

**Measuring What Works: A Mixed-Methods Evaluation of Women's Groups on
Maternal Health Uptake in Rural Nepal.**

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Abstract: Measuring what Works: A Mixed-Methods Evaluation of Women's Groups on Maternal Health Uptake in Rural Nepal

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Background: There is a need for more studies that analyse evaluation methods in the context of maternal health promotion. These should assess the effectiveness of health promotion interventions on health outcomes, factors contributing to impact, and transferability. This thesis reports on an evaluation of one such intervention in Nepal targeting rural women to promote maternal health.

Methods: A mixed-methods approach was used where, first, a Difference-in-Difference (DiD) estimation assessed the effects of the intervention on selected outcome variables while controlling for: 1) a constructed wealth index; and 2) women's socio-economic characteristics in a five-year controlled, non-randomised, repeated cross-sectional study of a community-based health promotion intervention targeting maternal health in Nepal. Second, the qualitative data were analysed to explore the knowledge, attitudes, and beliefs of women post-intervention. Finally, the financial data were analysed to identify resources needed and estimate the cost of the health promotion intervention.

Results: After five years, women in the intervention area were more likely to seek antenatal care at least once, to take iron/folic acid, and to attend postnatal care. The intervention did not influence women's place of birth or likelihood of receiving care from a skilled birth attendant. However, it did improve attendance for the recommended four antenatal visits for the first two and a half years. The qualitative findings helped explain some of the changes or lack thereof, where in the intervention area women were perceived, by the researcher, as empowered, confident, and the family as supportive. The cost of providing the health promotion intervention per group/woman and the evaluation process consisted of only 10% of the total programme cost.

Conclusion: This is the first community-based health promotion intervention that has demonstrated a greater impact during pregnancy (i.e., uptake of antenatal care) than around birth (i.e., changes in delivery care). Other factors, not easily resolved through health promotion interventions, may influence birth outcomes, such as financial liquidity or geographical constraints. The evaluation showed that using mixed methods provided valuable information that would not have been extracted through one method alone. While DiD is a precise tool for measurement, the qualitative research provided insight into why the intervention had an impact in pregnancy but not at birth.

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This work is dedicated to my mother, Naznin, brave and inspiring until the very end.

Declaration

I declare that I conducted the work represented in this thesis, entitled *Measuring What Works: A Mixed-Methods Evaluation of Women's Groups on Maternal Health Uptake in Rural Nepal*. It is in accordance with the requirements for the degree of Ph.D. at Bournemouth University. The work that is presented to the best of my knowledge is original except as acknowledged in the script. All quotations have been distinguished by quotation marks and sources of information have been specifically acknowledged. This thesis has not been submitted previously, either as a whole or in part, for a degree at this or any other university.

Sheetal Sharma

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List of Abbreviations

AIDS	Acquired Immunodeficiency Syndrome
AHW	Auxiliary Health worker
ANC	Antenatal Care
ANM	Auxiliary Nurse-Midwives
C	Control
CBA	Cost-benefit analysis
CBS	Central Bureau of Statistics
CEA	Cost-effectiveness analysis
CHW	Community Health Worker
CMA	Community Medical Assistant
CMACE	Centre for Maternal and Child Enquiries
CI	Confidence Interval
CUA	Cost-utility analysis
DALY	Disability-Adjusted Life Year
DC	Delivery Care
DHS	Demographic Health Surveys
DiD	Difference-in-Difference
EmONC	Emergency obstetric and newborn care
FCHV	Female Community Health Volunteer
FP	Family Planning
FP/MCH	Nepal Family Planning and Maternal and Child Health Plan
HDI	Human Development Index
I	Intervention
GDP	Gross Domestic product per capita (based on Purchasing Power Parity conversion)
GoN	Government of Nepal
GNI	Gross National Income
GTN	Green Tara Nepal
GTT	Green Tara Trust
HP	Health Post
HIV	Human Immunodeficiency virus
ICD-10	International statistical classification of diseases and related health problems, 10 th edition
ICD-MM	The WHO application of ICD-10 to deaths during pregnancy, childbirth and the puerperium: ICD Maternal Mortality
ID	Institutional Delivery
ITS	Interrupted Time Series
IMR	Infant Mortality Rate
M&E	Monitoring and Evaluation
MCH	Maternal and Child Health

