to go home' and I said 'no', so he said, 'ok, stay another day'. So I did because I was afraid, I was a first time parent and going home with a baby was a scary propsect and I know that's not reason enough given the fact that they are under pressure, under-resourced and understaffed to stay, but if he's willing to let me stay, then I was more than willing to take him up on that.

2: I would say it is reason enough, if you didn't feel confident enough going home...

1: ...but medically, and I suppose they're not in a position to..

2: ...but there's a big difference between medically fine and emotionally fine, and I do think that they should tend to that as well.

1: ...but thisis a medical model, you know, unless I'm going to be transferred to services, psychiatric versus whatever, social worker, so I suppose they're here to inform and I know realistically in my own, when I reason with myself, I have to go home eventually, or otherwise I would stay there!

2: [Laughing]

1: ..but maybe I'll feel differently for my second.

3: So medically when they say you're ready to go home, you know when they say 'look we're happy now that you'll be able to perform any duties that you need, or any things that you need to do to yourself' if they show you. Like, for instance, I had a section and, you know, my consultant said to me what care is needed, i.e. there was none [and she giggles - I don't know why], what is normal, and then I was 'oh, then I don't need you to do anything for me, I don't need to learn anything new, I don't need to be watching out for anything'. I think as long as they kind of put it into your hands and you know that the public health nurse is there, you know for the aftercare service. So you'd be inclined to say, you know, once you're medically up and running and you're ready to go, out the door you go. And it's up to you then, I think, then to provide, to

make sure that your family or friends or whoever are taking care of you at home, but I mean once your physically able you'd want to go home anyway for yourself.

6: Yeah exactly. They asked me if there was someone to help me, I had my Mum over, otherwise, I don't know, because I lost a lot of blood and they wanted to give me a transfusion, which I refused. So I was all like blue and white, so I was really weak if I would be by myself, so maybe they wouldn't even let me go if I wouldn't say my mum was here to collect me, otherwise maybe they would keep me longer. But I wanted to go home because I was here long and they couldn't stay here, it was only those two hours a day the visiting hours. Like you want to stay or you want to go home like you know, but it was all fine in the end, but maybe they would keep me longer if I need it.

3: But sure you have to stay 24 hours after the epidural anyway, don't you?

I: Yeah after some services you have to stay for a period of time...

3: ...and then you hear other mothers that deliver today and they're gone tomorrow [laughs to herself!]!

I: Well that was my next question, because do you know some hospitals around the country and they have this new scheme called the Domino scheme, and it offers women the choice, or the option of going home in as few as three to six hours after giving birth.

6: Yeah in the US I'd say.

I: Yeah and it's coming in here now [Ireland], in Dublin. It hasn't come down here to Cork yet.

3: You'd imagine it would be the midwives taking that!

2: [Laughs]

1: And the thing is, as you said, that's a choice, and as long as that's a choice, I don't mind. Becasue that's a decision that some people do make, you know, in three to six hours they'd like to be home and that's fine.

4: You'd probably have a lot more confidence if you've had a couple of children already to do that. But, it's not for everyone

5: After they check that everything is ok with you then you can go home, yeah. I wouldn't like to stay for three, four days really. I would like to stay for two days. And if everything is ok, then go home because I feel like I'm going to feel better at home. That in the house because I'm going public too so you have to sleep with other people and to other babies crying, and I prefer to just, you know, as soon as I can just go home.

3: It can be a long three days - I was in for three days - it can be quite lonely.

5: Yeah, yeah.

2: Yeah, yeah, I would say that, you know, and especially with what is it, two hours a day, wasn't it? [Referring to visiting hours].

3: It's like morning and afternoon...

6: Yeah, it's like your husband can stay with you whole time, but like my friends were over so like he couldn't stay here, you know it wasn't possible, so I was alone by myself.

2: I know this is like so immature but there wasn't even a tv, I was like 'what do they do all day?!' And the baby was really good so she just slept, and I was like 'what do ye do', and he said 'I just bring her in magazines and things just to try and keep her going'! But like I'm sure if you had a crier you'd keep yourself busy, like fingers crossed that it really could because you'd be bored out of your tree! But like vene to have that opportunity to turn it off, to turn it on, even if you just wasnt it for background noise.

6: If there is five women with you in the room then it's not really working.

2: Yeah, fighting over the remote!

2: Watching 'From Here to Maternity'!

All: [Laughing]

I: Brilliant. Now I have one last question and unfortunately it's a bit of a tricky one. I'm just going to ask ye to take a look at this choice card and I'm going to ask you pick your most preferred maternity care package, and your least preferred package. So there are three options here, they are pretty much described in terms of what we discussed here today. So just on the left hand side is the topic or the issue that we discussed earlier, so the role of the midwife, the medical staff, and each of these are described differently under each maternity care package. And if you need an extra description, that's provided on the right hand side.

2: By medical staff, do you mean anaesthististist, the consultant?

I: I mean both, yeah, all medical staff.

2: But not midwives?

I: Yeah, not midwives.

3: Can we create our own?!

2: Mix and match!

I: No!

[6 leaves for toilet]

I: Ok, I can take it no one went for maternity care package C?

All: [No]

I: Did anyone go for maternity care package B?

All: [No]

I: Ok. I see 6 ticked B.

7: Yeah I ticked B.

I: You ticked B as your most preferred?

7: Yeah, yeah.

I: So the rest of ye went for A?

All: [Yeah]

I: Now, really what I want to find out is how much value you place on you preferred type of care. So what I'm trying to find out is, if you had to pay, which you don't, but if you had to pay for one of these types of care, what would be the maximum amount you'd be willing to give up in money, or euros, to receive that type of care, opposed to

the type of care you'd least prefer. So you have to pick between the two, and you have picked your most preferred, and your least preferred, and what I'm trying to find out what is the maximum amount of money you'd be willing to pay for that care? Now, maternity care is free and it will remain free, and I dn't think that you should ever have to pay for it. But I'm just trying to figure out if there is a value you would place on these types of care.

2: Are you saying these are the only options available?

I: Yeah, so you have a choice between the two, and to not have C but to have A, what would you be willing to pay? It is a difficult question, and everyone has struggled so far! But basically how I could describe it is that maternity care package A is the public package, and maternity care package B is the midwifery-led package. And if you had to pay for on of those two, what would be the maximum amount you'd be willing to pay? So, [participant 6], just when you were gone, I saw that you picked B as your most preferred package. And what I'm trying to find out is how much value you would place on your preferred package, and one way to do that is to ask you how much, and you don't have to do this, you don't have to pay, but how much would you be willing to pay...

6: ..not to go to...?

I: ...to your least preferred..

6: ...to C yeah?

I: ...yeah, so your least preferred. That's your choice, and if you had to pay so as not to receive maternity care package C, what would you be the maximum amount you'd be willing to pay? You can think of it like you're at an auction and you see a product but you won't go above a certain amount, what would that maximum amount be?

3: So, A, B, and C are available to you?

I: No, no, it's just between your preferred and least preferred.

3: Ok, and so you pay for one and not for the other?

I: Yes!

6: Ok, so how much is to go private were you saying, three thousand?

I: Yeah, yeah, but we'll try and let go of private now for the minute. Package A is actually the public packagem, if you'll think of it like that, and package B would be a midwifery-led package and package C is hopefully something that you'll never have to face.

1: I feel it's difficult to answer because I can't get out of my head the private package, and it's essentially what I'm paying between package A and what I'm, the private service, which is €3,000, do you know what I mean.

I: Ok.

2: Would we have paid more than three though? I think I would have been, if he had said five, I wouldn't have said no way. Kind of like, in my own head...

3: You wouldn't have said no way?

2: I wouldn't have said no because I have the nerves, massively [giggles], and there would have been massive cutbacks and budgeting and things like that! But because I consider myself a nervous person, and I'm definitely a nervous person when it comes to the baby thing. And I think five is my upper limit.

I: Ok, so you put five thousand for private.

2: Yeah, yeah, like so is there a private option available?!

I: No, this is it.

2: well, five then because that's the offer.

I: Ok, so five then, great!

5: It isn't money wasted if it's all ok.

I: Ok, that's great, that's brilliant.

6: For me, like let's say the, my preferred most package would be, let's say the private, in the reality like. And the least one would be the public. I wouldn't go for the private, I said to myself that millions of millions of women gave birth and I should be one of them so I wouldn't pay if I have an alternative to do no pay, like. It's like go private or go public, so I wouldn't...

I: ...you wouldn't pay?

6: Yeah.

I: Ok...

1: ..yeah, it's a difficult one.

I: It is, yeah, yeah. Well let's see if we can get some values from some others before I break it down more, if they can.

1: Well, I'd say maybe €500.

6: Yeah, that would be, yeah, not €5,000. €500 would be fine, ok.

I: Yeah, ok, so €500?

6: Yeah.

2: So...but how...like...so the system that's available is like everybody would have to pay something is it?

I: Yeah.

2: Ok, so this is what you're getting at: so this will be the only system that's available, everybody would have to pay?

I: Yeah, yeah. So supposing that you did, but you don't - I have to keep saying that! - and you have the choice between your preferred package, amongst the options available there, and your least preferred package, so as to avoid the least preferred package, assuming it's free because you don't want that because, well, it's terrible, how much would you be willing to pay just to go the other way?

2: And that would be the only available option?

I: Yes, just assuming it is.

2: Ok, then €5,000 is ridiculous because, you know what I mean, I was thinking how much would you be willing to pay to avoid the other one [public package]. Like €500 sounds more like, you know...

6: ...if it would for €500, then I would say everyone would go for it.

I: Ok, so would you say €500 for the public system? And what would you say for the midwifery-led system if you had to? And rememeber there are no doctors involved in the midwifery-led system, per se.

1: So package B, is it?

I: Yeah.

1: Three.

I: €300, ok.

6: Not thousands, few hundred but not thousands.

2: I would say about three or four for the midwifery one. Then you'd probably go about six for the doctor one. Six, seven, kind of. Would that be...

I: Yeah, that's great. Any thoughts [to participant 5]

5: Yeah same [as participant 2: three, four for MLUs; six, seven for public].

I: Ok.

3: I'm not going to answer your question!

All: [Laughing]

3: Ah no, I just can't answer your question to be honest because I'm kind of looking at it and going everyone should be cared for and you know...

I: yeah, yeah, I know, I understand.

3: And it's to have to pick a package and the compromises, I was looking at the compromises that you'd need like A to B: B, informed and consulted; A, informed but not consulted. So you're kind of going 'ohhh', it's making you make decisions before you really know what's ahead of you. I actually don't know how you could put a value on coming home safely with you and the baby.

I: I know yeah, yeah, I know. Yeah, you'd pay anything. But basically what I was trying to find out is right now, assuming everything goes perfectly and you had to pay for it. But that's fine, that's absolutely fine.

2: Just on the purpose of, what's the question [asking me about the purpose of the question.]

I: Well it's actuallt to inform a broader study, so I'm just trying to find out if women could put a value on it what would it be on the public system and the midwifery-led system and that's really what I'm trying to do. And it costs the government, and you have been the group that has been pretty much been bang on for the public system as for the government it costs over €600 for a normal birth and in a midwifery-led system

it costs €500 and something. So, I guess woyuld that be around the value you would put on it?

2: Does that include your three nights stay and...

I: ...yeah that includes two nights stay and antenatal care visits, and things, the whole package.

3: How much is it again?

I: €670 or so for the public package and then for the midwifery-led system it's seventy euro cheaper, or eighty euro cheaper.

2: That seems like a bad, do you know what I mean, that seems like good value to get €670, rather than €590. You know with everything on site, like access to pain relief rather than corridor access.

I: Ok, you did great, ye did better than any other group at answering this question...

2: You say that to all the groups!

All: [Laughing]

I: That's it, thank you so much for coming today

[End]

A.2.1.4 *Focus group: session 4*

Date: Tues 02 Oct 2012

Time: 10.00

Location: Boardroom, Fifth floor, Cork University Maternity Hospital

Number of participants in attendance (excluding facilitators): Four

Facilitators in attendance: Two

Name of facilitators present: Christopher Fawsitt & Linda O'Keeffe

Transcribed by: Christopher Fawsitt

I: Ok, so let's get started, and I suppose we should start very informally with some introductions. If you give your name, and say whether this is your first pregnancy, or whether you have given birth before.

1: Hi, my name is [participant 1] (34), I'm 24 weeks pregnant. This is our first baby. I'm from Galway, but we live in [county Cork].

2: My name [participant 2] (32). This is also my first baby. I'm from Limerick, but live in [county Cork.

3: My name is [participant 3] (34). I'm originally from [county Cork], out beyond [county Cork], but live in [county Cork] and this is our third baby.

4: I'm [participant 4] (32). I'm 19 weeks pregnant with my third baby, and I'm living in [county Cork].

I: The first question I'd like to ask is how important is the role of the midwife to you? Usually I ended that question with 'during labour'. However, what I have noticed over the past couple of sessions is that women have a preference for continuity of care from care during pregnancy to care during labour. So what I'm wondering is: is that something you would have a preference for?

4: I don't think it is important to me. I have met different midwives in all the appointments I have had. But I think to have the same midwife there during labour is very important.

I: Ok, so continuity of care during labour. So it is ok if you don't know her and just meet her on the day.

4: Yeah it is ok if I don't know her and just meet her on the day. I'm comfortable with that.

I: What about during labour and there is a team of midwives on call. Would that bother you?

4: No, no, that wouldn't bother me.

I: And what about a shift rotation system?:

4: I know that because my second baby was born at half 6 and the midwife had to leave at 8 o'clock and I have to say that didn't really bother me. Once the baby is safely delivered it wouldn't bother me.

3: I think its probably the same. I hadn't seen any midwife for either pregnancy (because she was private), and the midwives make a big difference depending on who you have. For my first baby the midwife was much more reserved, and not as inclined to give much information and that made a huge difference. And on my second baby

the midwife was amazing. And even when she went onher break I still felt like she was keeping an eye, whereas themidwife for my first baby I felt like when she went on her break i felt like I was completely lost! Whatever hope I had was gone. So I suppose if they keep you fully informed you are happy enough with them to leave the room for whatever it is they need to do. But if you don't really have a clue what is going and they just seem to disappear it is a bit daunting.

2: The midwife I have met in Louise's private clinic has been the same every time. But I actually have no idea as I have never thought about it but I presume she isn't going to be the person that I mett when I turn up here on the day. I presume it will be someone new. But I would be a little happier if it was the same person throughout the whole process. I'd imagine you'd get a little bit of confidence or you'd relax more having one person than a team of people coming in, or a different person coming in. I'd imagine they'd all start blending into one another and you'd start getting more panicked than if you had one person.

1: Yeah, I'm with Louise as well, and I know that Dorothy (clinic midwife) isn't going to be there because I think she only works two days a week. I suppose I'm not thinking too much about the labour yet, I'm kind of blocking that out for another two months at least! But no I would like continuity of care, and that was the only reason we went private because we had a miscarriage before Christmas and we were going public and I just felt for our next pregnancy that we would go private so that we would have the same person at every visit; an established relationship.

4: Maybe it is something to do with having your first baby that it is that you feel you need more care. Whereas with your second and third you know the whole process and you are more comfortable with it.

3: Yeah definitely I think information is the key to being comfortable. Once you have an idea of how things are going to go.

1: My attitude is don't read beyond 32 weeks in the pregnancy books, or stop googling after that!

I: Great thanks. Well in the current system it is very difficult to guarantee women continuity of care throughout pregnancy and even in labour, and as many of you have said you have already seen different midwives on different occassions. But suppose you had a system or a maternity unit, like a midwifery-led unit, that offered that service of continuity, would that be a maternity unit you would be interested in attending?

3: Yeah, yeah it would. This is actually my fourth pregnancy, we had a miscarriage last year as well, but every time we have gone privately the reason for that is when you are pregnant you do feel that you want to know the person who is looking after you, that if something goes wrong there is somebody that has some clue about you, and it's not just someone who meets you on the day. But if there was a midwifery-led system, it would certainly be an alternative to a consultant-led system. The midwives have a level of expertise and you can't rule that out just because it is not an obstetric qualification or whatever. I still think that they really know their stuff and at the end of the day they are kind of there through most of the labour and usually they're the ones that deliver, unless there's a problem. So I think it would be nice if you could get to know your midwife and have her there.

4: I have to say I'm going public and I'm very happy with the set-up downstairs in the clinic. I'm very happy with th public system that I've met different, and mostly they've been student, midwives, but I'm comfortable with it. I know that they are around qualified midwives and if I have any questions they can't answer I know they'd ask

someone who did know. So I'm comfortable with meeting someone different, whether they're students or not. I feel safe you know.

2: Going private, I wouldn't have chosen going private because I wasn't going to see the midwife every time, that didn't enter my head. The only reason I went private was because I was sick beforehand, and recognised the importance of private health insurance which makes sure that you get access to the consultant, so that if something went worng it was the consultant that would draw the decision. So it was about having a consultant that you could call rather than the midwife. The midwife I didn't even think about until I arrived on the day, until I met Dorothy. I wouldn't even have thought about having a conversation with the midwife, I thought about the consultant. So it wouldn't have been a factor when deciding upon my care I suppose.

1: Yeah you're very green on your first time, and you can't ask people because obviously you can't tell them you're pregnant, so you have to guess how the system works in your head. So I suppose if there was more information out there on the different options. But I do think if this pregnancy goes fine and there is no complications that I would go public next time.

I: Speaking about the consultant then, how important is the role about the doctor during your labour?

4: Not very, I find. I had very little dealings with the doctors during any of my labours. But I was lucky that my labours went well! So I didn't have to have any doctors in, I was lucky, it was all midwives.

I: So you think there is nor real role for doctors unless there is an emergency?

3: They're like an insurance policy. They're there just in case. So, in my head, that why I go privately. You know for my first baby the consultant had to come in and deliver and it wasn't the most pleasant experience of my life, so in my head, a doctor coming into the room when you're in labour is the last thing you want to see. It's almost like seeing a grave digger coming. And you know on my second baby, the midwife said she'll let the consultant know you're delivering but I said no please don't, we'll just carry on ourselves, me and the midwife. And for one reason or another the baby came quite quickly in the end. So it was just the midwife, and the doctor came along a few minutes later and I was really with that because nothing went wrong and I didn't need to see the doctor. But at the same time if something had have gone wrong, it was really reassuring to know that they were there and they're going to show up. Also, for the epidural!

I: Ha we'll get to that!

3: The most important thing!

M: [Telling a short story about being sick and needing colonoscopy before getting pregnant. She didn't have PHI then but after her experience she took it out] So having the consultant back-up I suppose. I do hope that I don't see an awful lot of my consultant, and I like the fact that I go in [to an antenatal visit] there and I might only be in there for 3 or 4 minutes, and I hope that I only ever have to be in there for 3-4 minutes and that I never have to call her mid-week or out of a schedule appointment! And I'm hoping I never will have to!

3: Yeah it is the one time you hope you don't ever get value for money!

1: Yeah I got the consultant for continuity, and I suppose they are much quicker, and well my husband wouldn't be very patient!

4: Yeah with the public you could be waiting 3 hours but that is 3 hours away from my children! And I bring my book so I'm quite happy to stay out there; that's my peace.

I: How important is the homeliness of the room? Have you given it any thought?

4: I found with my second baby...I remember that there was a pink radio in the room that was actually shown in the series 'From here to maternity' and I was like that was my room! But I remember the pink radio and there was music playing the whole time, and it was fabulous, it was absolutely fabulous. It was a gem. And my my husband was able to have a little bit of a snooze on one of the seats, after my epidural of course! I just found it very, very comfy, and you have your own bathroom and everything. But I just remember the radio.

I: So it had a kind of homely feel to it?

4: I mean it was still a hospital so it had a little bit of a clinical feel to it, but it was homely.

3: Yeah I think that even more important than the homely feel...having your own bathroom. It makes such a difference because you do need the loo and you do need to take your time! You know when it is you're first you do think about that sort of thing, like the homeliness of the room, and the candles, and the CD, and the birth plan. I think it's kind of a first baby thing, then after that it's more about having the actual baby and maybe getting home to the other kids. It's less about the experience and the

room being nice. The bathroom is a big thing, and those beds are fabulous, they're so wide!

1: I haven't given the actual room much thought. You know hearing about these birth plans and all that, I can't imagine that what the room looks like will actually bother me.

4: You know my husband is working in Dublin and he wants us to move up there but I'm saying no way, not until after I have the baby because I want to have the baby here beacasue I know it, I'm comfortable with it, it's 10 minutes from home, so I said no way because I don't know any of the hospitals up there.

I: How important is it to have complete access to pain relief? Like the epidural?

3: Extremely!

I: Extremely?! So it has to be on site?

3: Yeah!

4: Yeah. I remember years ago it used to only be available on a Tuesday. I think it was the Erinville and they were only available on a Tuesday and a Thursday, so everyone was trying to keep their legs crossed until a Tuesday or a Thursday! But yeah I remember with my second baby that I had, first baby that I had here, I remember that they were up the walls. There was a big baby boom and I remember that midwife said to me that there is a chance that the epidural may not be available to me. So I was saying ok, if I can accept it then I can get on with it got stronger and the midwife said there is an anaesthistist there and we can call him so I said yes, yes! So it is very important to have it there the whole time.

3: I think for me that's a big thing about going private, whether it is acknowledged or not, it seems to be the case that if you are private you are never really told that it is too late for an epidural or that they are not available. Even when I had my last baby, it was New Year's day, and I think there were 2 anaesthist in the maternity hospital, and they were both in theatre, so they sent over to the main hospital for an anaesthist and there were four other midwives came to the door when they saw him coming [to get him to treat their women] and I felt guilty because I had just started to feel my pain but I had made up my mind and there was no way I was having any pain in my second after the first one. So it does seem to be the case that you do get access to your epidural faster if you are a private patient than a public patient. I'm not so sure if that will be so important for this pregnancy as I'm after getting over the fear in my head of doing it without an epidural. I'm actually thinking I might do without it this time, but especially for your first baby you go into it thinking that you'll see what happens and you're open minded, but then you get to 7cms, and you're like where in the name of God is that man, I don't care what he's got! If it was crystal meth you'd take it!Yeah it is very important that it is there.

2: I was given two pieces of advice. One to put €50 into a box and hand it to the porter on the way in and ask him to mind your dignity and you'll collect it in a few days. The second thing is when they ask you for your name that you will not give them your name until you get an epidural, so I'm going to be the first one! I'm not going to wait until I'm 7cms, I can't even imagine a world where if you wanted something and it wasn't available, I think I'd probably scream the hospital down. I'd have no tolerance for, you know in this day and age, I wouldn't hear 'no' to often and I if I wanted

something and I couldn't get it I think I'd lose the head altogether. I would have thought in this day and age an epidural, public or private, was a given right.

4: You know there is some difference when you have the epidural. You go from being an animal to just this calm person, and you're just able to enjoy it more.

3: What a fabulous day you're having!

4: Yeah and you can have a little snooze!

3: I was like 'ah that was lovely, we'll have to do that again'! But after the first baby we were like 'no way'. That was horrific. Even after six weeks we could hardly look at each other!

1: I suppose I'm naive because this is my first and I haven't a clue what the pain is going to be like, but in ideal world I'd love not to have the epidural because I'm all about recovery time. And I don't like that the needle goes into your back, I'm a bit squeamish!

4: You don't care! So was I, but you don't care, even if they're going to cut you open with a hatchet!

1: So yeah I'll be open to whatever.

I: So suppose there was a metrnity unit here that didn't have the epidural on site, like a midwifery-led unit? If you were interested in delivering in a unit like that and you wanted the epidural last minute you could actually be transferred to the building next to the unit you are delivering in, would you be comfortable with that?

4: No

3: I think I could. Not for my first baby, definitely not for my second baby, but at this stage yeah I'd be interested in giving it a go. Because I think the midwives can give you a huge level of support. At the moment I think it seems to be the case that the midwives role and the consultants role they are not cohesive at all, so if you had the midwives who were doing there own thing and they didn't feel as if they were answering to a doctor. Whereas if it was a midwifery-led unit I think they'd go all in and I think that you would have a better chance of getting through it without an epidural.

I: So not much of an appetite for that?

Most: No!

I: Would you like to be involved in the decision-making around your labour? Or to what exten would you like to be involved?