MCHW	Maternal and Child Health Worker
MDGs	Millennium Development Goals
MDSR	Maternal Death Surveillances and Response
MNH	Maternal and Newborn Health
MMR	Maternal Mortality Rate
MH	Maternal Health
MOHP	Ministry of Health and Population
NFHP	Nepal Family Health Programme
PCA	Principal Component Analysis
PHCCs	Primary Healthcare Centres
PHN	Primary Health Nurse
PPP	Purchasing Power Parity
QALY	Quality-Adjusted Life Year
RCT	Randomised Controlled Trial
RR	Relative Risk
SBA	Skilled birth attendant
SDGs	Sustainable Development Goals
SES	Socio-economic Status
SHP	Sub-health Post
SRH	Sexual and Reproductive Health
STI	Sexually Transmitted Infections
TBA	Traditional Birth Attendant
TFR	Total Fertility Rate
OR	Odds ratio
UN	United Nations
UNICEF	United Nations Children's Fund
UNFPA	United Nations Population Fund
USA	United States of America
USD	United States dollar
VDC	Village Development Committee
VHW	Volunteer Health worker
WHO	World Health Organization

Chapter '0' Introduction to Thesis

This introductory chapter provides a road map to the thesis, which the reader may feel is laid out in an unconventional way. This doctoral work is concerned with identifying and applying a pragmatic and achievable method to evaluate healthcare interventions in low- and middle-income countries. In this thesis the substantive research in Nepal centres on the intervention implemented by Green Tara Nepal, this health promotion intervention acts as a case study to test the methods. The health promotion intervention was run by the Non-Governmental Organisation (NGO) *Green Tara Nepal* (GTN) and financially supported by a Buddhist charity based in London called *Green Tara Trust* (GTT). GTN and GTT are interlinked, and henceforth the intervention is referred to as the "GTN Intervention" throughout this thesis. The GTN intervention was designed by GTT in close collaboration with researchers based at the University of Aberdeen. It aimed to increase the uptake and knowledge of maternal health and thereby improve maternal healthcare and decision-making by individual mothers in two districts in Kathmandu Valley, Nepal.

While a more conventional thesis may have started with an outline of the intervention under research, one key focus of this thesis is the pragmatic approach to evaluation research and the most appropriate methods of evaluation. In particular, this research was concerned with how community interventions in maternal health promotion can be evaluated in low-income settings. Thus, this PhD study is substantively based on an evaluation designed to determine the mechanisms at work in the GTN intervention. This evaluation is concerned not only with assessing the effectiveness (here, impact) of the programme, but also with extracting the findings from the intervention so that they can be plausibly applied to other interventions. Additionally, this mixed-methods study explored various socio-demographic characteristics of study participants using primary and secondary data. The study approach is based on a controlled-before-and-after design; hence data were collected in both the intervention and control areas to identify whether these factors acted as enablers or barriers to the uptake of maternal healthcare, knowledge, and decision-making. Finally, the researcher assessed the costs of the intervention and the evaluation. Following this outline, the overview of chapters satisfactorily explains the internal logic of the thesis.

The main body of the thesis is organised into nine chapters. *Chapter 1* provides an outline of evaluations, the global situation for maternal health, its indicators of

progress, the global burden of maternal mortality, and the global initiatives that target the latter. Brief aspects focusing on health promotion in the field of maternity care and the uptake indicators in low and middle-income countries follow it. These indicators are sometimes referred to as “proxy outcomes” or simply “outcomes”. As the GTN intervention took place in rural Nepal, the chapter ends with providing context for the evaluation by presenting Nepal and the local situation for maternal health. Also discussed is the justification for this study.

Chapter 2 expands upon the notions of health promotion. Health promotion is explored as a discipline concerned with maintaining health rather than preventing disease in order to improve community-based health. Also detailed in this chapter is the GTN intervention and the findings from the literature review on evaluations of community health promotion in maternal health interventions. *Chapter Three* explores the underlying philosophies of evaluation and evaluation approaches to the practice of health promotion. *Chapter Four* focuses on methodology and the methods or the tools of evaluation employed in carrying out the mixed-methods evaluation of the GTN intervention.

Chapters Five and Six present, in detail, the findings of this thesis with respect to this particular project in Nepal, which is important in its own right. These findings and interpretations will of course be of interest to GTN and similar organisations concerned with social improvement.

In *Chapter Seven*, the results from the different methods in this mixed-methods study are synthesised into a comprehensive discussion, while discussing the strengths and limitations of this work. Finally, *Chapter Eight* concludes on both the substantive Green Tara Intervention as well as on methodological issues raised.

Chapter Nine provides recommendations that arose from the analyses in this PhD research. Separate recommendations are provided for practitioners, educators, researcher and policy-makers.

Chapter 1 Introduction

1.1 Setting the scene

Evaluations of community-based interventions can be complex, especially those on a larger scale. It is important to measure the outcomes of health and health promotion interventions everywhere, but perhaps more so in low-income countries. The knowledge such evaluations generate is important as an exercise in accountability for researchers, funders, policy makers, practitioners in the field, and to most importantly (potential) recipients. Moreover, the aim of evaluation research is to address enablers and obstacles of the study in question for determining “what works” in order to continue programme activities or upscale. An evaluation study can be undertaken using various research approaches or within the context of a philosophy, such as realism, positivism, or pragmatism. In addition, evaluation is one particular type of research that gives a distinctive account of the nature of programmes and how they work, of what is involved in explaining and understanding programmes, of the research methods needed to understand how the programme works, and of the products/outcomes of evaluation research (Clancy 2002; Pawson and Tilley 2004).

This PhD study is based on evaluation research designed using mixed methods to determine the mechanisms at work in a maternal health promotion and community-based intervention in a low-resource setting. Health promotion is a ‘salutogenic’ (preventative) approach to improving community-based health (Judd et al. 2001). The health promotion programme was implemented by Green Tara Nepal (GTN) and is discussed in detail in Chapter 2. This chapter sets the scene for evaluations and the particular Green Tara Intervention is placed in context of the wider country (Nepal). The chapter has been divided into three parts: the first part discusses evaluations of community-based interventions, the second part discusses the chosen outcomes indicators/outcomes to evaluate maternal health, and the third examines the context behind this evaluation.

1.2 Evaluation of community-based interventions

In 1998, the World Health Organization (WHO) called for more robust evaluations of implementations from the field (WHO 1998) in order to determine impact on lives, scalability, replicability (whether programmes were generalisable), validity, to provide accountability to stakeholders and funders alike, and to set certain criteria/standards of evaluation (Judd et al. 2001; Duflo 2004; Godin et al. 2006).

As discussed in Sections 1.1 and 2.5, however, nearly two decades later there have been few evaluations of health promotion interventions in Low- and Middle-Income Countries (LMICs). This section explores the challenges of evaluating these types of health promotion interventions due to the nature of such interventions and the cost of properly designed effectiveness evaluations of interventions. In LMICs, there exists a risk of providing simple or no comparisons to a given intervention – thus many evaluations do not answer the question “did it work?”. Further impacting this risk is the existence of publication bias, which hypothesises that only “successful” studies are published (Duflo 2004). Several examples of evaluations and their outcomes are given below.

Consider the example of a school allocation lottery programme where the evaluation only compared attendance rates, choice of school, and performance (Duflo 2004). It appeared that students performed better when they were able to choose their school. However, a further regression analysis of lottery winners and losers showed that students who chose among the neighbourhood schools had low performance outcomes. This shows that a simple analysis of choice versus no choice did not take into consideration the kind of choices people made (the factors involved in choosing).