4: Not really. And I even think birth plans...I have no interest in birth plans because the day that you go into labour something completely different can happen, and I think the midwives or the professionals I am happy to leave it all up to them. Obviously they ask you things like do you want pain relief, or do you want pethidine, or whatever, and it is nice to make those decisions, but I'm happy to leave the professionals make most of the decisions.

3: I think I would like the opportunity to make more of the decisions but you would have to be getting more of information from them. You know I find that maybe it is because it is second nature to them that they know what position you baby is in, they know how long you're going to be, I mean they can tell just by looking at you a lot of

the time. But they don't tell you, for whatever reason, maybe it's a good thing that they don't tell you or maybe it's a bad thing, but if you want to make an informed decision then you have to be informed. They'd have to be telling you an awful lot more before you could make any kind of constructive decision.

2: I think what is surprising is that I am 30 weeks pregnant now and no midwife, no consultant or doctor, no GP, absolutely noone, has discussed anything with me. I I wonder are they ever going to talk to me or will I arrive in on the day and they fill me in then and that might be ok too. But I have never been told anything.

1: I'm happy for the professionals to make all the decisions. They've been to college and delivered hundreds of babies, maybe thousands. But the one thing I thought was weird was the antenatal classes, like why do you need to have them? Why aren't they part of the package? I missed out on the public ones because I didn't know that you had to ring when you are 10 weeks pregnant to get them, so we had to pay for them, so that was another €140. And there is a big list of what they're going to cover, but you would really expect that to be covered in your maternity care with the hospital.

3: I didn't find it very helpful here (antenatal classes). The only thing I cam away with was the length of the tube for the epidural. They handed one around and I took one look at it and I thought 'no bloody way', and I think that's how I managed to get to 7cms without it. It was because of the fear! They showed us the forceps and the different sizes and those are things that you don't need to know about. I mean I had a fear in my mind going in about the whole thing and sure of course we had them all! But the thing is if they had paid more attention to things like the physio, your pelvic floor, and your recovery time. So there is a lot more information that could be given that would be less terrifying!

I: So more information on certain things, and less on others?

3: Well I mean you could have information without your wits being scared out of you. I mean I don't think there is any need for anyone to see an epidural needle or a forceps.

4: You know maybe there are some people who would like to see those gruesome things!

I: How important is the attitude of the health care provider towards you? Would you like them to considerate towards you, or do you expect them to be or act in a certain way? Or have you even given it any thought, is it something you just assume?

3: Yeah, you assume it, and then you meet someone who is not and it's horrific. Last year when we had the miscarriage there was a consultant that came up to do a scan and he had absolutely no social skills whatsoever. I don't know how he is allowed out in public, it was absolutely horrifying. We came out of there almost as upset about his attitude as we were about the baby being gone. Everyone else has been outstanding. I mean you might meet someone and your personalities don't click but they're doing their job to the best of their ability and they have plenty of respect for whoever they are seeing, but that guy. You know it puts things into perspective in the sense that you do realise that you take it for granted that you will be treated a certain way.

4: You expect them to be empathetic towards you and nice, and say 'I understand what you are going through'. I remember the first midwife I had up in the Erinville was horrible, and I was only young, but I thought that she was cruel to me. And then I remember the second time, the girl here, she was gorgeous, I remember her name and she was fantastic. And she talked about stupid things, because you know you'd be a

little bit out of it and talking gibberish, but she never said 'oh, be quiet, you're talking gibberish', she just continued to talk gibberish to me! It made me feel normal, and I remember her perfectly. Friendly. Woman-to-woman!

3: They are great in general, and you would have good banter. But it's astonishing when you meet someone like that guy.

1: Yeah I would just like them to be empathetic, and not patronising. Like if you're acting up because it's your first and you haven't a clue and you're freaking out, I wouldn't like them to go 'oh would you cop yourself on'. So I would like them to put themselves in your shoes.

4: Yeah you want to be special, like you're the only woman in the world at the moment giving birth! Because you do feel important and you do feel amazing after giving birth.

2: Yeah I think I'd be the same, once that they are courteous and kind, and again if they weren't I'd have so little tolerance that I'd be like 'actually, no, you're driving me mad, get out!' But I don't anticipate that happening. I would imagine that 99.99% of the people that I meet would be ok. I mean I wouldn't be very intolerant of people so as long as they are in some way pleasant, and I often say I'll turn into a bitch or a baba, where I'm not sure which one I'm turning into. Like after my colonoscopy I asked my consultant which one did I turn into and she said an absolute baba!

4: To encourage you the whole time. Because a lot of of women will say something like I can't do this anymore, and what you need to hear is 'of course you can, go away out of that, you're grand, come on!'

I: Ok great. So, CUMH has all neonatal services like the paediatrician and neonatal unit, and what I'm wondering is is it important to you to have all of those services on site?

All: Yeah.

I: Because up until recently with the arrival of CUMH certain maternity units didn't have all of those services, and you would have to be transferred. Would you be inclined to pick a hospital with those services?

4: Yeah it is the whole package here.

3: I think it was the Erinville that did have them because that was why we went with the consultant that we did on our first baby because he based there. It is very important. Our first baby was a forceps baby and she had to be checked over by a paediatrician when she was born and he was there in the room so it made a big difference. And to think that if she had to go somewhere, to think that she was only going up a flight of stairs as opposed to going across town because you are in no condition to...and you can imagine trying to send your husband off with your baby and then trying to pull yourself together to get some information, it would be awful.

I: And what about in a midwifery-led unit that would be attached to the main consultant-led unit. I mean with any maternity unit you may have to travel to access these neonatal services. But would you be inclined not to go with a midwifery-led unit because the distance might appear further than a consultant-led unit?

3: Would they all be on the same grounds?

I: Yes they would all be on the same grounds. But the neonatal services would be in the consultant-led unit, which is attached to the midwifery-led unit.

4: No, I'm comfortable with having everything here under one roof.

3: I don't think I'd mind once it is on the same campus.

2: It's not something I would have considered. I don't think on your first baby you actually think about afterwards too much. So I suppose it is when you are here and you see a sick baby then you become more familiar with the idea that things can go wrong. You know at the moment it is all about getting to that day than thinking about what comes afterwards, so it wouldn't be a big consideration for me for our first baby. But I Imagine for your second or third baby you would be a little more aware. But I think if it was on campus I'd be ok, I'd be happy enough knowing that the services are available within an easy enough distance. I wouldn't like the idea of having to travel across the city or county. The worst scenario is having a child that has to go to Crumlin.

4: Yeah I wouldn't feel comfortable even going to another building. I would like to have the baby close to me. I remember when I had my first baby and there was overcrowding in the Erinville and they came around to all the new moms and asked would they be willing to move to St. Finbarr's and I said 'absolutely no way'. I don't think you're in any fit state to walk anywhere afterwards, I could barely walk to the bathroom afterwards.

[3 leaves as agreed at 12pm due to antenatal appointment]

I: Have you given any thought to how long you would like to stay in hospital after you have given birth?

4: Yeah, as little time as possible. The first baby I'm not going to talk about because it was in the Erinville and it was different, but the second baby I had him at 6.30 on a Friday morning and I came out on Saturday afternoon because I went public and there

was three other babies in the room so I didn't get a wink of sleep, not a wink, because of the other babies crying. And it might sound stupid but I wanted to come home, have a glass of wine and watch X-Factor. I know it may be stupid but I wanted to be comfortable in my own bed, in my own home so I just came out the next day and I was able to do that because it was my second baby. I think for your first you are kept in for 2 or 3 nights or something and I just couldn't. It was a beautiful experience and I love the hospital and everything but when there is other newborn babies crying through the night and you've just gotten yours to sleep I just couldn't cope with it at all.

3: Yeah I'd be the same. For my first baby I stayed in for the length of time that you stay in, I think it is 3 days or something. And I was very happy to do that to be honest. I was loving the painkillers and the care. And like you know when you come home with your first baby you are a bit vulnerable, you don't really know what you are doing and you suddenly realise the enormity of the task. But on my second baby, like Amy, I had her on a Friday and it was New Years day and I was going to come home on Saturday morning even though I had my own room and everything was lovely, it was the quietest place. And I thought I would come home on the Saturday because my little girl was at home but they persuaded me to stay until Sunday just to give yourself a chance, so I did and I went home on the Sunday morning. But to be honest I would have been fit enough to go home on the Saturday. I think once you're after your first baby really the idea is to go home as fast as you can...

4: ...yeah you know what to expect...

3: And you'd be conscious as well, and especially this time as my little girl is after starting school so there would be a school run, to collect her and drop her and

whatever, and there's a smaller child and then to have my husband coming up and down to the hospital then to visit it would just be a lot easier and faster then to get home. And it's not so much that I'm going home to do stuff because god help us but I won't be looking at the ironing for quite a while, but it's just to be at home, and I think your children are a lot happier when you're at home, they do miss you when you are away overninght.

1: Yeah I suppose I'd like to stay the length, 3 days. And I hope that I get a private room because I am private...

4: ...and yeah I think that would have made the difference for me. I mean I chose to go public because we couldn't afford to go private but if I did have the private room it would probably make the difference because at least then it's only your baby that you're listening to and you can sleep. I just found the other babies crying just did my head in, I couldn't cope with it at all.

3: Because you would be responding to every cue from every child.

4: I rememvber I was so tired because I hadn't slept, I was in labour for 2-3 days, and I remember trying to ring my husband the next day and I was looking at my phone and the phone was actually doing this infornt of me [shakes her funny intimating that she couldn't see it!]. I was just so, so tired I had to go home.

I: Now some hospitals have introduced this new scheme called the DOMINO scheme and it allows women to go home within 3-6 hours of giving birth. Is that something you'd have an iterest in?

4: If everything went ok and the baby was ok I think I'd be ok with that.

3: I don't think you can with the epidural.

4: Oh yeah. Well then yeah I suppose if I didn't have the epidural and everything went ok then yeah

3: Yeah I think I'd be happy to go home shortly after if they said your baby is perfect. Certainly I'd be happy to go home after one night in hospital, you know more for observation of the baby than me. But yeah I think 3-6 hours would be ok if you were confident evrything was ok.

1: Yeah my friend used the DOMINO scheme and she was in one of the hospitals in Dublin. And it was her first baby so I was really surprised because she had the baby on a Friday morning and she was home Friday night. I just wouldn't even consider it for my first baby.

4: Yeah not for first I wouldn't

1: But I think a midwife comes in for a couple of hours every morning.

3: But for me it would depend on whether you want a paediatrician to see your baby. With my last baby because she was born on New Years day there was really nobody around, which was lovely in many ways, but because she was a healthy baby they didn't have a paediatrician in the room. And I don't know did he come that night, but he came the following morning to have a look at her. And I was really glad because she was throwing up blood during the night and if it was my first baby I would probably have been running off to A&E with her, but I knew many people who this had happended to so it was just something that can happen to babies, they cough up what they swaloow during the delivery. But I was so glad that he saw her and he just put her to sleep on top of my tummy to let her get it up. But I think if I had gone home

and that had happened I would have been stressed beyond belief. So I would say there is a value in staying in on your first.

I: Ok great, I have one last question. And I'm going to change tack a little bit and I'm going to give you a choice card that contains three maternity care packages and I want you to tell me which is your preferred package and which one is your least preferred. It is described pretty much in terms of what we have discussed here today. For instance on the left hand side you will see midwifery-led services where each package is described in terms of whether you have one-to-one care for the duration of your labour, or shift rotation, or a team of midwives. So it is basically it is described using the different aspects of care that we talked about today. So I want you tell me which one is your preferred and which one is your least preferred.

4: It's hard. I wish I could swap them around!

3: The first one is like you are describing CUMH!

4: Except for the room: a clinical setting

3: It kind of is.

4: I suppose it is

I: You're dead right. Basically what I have done with maternity care package A is I have described the public system, or a CLU, then B is a MLU and C is perhaps your worst case scenario, maybe twenty years ago. I guess what I want to find out is does anyone want to go with the public system or the MLU.

4: A

I: So A and the C as worst case scenario?

ALL Yeah

3: Yeah I think that's how it's looking. The only thing that is swaying me towards B is how relaxed it is, and being kept informed and consulted That has an awful lot to it. To be honest B sounds nice too.

I: Now what I'm trying to find out is how much would you value the CLU. Now imagine that, comparing A with your least preferred scenario, as in C, and assuming C is free, but if you wanted maternity care package A, what I want to know is if you had to pay for what is the maximum you would be willing to pay to receive maternity care package A. And we are assuming that your delivery goes well and everything is fine, if you had to pay for A, is there a value or maximum amount that you would put on it? Now you should note that maternity care is free and will remain free. I'm just trying to find out if there is a value you would place on care in a public unit, or CLU.

1: Do you have to pay out-of-pocket or could you claim it from your health insurance?

I: First I'd like you to think about it in terms of having to pay out of your own pocket.

4: Definitely compared to C I'd be willing to pay for A just to avoid C.

3: There's not a whole lot of difference between that there and what you get as a private patient. At the moment it's €3,000 on top of what your health insurance pays.

4: That's a lot of money.

3: That's a lot of money. But it's your child you know.

I: Now it wouldn't be as intensive as the private care package because you're getting continuity of care so there is less involved in the public package.So would you pay as much as private, or pay less?

1: Pay less yeah. Maybe €1,000 or €1,500.

4: Yeah that's what I was thinking, maybe a €1,000.

3: Yeah because the level of qualification is less in the public.

I: Now suppose it is between the MLU and maternity care package C. Now there are probably less services involved again. What would you be willing to pay for that?

3: I actually think that both of those options are my preferred options, I couldn't choose between them.

I: It's a really tricky question and I'm sorry for throwing you!

1: It is, because you know when you are getting the bill back from the VHI. Like a few years ago I had my tonsils out and I got the bill that had been paid by the VHI and the cost for the day was huge.

3: So when you see it back what the the health insurer pays it's phenomenal. It's probably like the three grand again, and that's with everything going fine.

4: And also because I've gone public with my other two babies I find it very hard to justify paying.

I: So maybe if I phrased it in terms of taxes. We already pay for health care through taxes. How much of your taxes would you like to spent on maternity care?

3: I can just imagine all the people that would say 'I'm not paying for other people to have babies!'

4: Yeah, men wouldn't want to have to pay.

3: Actually I think men would be fine about it. But I think there would be some women whom wel all know that would say'I'm not paying for them!'

1: I suppose you would want to get value out of the tax that you would pay.

3: Wouldn't that be a good idea if they directed some of women of childbearing years taxes towards maternity services, andolder men's s taxes towards prostate services.

1: It would probably be a minefield though, just say if you couldn't have children.

4: Yeah that was my thought exactly.

3: They could have options though as to where they want their tax to go.

I: So suppose you had that option and you could say that you want your taxes to go to maternity services. Is there a value you could put on that?

1: I think money should be spent like it is in Cork. Dublin sounds like a nightmare. There should be money put into bring other hospitals up to the standard like Cork is.

3: You could really imagine that going down well with the Cork people given how Cork people are so localised. You would have to regional taxes like they do in Germany. And then we suddenly become a federal state.

I: So is there a value then?

3: I don't think you can put a value on it. It is such an emotive thing. I mean having a baby, the most important thing you can do for them is to give them a good start.

I: Now suppose I said to you that it costs the government in the public system €650 for the whole package of care in a CLU, including antenatal care and two days in hospital postnatally, would that sound about right? Would you be willing to pay that?

4: Yeah that sounds about right.

3: Yeah I just can't believe that they are getting it for that.

1: Is that how much it is?

I: Yeah that's how much it costs the government. That's for a natural birth, nothing else.

1: I would have thought it would cost more.

4: Yeah I'd be willing to pay that.

I: Now for a MLU it is slighty less expensive at €570. Would that be something you'd be willing to pay for a MLU, or would you be willing to pay more or less?

1: Yeah I'd be willing to pay that.

3: Yeah I'd be willing to pay that, yeah slightly less on the basis that there are slightly less services available.

I: Some of the figures I have been getting from other sessions is around €300 for th MLU and €500 for the CLU, which is pretty much what you have said here

3: The thing is with the midwifery one then if you needed extra services then would you have to pay for them?

I: No, no you wouldn't.

3: It just sounds awfully cheap. Are they taking into consideration all the fancy scanning machines, all the medicines, even keeping the building running.

I: Yeah all that is factored in, everything is factored in and discounted so adjusting for iflation and things like that. And anything that would be shared in a CLU and MLU would be discounted altogether like the hospital bed. So when it gets down to the nitty gritty of it that's how much it would cost: €650 for a naturakl birth with no complications.

3: It's crazy then when you think about what they are charging the insurance companies and the levies that you pay.

I: So which phrase do you prefer: to pay out of pocket or pay through taxes?

1: It's probably easier to phrase it in terms of paying personally becasue not everyone is going to have a baby.

3: Yeah, possible.

I: So out of pocket?

4: I think in terms of taxes because you don't feel like your out of pocket.

3: It would be nice to know that the taxes that you are paying is being put to something that you are benefitting from.

I: That's really it. I have no more questions to ask you. Is there anything that you would like to add? Are there any topics that are important to you that I may have missed?

All: [No]

I: Ok, that's it! Thank you very much....

APPENDIX B.1

MAMS Invitation letter, reminders and information leaflet

NATIONAL PERINATAL EPIDEMIOLOGY CENTRE

Coláiste an Leighis agus na Sláinte
College of Medicine and Health

Roinn na Cnáimhseachas agus Liacht Bhan
Department of Obstetrics and Gynaecology

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www.ucc.ie/en/npec

Professor R.A. Greene, MB, MRCOG, MRC
Director

14th March 2014

Dear Ms. ,

We are writing to ask you to participate in a new and exciting study on women's preferences for maternity care in Ireland, called Maternal Assessment of Maternity Services (MAMS). MAMS is the first study of its kind to collect information on women's preferences for maternity care. It is designed to give women a voice in the future planning of maternity care in Ireland.

The study is an initiative of the National Perinatal Epidemiology Centre (NPEC). The NPEC is part of University College Cork and is based in Cork University Maternity Hospital (CUMH). The NPEC is committed to improving the health and wellbeing of mothers and babies in Ireland.

Maternity care is evolving in Ireland, and at the NPEC we believe that women should have a say in how maternity care is packaged and delivered. Yet, very little is known about what women want from maternity care. MAMS aims to capture women's preferences for different aspects of maternity care including antenatal care, postnatal care, and care during labour (see information leaflet enclosed). At the NPEC, we believe that maternity care should be shaped around what women want. This is a great opportunity for you to have your say about maternity care.

If you would like to participate in this study please complete the enclosed questionnaire and return it to us in the pre-paid envelope provided as soon as possible. If you decide that you do not wish to participate in the study please return the "Opt-out Consent Form" (below).

The survey takes approximately 15-20 minutes to complete. To show our appreciation for your participation in this survey you will be entered into a prize draw to win an *iPad*.

Please note that you have been chosen to take part in this study because you recently booked to deliver at CUMH, where your details were *randomly* selected from the hospital's booking records. We would like to learn more about your preferences for maternity care. Sometimes mothers and babies have traumatic and difficult experiences during pregnancy, and undertaking a questionnaire for some women who have had a

traumatic maternal experience can be difficult. However, if you have had a traumatic experience, your input is still equally important to us. MAMS is a study about women's preferences for maternity services, whether women have had several experiences with maternity care or none at all. By participating, you will help us to learn about the aspects of care that are important/not important to you.

MAMS is inviting 800 women from around the country to give their views on maternity care. All information collected in the course of the study is **completely confidential** in line with the Data Protection Act 1988/2003 and will only be used for research purposes. In fact, we do not even ask your name in the questionnaire. Instead we assign every woman with a Study ID. This provides all respondents with complete **anonymity**.

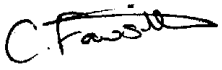
Ethical approval for this study was granted to us from the Clinical Research Ethics Committee, and the Division of Obstetrics and Gynaecology in CUMH. If you would like to find out more about the study or your involvement in it, please do not hesitate to contact our lead researcher, Mr. Christopher Fawsitt, on telephone at (021) 4205060 or by email at c.fawsitt@ucc.ie. Alternatively, please visit our website (http://www.ucc.ie/en/npec/projects/mams/) for further information about the study and prize giveaway. The website also provides contact details for and useful links to important and relevant maternity care services.

We would like to thank you for taking the time to read this letter. We would also be extremely grateful for your participation in this study. It is important to note that participation is voluntary. If you do not wish to participate there is no penalty and your treatment and care will not be affected in any way now or in the future.

Thanking you in advance.

Yours sincerely,





Professor Richard A. Greene
Director
National Perinatal Epidemiology Centre

Mr. Christopher Fawsitt
Email: c.fawsitt@ucc.ie
Tel: (021) 4205060

✂----------

Opt-out Consent Form

Study ID: 1A001

If you do not wish to participate at all in the survey please tick this box ☐ and return this slip to us in the postage paid envelope provided.

NATIONAL PERINATAL EPIDEMIOLOGY CENTRE

Coláiste an Leighis agus na Sláinte
College of Medicine and Health

Roinn na Cnáimhseachas agus Liacht Bhan
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Professor R.A. Greene, MB, MRCOG, MRC
Director

28th March 2014

Dear Ms. ,

We wrote to you on March 14th to request your participation in a research project called Maternal Assessment of Maternity Services (MAMS). Since we haven't heard back from you, we are sending this gentle *reminder* about the survey. We would be extremely grateful for your participation.

MAMS Ireland is the first study of its kind which aims to capture women's preferences for maternity care. We believe that maternity care should be shaped around what women want. This is your opportunity to have your say as the results of this study will be used to inform health care providers and policy makers on the different aspects of maternity care that are important to women. With your help we hope to deliver a maternity care system that reflects your needs and preferences.

You have been chosen to take part in this study because you recently booked to deliver at CUMH, where your details were randomly selected from the hospital's booking records.

If you would like to participate in this study please complete the questionnaire and return it to us in the pre-paid envelope provided in our previous letter. If you do not wish to participate in the study please return the "Opt-out Consent Form" (overleaf). If you would like to find out more about the study or your involvement in it, please do not hesitate to contact our lead researcher, Mr. Christopher Fawsitt, on telephone at 021 4205060 or by email at c.fawsitt@ucc.ie, or visit our website: http://www.ucc.ie/en/npec/projects/mams/.

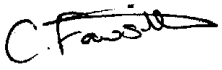
To show our appreciation for your participation in this survey you will be entered into a prize draw to win an *iPad*. The survey takes approximately 15-20 minutes to complete.

We would like to thank you for taking the time to read this letter. We would also be extremely grateful for your participation in this study.

Thanking you in advance.

Yours sincerely,





Professor Richard A. Greene
Director
National Perinatal Epidemiology Centre

Mr. Christopher Fawsitt
PhD Candidate (Health Economics)
National Perinatal Epidemiology Centre

✂----------

Opt-out Consent Form

Study ID: 1A001

If you do not wish to participate at all in the survey please tick this box ☐ and return this slip to us in the postage paid envelope provided.

NATIONAL PERINATAL EPIDEMIOLOGY CENTRE

Coláiste an Leighis agus na Sláinte
College of Medicine and Health

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www.ucc.ie/en/npec

Professor R.A. Greene, MB, MRCOG, MRC
Director

11th April 2014

Dear Ms. ,

We wrote to you recently to request your participation in a research project called Maternal Assessment of Maternity Services (MAMS). Since we haven't heard back from you, we are sending this *gentle* reminder about the survey. We would be extremely grateful for your participation.

MAMS is an initiative of the National Perinatal Epidemiology Centre (NPEC) and is being conducted in collaboration with CUMH.

Maternity care is evolving in Ireland, and at the NPEC we believe that women should have a say in how maternity care is packaged and delivered. To date women have never been consulted about their preferences for care, yet women are the dedicated recipients of maternity care and their views should be accounted for. We intend to take the results of this study to our policy makers and health care providers alike to ensure that any future decisions regarding the provision of maternity care can account for your views and preferences. With *your* help we hope to deliver a maternity care system that reflects *your* needs and preferences.

To show our appreciation for your participation in this survey you will be entered into a prize draw to win an *iPad*. The survey takes approximately 15-20 minutes to complete.

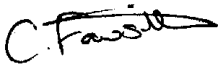
If you would like to participate in this study please complete the questionnaire and return it to us in the pre-paid envelope provided in our previous letter. If you do not wish to participate in the study please return the "Opt-out Consent Form" (overleaf).