Obstetrics also has its fair share of poorly evaluated interventions that have been introduced. Three separate Cochrane Collaboration reviews have shown how some simple maternity-care interventions were harmful or ineffective. These included shaving women’s perineal area, which does not decrease infection risk (Basevi & Lavender 2014); using enemas during labour, which led to an increase in intrapartum infection (Reveiz et al. 2007); and the use of fundal pressure, which was associated with an increase in anal sphincter tears (Verheijen et al. 2009).

Evaluations can also yield measures of effectiveness. Effectiveness is used to describe evaluations or understand the findings of the studies conducted in real-world settings by individuals who are not part of a research staff (Glasgow et al. 1999). An example of effectiveness is provided by Banerjee and Duflo (2011), who evaluated a development project addressing food aid. The intervention did not yield a positive effect; despite the provision of food aid, trial participants did not eat healthier. The unintended consequence (Sections 3.2 and 3.2.3.2) was that the money received was spent on alcohol, tobacco, and festivals. As culture, politics, history, laws, infrastructure, and individuals shape society, introducing an intervention into a given community requires adaptation. When something is improved, it is changed in an expected way but also in an unexpected way; “unintended consequences” may occur. For instance, an increase in uptake, although desired in principle, may lead to overwhelmed staff, uptake of poor quality care, or the reduction of health provision by local governments (Thrall 2011). Hence, appropriate evaluation methods ought to be chosen for low-resource settings to account for these, such as mixed methods (Alderman et al. 2009). Mixed methods address both quantitative and qualitative questions and as such may help explain unexpected outcomes and unintended consequences of an intervention. For instance, a mixed-method review saw that women groups had positive effects on various dimensions of women’s empowerment, including economic, social, and political. Yet, there were unintended consequences of the interventions for these women empowerment groups and were detailed as: intimate partner violence, stigma, disappointment, and reduced subjective wellbeing. In essence, the mixed-method approach enables the research to capture a broader range of evidence than a review of quantitative studies alone to answer relevant policy questions more comprehensively (Brody et al. 2016).

Evaluations can also provide evidence on transferability. In Kenya, a school deworming programme improved attendance, pupils’ performance, and graduation rates. Based on this evidence the funders decided to replicate this deworming programme in India. In India, the programme was not as successful as the intervention was rolled out rapidly (with little planning for the local context) and without a comparison of control and treatment groups. This made it difficult to assess the gaps in implementation in the India setting (Hawkes 2013).

Furthermore, when evaluating the effectiveness of an intervention, it is important to have a comparison group. A good example of a large-scale community intervention without comparison (i.e. no control villages) is the Millennium Villages Project (2004).

This programme built houses, schools, roads, health clinics, and provided education, nutrition, health, training as well as financial resources in nine millennium villages. To evaluate the impact of the project on these villages, 18 indicators were measured, ranging from child mortality and maternal health to measles immunisation and the use of anti-malaria bed nets. The study concluded post-intervention there were significant reductions in child mortality (Pronyk et al. 2012). Although, the baseline data of the control villages had to be retrofitted by surveying participants three years later about indicators at baseline, which created recall bias. Comparisons were needed to test this intervention for impact. Examples include a control group of villages to avoid the above recall bias and a comparison to national trends during that time period (Anon. 2012; Malenga and Molyneux 2012).

Thus, research and evaluation enables us to determine what will work in a given community, where programme strategies may vary from better infrastructure (hospital buildings) to more health workers, lower user fees, better transport, or incentives (Glasgow et al. 1999). Although there are several methods available to an evaluator, some are not suitable. For instance, simple average changes in percentages of descriptive studies, Pearson's chi-squares (χ^2), or counts may not yield the precision required to understand whether the intervention has 'worked' (i.e., if it was effective). At the other end of the spectrum, sophisticated techniques such as the gold-standard randomised controlled trial (RCT) have gained popularity in social/non-clinical interventions. Many have said that RCT-type evaluations are appropriate, practical and ethical (Glasgow et al. 1999; Tollefson 2015). One of the first RCTs in a social intervention was *PROGRESA* incentivising school and health clinic attendance in low-income communities, and comparing the results to the control area showed effectiveness (Tollefson 2015).