If you would like to find out more about the study or your involvement in it, please do not hesitate to contact our lead researcher, Christopher Fawsitt, on telephone at 021 4205060 or by email at c.fawsitt@ucc.ie or visit our website: http://www.ucc.ie/en/npec/projects/mams/.

We would like to thank you for taking the time to read this letter. We would also be extremely grateful for your participation in this study.
Thanking you in advance.

Yours sincerely,





Professor Richard A. Greene
Director
National Perinatal Epidemiology Centre

Mr. Christopher Fawsitt
PhD Candidate (Health Economics)
National Perinatal Epidemiology Centre

✂----------

Opt-out Consent Form

Study ID: 1A001

If you <u>do not wish to participate at all</u> in the survey please tick this box ☐ and return this slip to us in the postage paid envelope provided.

NATIONAL PERINATAL EPIDEMIOLOGY CENTRE

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www.ucc.ie/en/npec

Professor R.A. Greene, MB, MRCOG, MRC
Director

25th April 2014

Dear Ms. ,

We wrote to you recently to request your participation in a research project called Maternal Assessment of Maternity Services (MAMS). Since we haven't heard back from you, we are sending this *final* reminder about the survey. We would be extremely grateful for your participation.

If you would like to request a new copy of the survey please send a text message with your Study ID (see overleaf) to the NPEC work mobile number 086 0289967, or telephone 049 4376331 and leave a voicemail with your Study ID.

MAMS is an initiative of the National Perinatal Epidemiology Centre (NPEC) and is being conducted in collaboration with CUMH.

To show our appreciation for your participation in this survey you will be entered into a prize draw to win an *iPad*. The survey takes approximately 15-20 minutes to complete.

If you would like to find out more about the study or your involvement in it, please do not hesitate to contact our lead researcher, Christopher Fawsitt, on telephone at 021 4205060 or by email at c.fawsitt@ucc.ie, or visit our website: http://www.ucc.ie/en/npec/projects/mams/.

We would like to thank you for taking the time to read this letter. We would also be extremely grateful for your participation in this study.

Thanking you in advance.

Yours sincerely,

Professor Richard A. Greene
Director
Economics)
National Perinatal Epidemiology Centre
Epidemiology Centre

Mr. Christopher Fawsitt
PhD Candidate (Health
National Perinatal

✂----------

Opt-out Consent Form

Study ID: 1A001

If you do not wish to participate at all in the survey please tick this box ☐ and return this slip to us in the postage paid envelope provided.

NATIONAL PERINATAL EPIDEMIOLOGY CENTRE

UCC Coláiste na hOllscoile Corcaigh, Éire University College Cork, Ireland

MAMS Ireland – Information Leaflet

Maternal Assessment of Maternity Services in Ireland 2014

Invitation to take part in a research study:

You are invited to take part in a study entitled 'Maternal Assessment of Maternity Services in Ireland' (MAMS Ireland). The study is being conducted by the National Perinatal Epidemiology Centre (NPEC), University College Cork, in conjunction with Cork University Maternity Hospital (CUMH).

What is the MAMS study?

MAMS is an initiative of the National Perinatal Epidemiology Centre (NPEC), which is being conducted in collaboration with CUMH and several other maternity units across Ireland. MAMS aims to capture women's preferences for different aspects of maternity care including antenatal care, postnatal care, and care during labour. It is designed to give women a voice in the future planning of maternity care.

What is my role?

You are asked to complete the enclosed questionnaire and return it to us in a pre-paid envelope provided. The survey takes approximately 15-20 minutes to complete. We are interested in the different aspects of maternity care that are important/not important to you.

What sort of questions do you ask me?

We ask you:

- about your obstetric history, if any;
- about the importance to you of different aspects of maternity care;
- to choose between hypothetical packages of maternity care;
- general questions about yourself.

What are the benefits and risks?

There are no anticipated risks associated with taking part in this study. The benefit of taking part in this study is that any future changes in the way maternity care is provided in Ireland can account for women's preferences for care. At the NPEC, we believe that maternity care should be shaped around what women want. ***To show our appreciation for your participation in this survey you will be entered into a prize draw to win an iPad***. The draw will take place shortly after the data collection phase. The winner will be identified by her Study ID and the result will be posted to our website (link below).

Can I change my mind?

If, at any point, and for any reason, you wish to withdraw from the study, then you may do so.

What happens to the information?

Any information that we obtain from this study about you will be *anonymous* and *confidential*. In the survey, we do not ask your name, so all information provided is completely anonymous. Individual Study ID's are assigned to each woman; thus, no names or unique identifiers or other data elements that could identify individuals from records in the study will be available to the research team.

If you have any questions or would like further information, please feel free to contact the primary researcher, Christopher Fawsitt, by telephone at (021) 4205060 or via e-mail at c.fawsitt@ucc.ie, or visit http://www.ucc.ie/en/npec/projects/mams/ for more information about the study

APPENDIX B.2

Ethical Approval

UCC
Tel: + 353-21-490 1901
Fax: + 353-21-490 1919
Coláiste na hOllscoile Corcaigh, Éire
University College Cork, Ireland

GOISTE EITICE UM THAIGHDE CLINICIÚIL
Clinical Research Ethics Committee
Lancaster Hall,
6 Little Hanover Street,
Cork,
Ireland.

Our ref: ECM 4 (t) 03/04/12

9th March 2012

Dr Brendan McElroy
Lecturer
Department of Economics
Aras na Laoi
Western Road
Cork

Re: A mixed methods study exploring maternal preferences for various models of maternity care.

Dear Dr McElroy

The Chairman approved the following:

- Interview Guide.

Full approval is now granted to carry out the above study.

Yours sincerely

Dr Michael Hyland
Chairman
Clinical Research Ethics Committee
of the Cork Teaching Hospitals

The Clinical Research Ethics Committee of the Cork Teaching Hospitals, UCC, is a recognised Ethics Committee under Regulation 7 of the European Communities (Clinical Trials on Medicinal Products for Human Use) Regulations 2004, and is authorised by the Department of Health and Children to carry out the ethical review of clinical trials of investigational medicinal products. The Committee is fully compliant

An tOspidéal Náisiúnta Máithreachais
The National Maternity Hospital
Founded in 1894

Sráid Holles, Baile Átha Cliath 2 • Holles Street, Dublin 2.
Telephone: (01) 6373100. Fax: 6766623. Web: www.nmh.ie



Máistir/ Master: Dr. Rhona Mahony

20th March 2014

Mr. Christopher Fawsitt
National Perinatal Epidemiology Centre
College of Medicine and Health Science
Department of Obstetrics and Gynaecology
Cork University Maternity Hospital
Wilton
Cork

Re: Maternal Assessment of Maternity Services in Ireland (MAMS Ireland)

Dear M. Fawsitt,

Thank you for your letter dated 4th March 2014. I agree that the National Maternity Hospital headed paper can be used for the covering letter, information leaflet and subsequent correspondence. If you require a signature then I am prepared to allow my signature to be used.

Thank you for the amendments to the study and it now has Ethical approval.

Kind Regards

Yours sincerely

pp

Dr. John Murphy
Consultant Paediatrician
Chairman
Ethics Committee

Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

Regional Consumer Affairs
HSE Dublin North East
Bective Street, Kells
Co. Meath

Tel: +353 (0) 46 9251200
Fax: +353 (0) 46 9251774
Email: appeals.dne@hse.ie

11th July 2013

Mr Christopher Fawsitt
National Perinatal Epidemiology Centre
5th Floor
Cork University Maternity Hospital
Wilton
Cork

Re/ Research Study Proposal:
"Maternal Assessment of Maternity Services in Ireland"
REC Meeting Date: 20th June 2013

Dear Mr Fawsitt

I wish to acknowledge receipt of your email correspondence of 10/07/13 in response to issues raised by the REC at their meeting on the 20th June 2013.

I can confirm that you have met all the conditions of the Committee and you may commence your study.

This will be formally noted at the REC meeting on the 5th September 2013.

Yours sincerely,

Dr. Brendan MacMahon
Chairperson
Research Ethics Committee

AVONMORE
20 AUG 2013

Copied to/ **Ms Bridget Clarke, General Manager, Cavan/Monaghan Hospital Group**
Dr Alan Finan, Clinical Director, Cavan General Hospital
Ms Margaret Swords, General Manager, Louth/Meath Hospital Group
Ms Marina O'Connor, A/DON, Our Lady of Lourdes Hospital, Drogheda
Prof Richard A Greene, Professor of Clinical Obstetrics and Director of National Perinatal Epidemiology Centre, 5th Floor, Cork University Maternity Hospital, Wilton, Cork

Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

University Hospital Galway
Ospidéal na h-Ollscoile, Gaillimh
GALWAY UNIVERSITY HOSPITALS

5th June, 2013

Professor Richard A. Greene,
Director,
National Perinatal Epidemiology Centre,
University College,
CORK.

Dear Professor Greene,

Thank you for your letter dated the 27th May, 2013 in which you requested our support in relation to an assessment of Maternity Services in Ireland (MAMS Ireland).

We would be very happy to co-operate with you in relation to this survey.

With best wishes,
Yours sincerely,

Dr. Geraldine Gaffney,
Clinical Director,
Womens' and Children's Directorate.

To Christopher
Fr bb

APPENDIX B.3

Maternal Assessment of Maternity Services in Ireland 2014

SECTION ONE – Your Delivery: Past and Future

1. **By filling out this questionnaire and ticking this box ☐, you are indicating that you have read the information leaflet and are agreeing to participate in this study.**

2. **Please write in the name of the maternity unit where you plan to have your baby**

   _____

3. **Please state whether it is an obstetric unit or midwifery-led unit.**
   (Please tick *one* box)

   An obstetric unit is a clinical location where maternity care is provided by a team of obstetric doctors and midwives, whereas a midwifery-led unit is a clinical location where maternity care is provided solely by midwives and no obstetric doctors are present.

   Obstetric unit….☐[1] Midwifery-led unit....☐[0]

4. **Is this your first baby?** (Please tick *one* box)

   Yes..... ☐[1] *Go to Q12* No.....☐[0]

5. **How many other babies have you had?**

   I have had _____ other baby/babies

6. **Please indicate the number of times you have given birth in the following locations:**

   Obstetric unit _____

   Midwifery-led unit _____

   At home (planned) _____

7. **For your last pregnancy, how did you receive your maternity care?**
   (Please tick *one* box)

   Publicly..... .....☐[1]
   Semi-privately .....☐[2]
   Privately .....☐[3]

9. **Have you ever delivered by Caesarean section?** (Please tick *one* box)

   Yes .....☐[1] No.....☐[0]

   If yes, please indicate the number of times you delivered by Caesarean:

   I delivered by Caesarean _____ time(s)

10. **During any of your previous pregnancies, did you have any of the following complications?** (Please tick *all* that apply)

    Raised blood pressure (pre-eclampsia) ☐[1]
    Gestational diabetes (insulin treated)....☐[2]
    Intrauterine growth restriction.....☐[3]
    Placenta praevia .....☐[4]
    None of the above.....☐[5]
    Other, Please specify:
    _____

11. **Have you ever participated in the Domino scheme?** (Please tick *one* box)

    The Domino scheme is a relatively new scheme that offers women the option to give birth outside of a hospital environment, either at home or in a special, more homely, 'birthing room' within the hospital, whilst still having access to a hospital based midwife team.

    Yes ..... ☐[1] No.....☐[0]

12. **Have you ever participated in the Early Transfer Home scheme?**
    (Please tick *one* box)

    The Early Transfer scheme allows women to return home within 24 hours of giving birth.