However, RCTs may be inappropriate for community-based interventions as they are expensive or inadequate due to the large sample size required - "there is little research on interventions that address whole populations, (that) are long lasting, or (that) become 'institutionalised' (generalised)" (Glasgow et al. 1999, page 1322-1327). The authors continue to state: "*low-intensity interventions that are less efficacious but that can be delivered to large numbers of people may have a more pervasive impact*". RCTs have proved to be expensive and lacking in external validity and generalisability due to their selective eligibility criteria (e.g. participants are often excluded if they have concomitant medication use, medical comorbidities or are women). RCTs are explanatory but they are also artificial as the evidence is generated under the most

favourable circumstances. In other words, the RCT exclusion criteria may mean the RCT does not reflect the 'real world'. However, experimental non-randomised controlled trials (community trials/controlled before and after studies) are studies that, if well designed, offer external validity but may not offer internal validity if covariates, such as age or education, are not taken into account (Clancy 2002; Van Spall et al. 2007).

Evidence-based community health promotion needs evaluation, but these health promotion interventions are often not evaluated for evidence of effectiveness (Rychetnik 2002). Resources for health promotion interventions are often limited, which means funding for evaluations can be limited. In addition, health promotion evaluations are often not designed and conducted by researchers. In order to better understand the NGO GTN's intervention and its evaluation, and why there is a need to conduct evaluations, the next section presents key issues around maternal health and its indicators for evaluation and health promotion. Those who deliver and plan health promotion services have a very broad range of questions for evaluation studies to answer, of which "does it work?" is one. Evaluation in health promotion is expected to be useful - it influences decisions about whether to stop, continue, or extend a project and how it should be changed or improved. Therefore, there should be an emphasis on the core health promotion values at the outset of the evaluation. Building on core values and adopting a participatory approach to evaluation by involving both stakeholders and the client group has been found to be crucial to the success of evaluation studies in a wide variety of settings and disciplines (Patton 1996; Rootman et al. 2001). Finally, in LMICs, NGOs and academics have collaborated to implement and evaluate projects for the benefit of stakeholders, funders, and science (Duflo 2004; Alderman et al. 2009; Morrison et al. 2014).

At a local level, evaluations usually have several purposes, according to the values and priorities of the people involved. When planning an evaluation to determine whether a programme has "worked", it is important to check what it is that the programme manager/provider and funders consider success, or what they consider to be important for good health promotion performance. Perkins et al. (1999), recommend a negotiated approach to evaluation, in other words, one that takes account of the stakeholder values and expectations which provides a practical framework for gathering evidence. Key reasons for evaluation in health promotion practice which guide the mixed-method approach of this evaluation are to:

1. improve the design or performance of a health promotion project, policy, activity or service;
2. make choices between health promotion activities;
3. Aid decisions about which activities should be funded and which initiatives have greatest impact;
4. learn how a particular health promotion project or activity might be repeated and sustained elsewhere;
5. find out whether an activity is conducted according to an agreed plan, objective and time frame;
6. establish whether a project provides value for money (cost-effectiveness) and;
7. test whether new ideas will work in practice (Nutbeam 1998; O'Connor-Fleming et al. 2006).