    Yes ..... ☐[1] No.....☐[0]

13. **Do you plan to participate in the Domino scheme or Early Transfer Home scheme for your upcoming delivery? (If yes, please specify; see Q 10 and 11 for description of both schemes)** (Please tick *one* box)

    Yes ..... ☐[1] No.....☐[0]

    Please specify: _____

SECTION TWO – Your preferences for maternity care

14. Certain aspects of maternity care can vary, such as continuity of care, or access to pain relief. The following lists 5 different aspects of maternity care. Please indicate your preferred scenario for each aspect of care (Please tick *one* box for *each* aspect of care, 1-5):

Your Preferred Scenario

1. Continuity of carer for the duration of your pregnancy and labour

a) You are guaranteed continuity of care with the same midwife ..... ☐1
b) You are *not* guaranteed continuity of care with the same midwife ..... ☐2

2. Involvement of obstetric doctors during labour

a) Obstetric doctor(s) will be involved in your care if a complication arises ..... ☐
b) Obstetric doctor(s) will be involved in your care if a complication arises, but you will have to be transferred to an alongside obstetric unit which is accessed through a corridor ..... ☐

3. Types of pain relief immediately available

a) Gas and air, Pethidine, and Epidural ..... ☐
b) Gas and air, Pethidine, and Birthing Pool ..... ☐

4. Your role in decision-making during labour

a) Medical staff (midwives/ doctors) keep you informed and involved in decision-making ..... ☐
b) Medical staff (midwives/ doctors) make all decisions for you, but keep you informed ..... ☐

5. Maximum length of stay in maternity unit after your delivery

a) 6 hours ..... ☐1
b) 24 hours ..... ☐2
c) 2 days ..... ☐3
d) 3 days ..... ☐4

15. When thinking about maternity care, how important are the following? (Please tick *one* box on *each* line)

	Level of importance			
	Very	**Quite**	**Somewhat**	**Not at all**
Continuity of care with a midwife	☐1	☐2	☐3	☐4
Involvement of obstetric doctors during labour	☐1	☐2	☐3	☐4
Access to pain relief	☐1	☐2	☐3	☐4
Your role in decision-making during labour	☐1	☐2	☐3	☐4
Length of stay after your delivery	☐1	☐2	☐3	☐4

16. Which of the following features of maternity care <u>matters the most to you</u>? (Please tick *one* box only)

Continuity of care with a midwife ..... ☐1
Involvement of obstetric doctors during labour ..... ☐2
Access to pain relief ..... ☐3
Your role in decision-making during labour ..... ☐4
Length of stay after your delivery ..... ☐5

SECTION THREE – Your preferred maternity care package

Please read the following section before answering the following choice questions.

You are due to have a baby. Where and how you would like to have your baby is up to you.

For the purposes of this questionnaire, you are asked to choose between different hypothetical packages of maternity care in each of the following 16 scenarios. Please note that these are hypothetical packages of care. They describe maternity care using important features of antenatal care, postnatal care, and care during labour. In each of the next 16 scenarios, these maternity care packages are somewhat varied. In each scenario, *please indicate your preferred maternity care package* (i.e. A, B, or neither).

We are also asking you to consider how much you would be willing to pay for each package of care. *Please note that maternity care is free, and will remain free*. What we are trying to find out is how much *value* you place on maternity care. One way to find out how much you value maternity care is to ask you *how much would you be willing to give up of your own money* to receive a particular maternity care service.

Please indicate your preferred maternity care service in each choice scenario.

A list of definitions of terms used in the choice scenarios is provided at the end of this booklet for your reference.

SCENARIO 1

Which maternity care service do you prefer (A, B, or Neither A nor B)?

	Maternity Care Service A	**Maternity Care Service B**
Guaranteed continuity of care with midwife	Yes	No
Involvement of obstetric doctors during labour	No	Yes
Types of pain relief immediately available	Gas and Air, Pethidine, and Epidural	Gas and Air, Pethidine, and Birthing Pool
Your role in decision-making during labour	You are informed, but not involved in decisions	You are informed and involved in decisions
Length of stay in hospital after birth	6 hours	2 days
Cost of care (out-of-your-pocket)	€1,000	€500

Which service do you prefer (A, B, or Neither A nor B)?
(Please tick <u>one</u> box)

A ☐ **B** ☐ **Neither A nor B** ☐

[Answer only If you selected 'Neither A nor B']

If you could only choose between A or B, which one would you choose?
(Please tick <u>one</u> box)

A ☐ **B** ☐

SCENARIO 2

Which maternity care service do you prefer (A, B, or neither A nor B)?

	Maternity Care Service A	**Maternity Care Service B**
Guaranteed continuity of care with midwife	Yes	No
Involvement of obstetric doctors during labour	No	Yes
Types of pain relief immediately available	Gas and Air, Pethidine, and Birthing Pool	Gas and Air, Pethidine, and Epidural
Your role in decision-making during labour	You are informed, but not involved in decisions	You are informed and involved in decisions
Length of stay in hospital after birth	2 days	3 days
Cost of care (out-of-your-pocket)	€500	€1,000

Which service do you prefer (A, B, or Neither A nor B)?
(Please tick <u>one</u> box)

A ☐ **B** ☐ **Neither A nor B** ☐

[Answer only If you selected 'Neither A nor B']

If you could only choose between A or B, which one would you choose?
(Please tick <u>one</u> box)

A ☐ **B** ☐

SCENARIO 3

Which maternity care service do you prefer (A, B, or Neither A nor B)?

	Maternity Care Service A	**Maternity Care Service B**
Guaranteed continuity of care with midwife	No	Yes
Involvement of obstetric doctors during labour	Yes	No
Types of pain relief immediately available	Gas and Air, Pethidine, and Birthing Pool	Gas and Air, Pethidine, and Epidural
Your role in decision-making during labour	You are informed, but not involved in decisions	You are informed and involved in decisions
Length of stay in hospital after birth	2 days	3 days
Cost of care (out-of-your-pocket)	€1,000	€500

Which service do you prefer (A, B, or Neither A nor B)?
(Please tick <u>one</u> box)

A ☐ **B** ☐ **Neither A nor B** ☐

[Answer only If you selected 'Neither A nor B']

If you could only choose between A or B, which one would you choose?
(Please tick <u>one</u> box)

A ☐ **B** ☐

SCENARIO 4

Which maternity care service do you prefer (A, B, or Neither A nor B)?

	Maternity Care Service A	**Maternity Care Service B**
Guaranteed continuity of care with midwife	Yes	No
Involvement of obstetric doctors during labour	Yes	No
Types of pain relief immediately available	Gas and Air, Pethidine, and Birthing Pool	Gas and Air, Pethidine, and Epidural
Your role in decision-making during labour	You are informed and involved in decisions	You are informed, but not involved in decisions
Length of stay in hospital after birth	6 hours	2 days
Cost of care (out-of-your-pocket)	€100	€1,500

Which service do you prefer (A, B, or Neither A nor B)?
(Please tick <u>one</u> box)

A ☐ **B** ☐ **Neither A nor B** ☐

[Answer only If you selected 'Neither A nor B']

If you could only choose between A or B, which one would you choose?
(Please tick <u>one</u> box)

A ☐ **B** ☐

SCENARIO 5

Which maternity care service do you prefer (A, B, or Neither A nor B)?

	Maternity Care Service A	**Maternity Care Service B**
Guaranteed continuity of care with midwife	Yes	No
Involvement of obstetric doctors during labour	Yes	No
Types of pain relief immediately available	Gas and Air, Pethidine, and Epidural	Gas and Air, Pethidine, and Birthing Pool
Your role in decision-making during labour	You are informed, but not involved in decisions	You are informed and involved in decisions
Length of stay in hospital after birth	3 days	24 hours
Cost of care (out-of-your-pocket)	€1,000	€500

Which service do you prefer (A, B, or Neither A nor B)?
(Please tick <u>one</u> box)

A ☐ **B** ☐ **Neither A nor B** ☐

[Answer only If you selected 'Neither A nor B']

If you could only choose between A or B, which one would you choose?
(Please tick <u>one</u> box)

A ☐ **B** ☐

SCENARIO 6

Which maternity care service do you prefer (A, B, or Neither A nor B)?

	Maternity Care Service A	**Maternity Care Service B**
Guaranteed continuity of care with midwife	No	Yes
Involvement of obstetric doctors during labour	No	Yes
Types of pain relief immediately available	Gas and Air, Pethidine, and Birthing Pool	Gas and Air, Pethidine, and Epidural
Your role in decision-making during labour	You are informed and involved in decisions	You are informed, but not involved in decisions
Length of stay in hospital after birth	6 hours	24 hours
Cost of care (out-of-your-pocket)	€1,500	€100

Which service do you prefer (A, B, or Neither A nor B)?
(Please tick <u>one</u> box)

A ☐ **B** ☐ **Neither A nor B** ☐

[Answer only If you selected 'Neither A nor B']

If you could only choose between A or B, which one would you choose?
(Please tick <u>one</u> box)

A ☐ **B** ☐

SCENARIO 7

Which maternity care service do you prefer (A, B, or Neither A nor B)?

	Maternity Care Service A	**Maternity Care Service B**
Guaranteed continuity of care with midwife	Yes	No
Involvement of obstetric doctors during labour	No	Yes
Types of pain relief immediately available	Gas and Air, Pethidine, and Epidural	Gas and Air, Pethidine, and Birthing Pool
Your role in decision-making during labour	You are informed and involved in decisions	You are informed, but not involved in decisions
Length of stay in hospital after birth	3 days	6 hours
Cost of care (out-of-your-pocket)	€500	€1,000

Which service do you prefer (A, B, or Neither A nor B)?
(Please tick <u>one</u> box)

A ☐ **B** ☐ **Neither A nor B** ☐

[Answer only If you selected 'Neither A nor B']

If you could only choose between A or B, which one would you choose?
(Please tick <u>one</u> box)

A ☐ **B** ☐

SCENARIO 8

Which maternity care service do you prefer (A, B, or Neither A nor B)?

	Maternity Care Service A	**Maternity Care Service B**
Guaranteed continuity of care with midwife	No	Yes
Involvement of obstetric doctors during labour	No	Yes
Types of pain relief immediately available	Gas and Air, Pethidine, and Birthing Pool	Gas and Air, Pethidine, and Epidural
Your role in decision-making during labour	You are informed and involved in decisions	You are informed, but not involved in decisions
Length of stay in hospital after birth	6 hours	3 days
Cost of care (out-of-your-pocket)	€1,000	€500

Which service do you prefer (A, B, or Neither A nor B)?
(Please tick <u>one</u> box)

A ☐ **B** ☐ **Neither A nor B** ☐

[Answer only If you selected 'Neither A nor B']

If you could only choose between A or B, which one would you choose?
(Please tick <u>one</u> box)

A ☐ **B** ☐

SCENARIO 9

Which maternity care service do you prefer (A, B, or Neither A nor B)?

	Maternity Care Service A	**Maternity Care Service B**
Guaranteed continuity of care with midwife	Yes	No
Involvement of obstetric doctors during labour	No	Yes
Types of pain relief immediately available	Gas and Air, Pethidine, and Epidural	Gas and Air, Pethidine, and Birthing Pool
Your role in decision-making during labour	You are informed, but not involved in decisions	You are informed and involved in decisions
Length of stay in hospital after birth	2 days	24 hours
Cost of care (out-of-your-pocket)	€500	€1,000

Which service do you prefer (A, B, or Neither A nor B)?
(Please tick <u>one</u> box)

A ☐ **B** ☐ **Neither A nor B** ☐

[Answer only If you selected 'Neither A nor B']

If you could only choose between A or B, which one would you choose?
(Please tick <u>one</u> box)

A ☐ **B** ☐

SCENARIO 10

Which maternity care service do you prefer (A, B, or Neither A nor B)?

	Maternity Care Service A	**Maternity Care Service B**
Guaranteed continuity of care with midwife	No	Yes
Involvement of obstetric doctors during labour	Yes	No
Types of pain relief immediately available	Gas and Air, Pethidine, and Birthing Pool	Gas and Air, Pethidine, and Epidural
Your role in decision-making during labour	You are informed and involved in decisions	You are informed, but not involved in decisions
Length of stay in hospital after birth	3 days	6 hours
Cost of care (out-of-your-pocket)	€1,500	€100

Which service do you prefer (A, B, or Neither A nor B)?
(Please tick <u>one</u> box)

A ☐ **B** ☐ **Neither A nor B** ☐

[Answer only If you selected 'Neither A nor B']

If you could only choose between A or B, which one would you choose?
(Please tick <u>one</u> box)

A ☐ **B** ☐

SCENARIO 11

Which maternity care service do you prefer (A, B, or Neither A nor B)?

	Maternity Care Service A	**Maternity Care Service B**
Guaranteed continuity of care with midwife	No	Yes
Involvement of obstetric doctors during labour	Yes	No
Types of pain relief immediately available	Gas and Air, Pethidine, and Epidural	Gas and Air, Pethidine, and Birthing Pool
Your role in decision-making during labour	You are informed, but not involved in decisions	You are informed and involved in decisions
Length of stay in hospital after birth	24 hours	3 days
Cost of care (out-of-your-pocket)	€100	€1,500

Which service do you prefer (A, B, or Neither A nor B)?
(Please tick <u>one</u> box)

A ☐ **B** ☐ **Neither A nor B** ☐

[Answer only If you selected 'Neither A nor B']

If you could only choose between A or B, which one would you choose?
(Please tick <u>one</u> box)

A ☐ **B** ☐

SCENARIO 12

Which maternity care service do you prefer (A, B, or Neither A nor B)?

	Maternity Care Service A	**Maternity Care Service B**
Guaranteed continuity of care with midwife	No	Yes
Involvement of obstetric doctors during labour	Yes	No
Types of pain relief immediately available	Gas and Air, Pethidine, and Epidural	Gas and Air, Pethidine, and Birthing Pool
Your role in decision-making during labour	You are informed, but not involved in decisions	You are informed and involved in decisions
Length of stay in hospital after birth	3 days	2 days
Cost of care (out-of-your-pocket)	€1,500	€100

Which service do you prefer (A, B, or Neither A nor B)?
(Please tick <u>one</u> box)

A ☐ **B** ☐ **Neither A nor B** ☐

[Answer only If you selected 'Neither A nor B']

If you could only choose between A or B, which one would you choose?
(Please tick <u>one</u> box)

A ☐ **B** ☐

SCENARIO 13

Which maternity care service do you prefer (A, B, or Neither A nor B)?

	Maternity Care Service A	**Maternity Care Service B**
Guaranteed continuity of care with midwife	No	Yes
Involvement of obstetric doctors during labour	No	Yes
Types of pain relief immediately available	Gas and Air, Pethidine, and Epidural	Gas and Air, Pethidine, and Birthing Pool
Your role in decision-making during labour	You are informed and involved in decisions	You are informed, but not involved in decisions
Length of stay in hospital after birth	24 hours	6 hours
Cost of care (out-of-your-pocket)	€500	€1,000

Which service do you prefer (A, B, or Neither A nor B)?
(Please tick <u>one</u> box)

A ☐ **B** ☐ **Neither A nor B** ☐

[Answer only If you selected 'Neither A nor B']

If you could only choose between A or B, which one would you choose?
(Please tick <u>one</u> box)

A ☐ **B** ☐

SCENARIO 14

Which maternity care service do you prefer (A, B, or Neither A nor B)?

	Maternity Care Service A	**Maternity Care Service B**
Guaranteed continuity of care with midwife	Yes	No
Involvement of obstetric doctors during labour	Yes	No
Types of pain relief immediately available	Gas and Air, Pethidine, and Birthing Pool	Gas and Air, Pethidine, and Epidural
Your role in decision-making during labour	You are informed and involved in decisions	You are informed, but not involved in decisions
Length of stay in hospital after birth	24 hours	2 days
Cost of care (out-of-your-pocket)	€100	€1,500

Which service do you prefer (A, B, or Neither A nor B)?
(Please tick <u>one</u> box)

A ☐ **B** ☐ **Neither A nor B** ☐

[Answer only If you selected 'Neither A nor B']

If you could only choose between A or B, which one would you choose?
(Please tick <u>one</u> box)

A ☐ **B** ☐

SCENARIO 15

Which maternity care service do you prefer (A, B, or Neither A nor B)?

	Maternity Care Service A	**Maternity Care Service B**
Guaranteed continuity of care with midwife	No	Yes
Involvement of obstetric doctors during labour	Yes	No
Types of pain relief immediately available	Gas and Air, Pethidine, and Epidural	Gas and Air, Pethidine, and Birthing Pool
Your role in decision-making during labour	You are informed and involved in decisions	You are informed, but not involved in decisions
Length of stay in hospital after birth	2 days	24 hours
Cost of care (out-of-your-pocket)	€100	€1,500

Which service do you prefer (A, B, or Neither A nor B)?
(Please tick <u>one</u> box)

A ☐ **B** ☐ **Neither A nor B** ☐

[Answer only If you selected 'Neither A nor B']

If you could only choose between A or B, which one would you choose?
(Please tick <u>one</u> box)

A ☐ **B** ☐

SCENARIO 16

Which maternity care service do you prefer (A, B, or Neither A nor B)?

	Maternity Care Service A	**Maternity Care Service B**
Guaranteed continuity of care with midwife	Yes	No
Involvement of obstetric doctors during labour	No	Yes
Types of pain relief immediately available	Gas and Air, Pethidine, and Birthing Pool	Gas and Air, Pethidine, and Epidural
Your role in decision-making during labour	You are informed, but not involved in decisions	You are informed and involved in decisions
Length of stay in hospital after birth	24 hours	6 hours
Cost of care (out-of-your-pocket)	€1,500	€100

Which service do you prefer (A, B, or Neither A nor B)?
(Please tick <u>one</u> box)

A ☐ **B** ☐ **Neither A nor B** ☐

[Answer only If you selected 'Neither A nor B']

If you could only choose between A or B, which one would you choose?
(Please tick <u>one</u> box)

A ☐ **B** ☐

SECTION FOUR – About Yourself

17. How old are you?

I am _____ years old

18. Were you born in Ireland? (Please tick *one* box*)*

Yes..... ☐[1] → *Go to Q19* No…… ☐[0]

19. How old were you when you moved to Ireland?

I was _____ years old

20. Can you tell me what your ethnic or cultural background is? (Please tick *one* box*)*

Irish ..... ☐[1]
Irish traveller ..... ☐[2]
Other white background ..... ☐[3]
African ..... ☐[4]
Any other Black background ..... ☐[5]
Chinese ..... ☐[6]
Any other Asian background ..... ☐[7]
Other, please specify:

_____

21. Do you live with?:… (Please tick *all* that apply)

Partner ..... ☐[1]
Parents/parents-in-law ..... ☐[2]
Your other children ..... ☐[3]
Live alone ..... ☐[4]
Other, please specify:

_____

22. What is the highest level of education you have completed to date? (Please tick *one* box*)*

Some primary (not complete) ..... ☐[1]
Primary or equivalent ..... ☐[2]
Intermediate/Junior/Group certificate or equivalent ..... ☐[3]
Leaving certificate or equivalent..... ☐[4]
Diploma/certificate ..... ☐[5]
Primary degree ..... ☐[6]
Postgraduate/higher degree..... ☐[7]
Other, please specify:

_____

23. What is your current marital status? (Please tick *one* box*)*

Single (never married)..... ☐[1]
Married ..... ☐[2]
Cohabitating ..... ☐[3]
Separated ..... ☐[4]
Divorced..... ☐[5]
Widowed ..... ☐[6]

24. What is your current employment situation? (Please tick *one* box)

Self-employed ..... ☐[1]
Employee ..... ☐[2]
Homemaker ..... ☐[3]
Seeking work for first time..... ☐[4]
Unemployed ..... ☐[5]
Student ..... ☐[6]
Unable to work owing to permanent sickness/disability ..... ☐[7]
Other, please specify:

_____

25. Are you covered by a medical card? (Please tick *one* box)

Yes, full card ..... ☐[1]
Yes, GP only ..... ☐[2]
Not covered ..... ☐[3]

26. Do you have private health insurance? (Please tick *one* box)

Yes ..... ☐[1] No ..... ☐[0]

27. Could you please give an approximate level of net household income please? (Please tick *one* box)
This means the total income, after tax and PRSI, of ALL MEMBERS of the household. It includes ALL TYPES of income: income from employment, social welfare payments, child benefit, rents, interest, pensions etc. We would just like to know into which broad group the total income of your household falls. All information you give is entirely confidential. You can choose from the amounts per week or month – whichever is most convenient for you.

A	Under €193 per week ..... ☐[1]	/	Under €834 per month..... ☐[1]
B	€193 - €384 per week..... ☐[2]	/	€834 - €1,667 per month ..... ☐[2]
C	€385 - €575 per week..... ☐[3]	/	€1,668 -€2,500 per month ..... ☐[3]
D	€576 - €767 per week..... ☐[4]	/	€2,501 - €3,333 per month..... ☐[4]
E	€768 - €959 per week ..... ☐[5]	/	€3,334 - €4,167 per month..... ☐[5]
F	€960 or more per week ..... ☐[6]	/	€4,168 or more per month ..... ☐[6]

28. How many people (adults and children) including yourself depend on this income?

_____People

SECTION FIVE – Your Preferences

In the following question we would like to ask you how much you would value care in an obstetric unit or a midwifery-led unit. Please try to provide an answer, even if it is difficult. *Please note that maternity care is free and will remain free*. What we are trying to find out is how much value you would place on care in an obstetric unit or care in a midwifery-led unit, depending on your preferred location of care.

One way to find out how much value you place on maternity care is to ask you how much of your own money you would be willing to give up to receive a maternity care package in your preferred location. The following describes three locations and packages of care, please read them carefully before answering the following two questions.

Obstetric unit: a clinical location in which care is provided by a team of midwives and doctors, both during antenatal care and care during labour. Antenatal care is typically provided by a team of midwives and doctors and you could meet either one at each visit, waiting an average of two hours each time. You are *not* guaranteed the same carer for the duration of your antenatal care and care during labour. During labour, midwives take primary responsibility for your care, but doctors and all medical services including obstetric, neonatal and anaesthetic care are available on site should they be needed.

(Alongside) Midwifery-led unit: a clinical location in which care is provided solely by midwives, both during antenatal care and care during labour. Antenatal care is typically provided by the same midwife, where you can wait an average of 10-20 minutes at each visit. You could be guaranteed the same carer from antenatal care to care during labour. The full range of medical services, including obstetric, neonatal and anaesthetic care, is available, should they be needed, in the same building.

(Free-standing) Midwifery-led unit: same as an alongside midwifery-led unit, however, should you require medical services including obstetric, neonatal and anaesthetic care, you would have to be transferred to a nearby obstetric unit via ambulance transfer.

29. In which location would you prefer to receive your entire maternity care? (Please tick *one* Box)

Obstetric unit ....☐[1] *If you prefer obstetric unit, answer Q 30*
(Alongside) Midwifery-led unit.....☐[2] *If you prefer alongside midwifery-led unit, answer Q 31*
(Free-standing) Midwifery-led unit....☐[3] *If you prefer free-standing midwifery-led unit, answer Q 31*

30. Based on your choice above, what is the maximum amount you would be willing to pay to receive your entire maternity care in an obstetric unit *instead of* a midwifery-led unit? Please indicate in the space provided the maximum amount you would be willing to pay out of your own money to receive your maternity care in an obstetric unit instead of a midwifery-led unit.

(Please specify the *maximum* amount)

€_____

You are now finished the survey

31. Based on your choice above, what is the maximum amount you would be willing to pay to receive your entire maternity care in your preferred midwifery-led unit *instead of* an obstetric unit? Please indicate in the space provided the maximum amount you would be willing to pay out of your own money to receive your maternity care in a midwifery-led unit instead of an obstetric unit.

(Please specify the *maximum* amount)

€_____

You are now finished the survey

We would like to thank you for taking the time to complete this booklet.
We greatly appreciate your participation. Your input is truly valuable.

COMMENTS
If you have any comments to make about this booklet or relating to maternity services, please use the box below. Please continue overleaf if you need to.

Please return the survey in the envelope provided to Christopher Fawsitt, National Perinatal Epidemiology Centre, Cork University Maternity Hospital (Fifth Floor), Wilton, Cork.

Definitions of terms used in this questionnaire

These definitions may be useful to you in answering the choice scenarios

Feature	Description
Guaranteed continuity of care with midwife	**Yes –** You are guaranteed continuity of care with the same midwife for the duration of your pregnancy and labour.
	No – You are not guaranteed continuity of care with the same midwife for the duration of your pregnancy and labour.
Involvement of obstetric doctors during labour	**Yes –** Obstetric doctors will be involved in your care if a complication arises (obstetric unit).
	No – Obstetric doctors will be involved in your care if a complication arises, but you will have to be moved to an alongside obstetric unit to see medical staff (midwifery-led unit), which is accessed through a connecting corridor.
Access to pain relief	**Gas and Air, Pethidine, and Epidural –** The main methods of pain relief available in obstetric units are Entonox (gas and air), Pethidine, and epidural.
	Gas and Air, Pethidine, and Birthing Pool – The main methods of pain relief available in midwifery-led units are Entonox, Pethidine, and a birthing pool. If you desire an epidural you will have to be transferred to an alongside obstetric unit which is accessed through a connecting corridor.
Your role in decision-making during labour	**You are informed and involved in decisions –** These may include decisions regarding pain relief, length of stay in hospital, etc.
	You are informed, but not involved in decisions – You are happy to leave important decisions to medical staff, but wish to remain informed.
Length of stay after your delivery	Following the birth of your baby, you will stay in hospital for a certain period of time. This can range from six hours to three days, depending on your preference.
Cost of care (out-of-your-pocket)	You are asked to consider how much you would be willing to pay for maternity care out of your own pocket.