In addition, the planning of an evaluation needs practical research experience (Perkins et al. 1999). An experienced researcher will select the measures/type of evaluation and be able to plan the evaluation. He or she will be able to determine the indicators and outcomes to be measured given the time and resources available. Perkins et al. (1999) suggest that an "outside" researcher (one that is not part of the delivery of the intervention) should conduct the evaluation. The above-mentioned external (neutral) researcher should be involved as a partner with the local health promotion practitioners as the project staff may not have time and/or implementers or governments may not see the value of conducting an evaluation of their activities. As the latter may take time away from programme activities and they may already have the evidence or guidelines at hand (Judd et al. 2001). Lastly, the cost of an evaluation may be a further deterrent (Duflo 2004; Hobbes 2014). Therefore, the responsibility for the evaluation researcher is to understand the resource constraints, the requirements of the stakeholders and the health promotion principles and values that underpin the intervention (Perkins et al. 1999; Judd et al. 2001).

In the health promotion field, there has been considerable debate about the nature of evidence and how we can assess effectiveness (Glasgow et al. 1999). One of the issues that arise in evaluation is that a simple input–output model of evaluation cannot fully address the complexity of the health promotion programme, which is usually a multi-dimensional endeavour. Indicators of 'success' are not a single, one-size-fits-all measure; and meeting a set standard does not equal efficiency (Judd et al. 2001). For example, in an intervention, NGOs implement programmes, train staff, build links with

the community, and give away incentives (Godin et al. 2007). These process measures need to be accounted for in the evaluation, not only the global outcomes. Doing so yields qualitative information - themes and observations that sometimes are not comparable across interventions that permit implementers to spend time (collecting data) getting to know the community. This latter process helps design the data collection. Complementary qualitative research methods are applied in order to understand social phenomena in natural settings allowing researchers to draw meanings, experiences, and views of all participants, including those in the control area. Qualitative methods are concerned not with “how often”, as quantitative methods are, but with “why” something happens, “how” it works, and “what” people think (Judd et al. 2001; Clancy 2002; Godin et al. 2007a).

It is well recognised that evaluations should be concerned with process, impact and outcome indicators (Green and Tones 1999). Process and outcome evaluation examine whether targets have been implemented and achieved over the long-term. While an impact evaluation is structured to answer the questions: how would outcomes, such as individual participant’s wellbeing, have changed in the absence of the programme? Or how would those who did not receive the intervention (i.e., the control group) have benefitted if it had been available to them. This involves counterfactual analysis, that is, “a comparison between what actually happened and what would have happened in the absence of the intervention” (White 2006). In essence, impact evaluations seek to answer cause-and-effect questions: those changes in outcome that are directly attributable to the programme (Gertler et al. 2011). The pragmatic mixed-methods evaluation was chosen for this PhD study to assess the impact of both the intended and unintended consequences that can be attributed to the GTN intervention (Khandker et al. 2010a; Westhrop 2014; J-PAL 2015).

The evaluation aimed to address counterfactual questions and provide an average impact on the group in question, as there may have been unrelated changes concurrent to the programme implementation. Accounting for these changes is essential and often not solely possible through statistical methods. Concerns about the possible dominance of a quantitative methodological agenda in impact evaluations, such as an RCT (Green 2000a) and its limited applicability to health promotion evaluation, were discussed in Chapter 3.

These considerations informed the evaluation of the intervention in an area where health promotion is paramount, maternity care as the outcome of such an intervention may impact two lives - the mother and the baby. The next section discusses maternal health promotion in improving women's knowledge of and access to maternity services in LMICs, such as Nepal. Also explained are the maternal health indicators, set as standards, using evidence that measures progress to aid in the reduction of maternal morbidity and mortality.

1.3 Maternal health policy & community interventions

Maternal health is a matter of concern on the international health agenda and an important public health and health promotion issue in LMICs. It is estimated that 289,000 women die annually (approximately 800 per day) from pregnancy or childbirth-related complications with more than 99% of these maternal deaths taking place in the LMICs, and the highest rates of mortality in Sub-Saharan Africa and South-Asia (Simkhada et al. 2006; Lozano et al. 2011; WHO 2013). Maternal mortality is defined as:

“The death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes” (WHO 1992:1238).