APPENDIX C.1

Regression analysis of the CVM

C.1 Introduction

This appendix presents the regression results of the CVM. Since two differing elicitation formats are used, generating two different types of dependent variables, different regression analyses are examined. These analyses are assigned shorthand names, as described in Table 16.1.

The open-ended WTP question is described in the first instance in section C.1.1, followed by the payment scale design in section C.1.2.

C.1.1 *Open-ended WTP question*

Six demographic variables are expected to influence WTP, and include geographic location, previous obstetric experience, parity, PHI status, and ethnicity. These variables are described in Table 4.8. Since the marginal approach is assumed in this analysis, the open-ended WTP question generates WTP data on two models of care: care in a CLU and care in a MLU. Both models of care are explored separately. OLS is used in the first instance to analyse positive WTP values (Eqn. 5.10; Model 5a). Since the data are positively skewed, a log-linear OLS regression analysis is assumed (Eqn. 5.11; Model 5b) and compared with Model 5a. A Tobit regression analysis is also examined with different values censored at the upper bound, as well as the zero values at the lower bound (Eqn. 5.12; Model 5c).

Table 16.2 compares the results from the different regression analyses for care in a CLU. The OLS model a poor fit for the data, as illustrated by the insignificant *F*-test.

When a log-linear regression analysis is assumed (Model 5b.1), the *F*-test becomes significant, $F(6, 46) = 2.43$, $P < 0.\ 0.04$, with two statistically significant predictor variables: parity and ethnicity. The negative coefficient on the explanatory variable describing parity indicates that WTP decreases as obstetric experience increases. This variable mildly predicts WTP as it is significant at the 10 per cent level. The other significant predictor is ethnicity. Irish women are willing to pay more to deliver in a CLU instead of a MLU than other nationalities. There is no significant effect among the other variables.

A Tobit regression analysis is also examined to assess how censoring values at the lower and upper end affects estimated WTP (Eqn. 5.12). In the first instance, a Tobit model is examined with censored zero values at the lower bound (Model 5c.1). The model significantly predicts WTP, but includes only one significant variable. Irish women are willing to pay €568.80 more for consultant-led care than other nationalities. There is no significant effect on WTP arising from the other explanatory

Table C.0.1: List and description of all regression analyses

Model	Description	Section
C.1.1 Open-ended WTP regression analysis		
Model 5a.1	OLS on WTP for care in a CLU	C.1.1
Model 5b.1	Log-linear OLS on WTP for care in a CLU	C.1.1
Model 5c.1	Tobit regression (censoring values at zero) on WTP for care in a CLU	C.1.1
Model 5c.3	Tobit regression (censoring values at zero and €3,000) on WTP for care in a CLU	C.1.1
Model 5a.2	OLS on WTP for care in a MLU	C.1.1
Model 5b.2	Log-linear OLS on WTP for care in a MLU	C.1.1
Model 5c.2	Tobit regression (censoring values at zero) on WTP for care in a MLU	C.1.1
Model 5c.4	Tobit regression (censoring values at zero and €3,000) on WTP for care in a MLU	C.1.1
C.1.2 Payment scale WTP regression analysis		
Model 6a	Interval regression on WTP for care in a CLU	C.1.2
Model 6b	Interval regression on WTP for care in a MLU	C.1.2

Notes:
Abbreviations: OLS, Ordinary least squares; CLU, consultant-led unit; MLU, midwifery-led unit; WTP, willingness to pay

variables. Model 5c.3 censors potentially dubious observations at the upper bound. WTP values of €3,000 or more are censored. Four observations are removed, with no effect on model fit. Ethnicity remains statistically significant.

Similar regression analyses are performed on women's WTP for care in a MLU (Table 16.3). The number of observations used in this analysis is increased, and includes 90 observations (excluding zero values). The OLS model is insignificant, $F(6, 83) = 1.72$, $P < 0.1261$ (Model 5a.2). A log-linear regression model significantly predicts WTP, $F(6, 83) = 2.43$, $P < 0.0325$, but includes only one significant predictor: parity (Model 5b.2). Similar to above, women's WTP for care in a MLU decreases as obstetric experience increases. The remaining predictors have no effect on WTP.

Table C.0.2: Analysis of WTP for care in a CLU: OLS vs Log-linear vs Tobit regression

Variables	**Model 5a.1**	**Model 5b.1**	**Model 5c.1**	**Model5c.3**
Geographic location	68.37	0.323	56.73	40.31
	(291.6)	(0.271)	(277.0)	(299.6)
Experience	-335.4	-0.343	-177.0	-208.5
	(400.2)	(0.372)	(372.9)	(402.5)
Parity	-390.9	**-0.465***	-332.7	-351.7
	(269.5)	(0.250)	(254.6)	(274.3)
PHI status	249.1	0.323	317.7	341.7
	(229.1)	(0.213)	(214.6)	(231.8)
Income	-89.18	-0.179	-169.4	-168.1
	(253.4)	(0.235)	(232.6)	(251.4)
Ethnicity	**437.4***	**0.576****	**568.8****	**593.6****
	(237.0)	(0.220)	(216.4)	(233.4)
Constant	976.0**	6.360***	742.3	773.7
	(484.3)	(0.450)	(446.9)	(481.6)
R-squared	0.144	0.240	0.014†	0.0137†
F-test	1.29	**2.43****		
LR test			**11.74***	**11.21***
Observations	53	53	55	55

Notes:

Model 5a.1: OLS; Model 5b.1: Log-linear; Model 5c.1: Tobit regression (censoring values at zero); Model 5c.3: Tobit regression (censoring values at zero (2) and €3,000 (4));

Abbreviations: WTP, willingness to pay; LR, likelihood ratio test; PHI, private health insurance. Standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1.

† Pseudo R-squared

A Tobit model with censored zero values is statistically significant (Model 5c.2) (Table 16.3). The likelihood ratio test shows that at least one of the predictor variables does not equal to zero. At the 10 per cent level, there is a significant effect for geographic location, with women delivering in consultant-led regions willing to pay more for midwifery-led care than women delivering in regions where both models of care are available. The model is marginally improved when potentially dubious observations are censored at the upper end. Similar to Model 5c.3, observations that assume a value of €3,000 or more are censored. This removes one additional observation from the model. Geographic location plays a considerable role in predicting WTP with women delivering in a consultant-led region willing to pay €211.70 more for midwifery-led care than women delivering in a region that offers both consultant- and midwifery-led care.

Other analyses are examined to assess how WTP is predicted when more values are censored at the upper end. The results are not presented here as the analyses did not improve model fit. The data are too few for meaningful prediction of WTP.

C.1.2 *Payment scale WTP question*

An interval data model is used to examine the WTP data for the payment scale question (Eqn. 5.14). Interval regression analysis is especially attractive since the WTP values are observed in intervals. The model is applied to both WTP questions: care in a CLU and care in a MLU. There are 66 observations included in Model 6a, which examines WTP for care in a CLU. Model 6b analyses WTP for care in a MLU, and includes 73 observations.

Similar problems are encountered in this analysis as the open-ended WTP analysis. In the first instance, Model 6a significantly predicts WTP for care in a CLU, $\chi^2(6) =$

Table C.0.3: Analysis of WTP for care in a MLU: OLS vs Log-linear vs Tobit regression

Variables	**Model 5a.2**	**Model5b.2.**	**Model 5c.2**	**Model 5c.4**
Geographic location	144.8	0.146	**208.4***	**211.7***
	(122.0)	(0.174)	(119.9)	(121.3)
Experience	-99.21	-0.252	-184.4	-192.0
	(199.1)	(0.284)	(200.1)	(202.4)
Parity	-143.8	**-0.281****	-136.6	-138.6
	(94.93)	(0.136)	(96.05)	(97.11)
PHI status	33.95	0.125	61.51	62.09
	(129.9)	(0.185)	(129.6)	(131.0)
Income	214.1	0.262	234.3	241.4
	(154.5)	(0.221)	(156.2)	(158.0)
Ethnicity	66.85	0.224	154.5	156.0
	(163.4)	(0.233)	(158.4)	(160.2)
Constant	796.6***	6.417***	666.4***	668.6***
	(235.7)	(0.337)	(232.8)	(235.3)
R-squared	0.111	0.150	0.009†	0.009†
F-test	1.72	**2.43****		
LR test			**11.98***	**12.10***
Observations	90	90	94	94

Notes:

Model 5a.2: OLS; Model 5b.2: Log-linear; Model 5c.2: Tobit regression (censoring values at zero); Model 5c.4: Tobit regression (censoring values at zero (4) and €3,000 (1));

Abbreviations: WTP, willingness to pay; LR, likelihood ratio test; PHI, private health insurance. Standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1.

† Psuedo R-squared

14.51, $p < 0.024$ (7.15). Two variables predict WTP at the 10 per cent level. Women with PHI are willing to pay €263.30 more to deliver in a CLU than women who don't have coverage. The dummy variable describing highest income significantly predicts WTP. Women in the highest income bracket are willing to pay €248.20 more for care in a CLU than women in lower income brackets. There is no significant effect on WTP across the remaining predictors. Despite a larger sample size, the predicted WTP for care in a MLU is insignificant using interval regression, $\chi^2(6) = 1.70$, $p < 0.946$ (Table 16.4).

Sample size is too small to meaningfully predict WTP using regression analysis. The results presented here are illustrative only of the efforts made to identify predictors of WTP, and should not be treated as definitive where significance is achieved. Efforts

Table C.0.4: Interval regression analysis of WTP for care in a CLU and MLU

Variables	Model 6a	Model 6b
Geographic location	-82.40	-59.06
	(148.3)	(115.8)
Experience	-25.15	-6.550
	(238.4)	(176.3)
Parity	-37.23	-39.67
	(127.1)	(75.98)
PHI status	**268.3***	31.96
	(144.4)	(109.0)
Income	**248.2***	45.85
	(146.1)	(146.1)
Ethnicity	133.6	104.4
	(141.3)	(139.2)
Constant	753.9***	777.5***
	(280.1)	(209.0)
LR test	**14.51****	1.70
Observations	66	73

Notes:

Model 6a: Interval regression on WTP for care in a CLU; Model 6b: Interval regression on WTP for care in a MLU;

Abbreviations: CLU, consultant-led unit; MLU, midwifery-led unit; LR, likelihood ratio test; PHI, private health insurance.

Standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

to increase sample size are undertaken. Since there is no statistically significant difference between the open-ended and payment scale WTP values, the data are merged and different regression analyses are performed. For instance, an ordered probit model is explored where WTP values are classified as low (< €500), medium (€501 - €1,000), and high (> €1,001).[62] For care in a CLU, 128 observations are obtained for this analysis, while care in a MLU contains 177 responses. Little improvement in model fit is achieved by the ordered probit model.[63] While the data are too few and WTP values too dispersed to meaningfully predict WTP, it is not a requirement of the SP approach to perform regression analysis. Problems with sample size are common in the CVM literature, with many studies limiting their analysis to

[62] To the best of the author's knowledge, this approach has not been applied in the CVM literature.

[63] A multinomial logit model is also estimated, along with a probit model which classifies responses as low and high, however, neither analysis improves model fit.

descriptive statistics and hypothesis testing. (Borghi 2008; Grutters *et al* 2009; Haefeli *et al* 2008).

C.2 Conclusion

This section demonstrates the efforts that were undertaken to meaningfully predict WTP. However, sample size is too few for this analysis. Mitchell and Carson (1989) maintain that a sample size between 200 and 2,500 is usually sufficient to reliably predict WTP. This is considerably larger than the sample size obtained here. Therefore, the decision was made to present these results in an appendix to the thesis.