Maternal mortality levels have been advocated as a marker for a country's development. The Maternal Mortality Ratio (MMR) is one of the key indicators of the status of reproductive healthcare service delivery and utilisation, and also of women's overall status in society (Defo 1997). Complications of pregnancy and childbirth are still the leading cause of death and disability among women of reproductive age in LMICs (WHO 2009b). In LMICs, 80% of all maternal morbidities or deaths are due to obstetric complications that occur during pregnancy, labour, or puerperium. Five direct causes are responsible for nearly three quarters of all maternal deaths: unsafe abortion (13%), sepsis (15%), haemorrhage (24%), eclampsia and hypertensive disorders (12%), and obstructed labour (8%), (Ronsmans and Graham 2006). The remaining deaths are indirectly caused by or associated with diseases such as malaria and Acquired Immuno-Deficiency Syndrome (AIDS) during pregnancy (WHO 2012a; WHO et al. 2014b).

Poor maternal outcomes, which are defined as morbidity and/or mortality, have a significant impact on families, communities and societies and various socio-economic groups (Furuta and Salway 2006). The cost of treatment for complications can lead to considerable debt for women and their families (Ronsmans 2009). In addition, maternal morbidities can affect women's ability to work, resulting in a loss of productivity and negative outcomes for infants and children (Powell-Jackson and Hoque 2012).

The role of primary healthcare and prevention/health promotion is to improve health, including maternal health. Community-based preventive interventions and health-sector interventions designed to increase women's access to professional and quality medical care, were emphasised at the Alma-Ata conference in 1978 (WHO 1978). In 1987, the Safe Motherhood Initiative launched by the WHO and other international agencies prioritised the following: women's status, education of communities and the strengthening and expansion of core indicators of maternal health (Starrs 2006). For instance, ANC was chosen as a specific indicator at the World Summit for Children (1990). The summit included a recommendation that all pregnant women should have access to ANC, a skilled birth attendant (SBA) at delivery, and access to referral facilities (institutions) for high-risk pregnancies. It was recommended that these facilities should have the capacity to provide emergency obstetric care so that both the mother and child would have improved health outcomes (AbouZahr 2003). The maternal health service indicators, used as global standards for evaluation, are ANC, delivery care (DC) and postnatal care (PNC), both at the community and referral level.

Global initiatives have further galvanised maternal health progress. For instance, the 1987 Safe Motherhood Initiative was a commitment among political leaders: it highlighted the idea that maternal death is an "issue". The term "Safe Motherhood", with its implied focus on women's childbearing role (Starrs 2006) was thus in the public-health realm and a core component of reproductive health policy. Both the initiative's 20th anniversary and the Millennium Declaration strengthened the Safe Motherhood advocacy in the last 20 years.

In September 2000, the United Nations adopted the Millennium Declaration and set eight Millennium Declaration Goals (MDGs), the fifth (MDG5) of which was "to improve maternal health" (UNGA 2000). This goal was translated into two targets: the first one was to reduce maternal mortality by three quarters between 1990 and 2015,

and the second was to achieve universal access to reproductive health by 2015 (UN 2011a:30-31). The two key MDG5 indicators for monitoring the progress towards the first target are: (a) the MMR (i.e. the number of maternal deaths per 100,000 live births); and (b) the proportion of births attended by a skilled health attendant.

The MMR indicator represents the obstetric risk associated with each pregnancy. However, measuring MMR is problematic in many countries due to the challenges of obtaining accurate data on the number of pregnancies and determining whether maternal deaths are due to obstetric causes, especially in the community (home) versus hospitals/clinics. Most women in LMICs die in the community and in many countries, this is where they give birth. MMR is often measured in LMICs by surveys from respondents about the deaths of their sisters using the *sisterhood method* of estimation (Graham et al. 1989). This method is based on highly uncertain data. It is also subject to further variance due to poor health facility record keeping (Ameh et al. 2014; Graham et al. 2004). Thus, as an indicator MMR is controversial: if taken as a measure of maternal health progress, it is very variable. In the GTN intervention MMR was not available, as it is a rare event (WHO & UNICEF 2014b).

As a result of the introduction of MDG5, maternal health has received increased attention (Morrison et al. 2008). There has been a 43% decline in maternal mortality between 1990 and 2015 (Hogan et al. 2010; Lozano et al. 2011; WHO et al. 2012; EWEC 2015; WHO & UNICEF 2014b). The most recent progress on MDG5 indicated that nine countries had met the target (out of 75 countries) with a high burden of maternal mortality (WHO et al. 2015). Technical measurements and data are needed to determine progress or assess interventions and the accurate recording of deaths (Ameh et al. 2014; Graham et al. 2002). It should be noted these MMR data did spur the maternal health community, and some countries have made significant progress in maternal health.

Progress in maternal health and MMR is also credited to health and social factors. For example, the Safe Motherhood campaigns took inspiration from the 2006 initiative, which has increased the availability of skilled birth attendants and antiretroviral therapy as well as decreased pregnancy rates as a result of family planning and use of contraception (Hogan et al. 2010; WHO et al. 2012). Furthermore, the wide use of antibiotics led to a decrease in MMR (Costello et al. 2006). Progress was also due to data improvements in death registration, increased investigation into the causes of

deaths of women of reproductive age, vertical health programmes in the 1980s (promotion of breastfeeding, oral rehydration, and immunisations), and implementation of national programmes to improve maternal and child health and to promote women's health. Finally, socioeconomic and demographic changes (economic growth, improved education of women, and decreased fertility rates), and interventions outside the health sector (for example, conditional cash transfer programmes and improvements in water and sanitation) also played a role (Victora et al. 2011). Particularly in China, one-child policies arguably also contributed (Yanqiu et al. 2009).

Also, vital to progress was ensuring a continuum of care from ANC to PNC during the launch of Partnership for Maternal, Newborn and Child Health (2005). This global consortium took on the goal of reducing maternal mortality advocating and integrating it with newborn and child mortality in a continuum of care (Starrs 2006; WHO et al. 2011). In order to continue the progress in achieving MDG5, women's socio-economic status and the health system conditions should be addressed as these also present a risk (WHO 2004). Lozano et al. (2011) highlighted that interventions are still needed for disadvantaged/marginalised women.

Recently, the MDGs reached maturity in 2015 and were replaced by the Sustainable Development Goals (SDGs) towards continued development. The single health goal (Goal 3.7) aims to address the universal need for access to quality sexual and reproductive health services to meet the need of women and their families: "By 2030, ensure universal access to sexual and reproductive healthcare services, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes". The specific targets for measurement are still under debate, yet SBA at birth and MMR are likely to still be used as indicators (UN 2016).

1.3.1 Maternal health access and outcome indicators for evaluation

In this section, the intricacies of provision of these maternal health indicators are discussed as they are used in this evaluation. One key strategy in achieving improvement in maternal health is to increase the uptake of maternal health services, particularly ANC. Uptake of ANC is relevant not only to LMICs. In high-income

countries, such as the UK, there is evidence that 26% of the women who died from direct or indirect causes related to pregnancy were poor ANC attendees (Lewis 2011). Access to antenatal health visits and medicines can prevent death from hypertensive disorders, while death due to sepsis can be averted by screening for prenatal maternal infection and sexually transmitted infections (STI) during antenatal visits and with hygienic infection control measures provided by SBA during birth (Ronsmans & Graham 2006). The antenatal period presents an important opportunity to identify danger signs, symptoms, and potential risks of labour and delivery. It is during the antenatal period that measuring women's blood pressure can identify women at risk of pre-eclampsia and treatment can prevent eclamptic convulsions (AbouZahr et al. 2003). Furthermore, if anaemia is targeted during ANC (especially during the first trimester) with a nutritional intervention, low birth-weight and mother and foetal outcomes can be improved (AbouZahr et al. 2003). Also, tetanus immunisation during pregnancy can be life-saving as it prevents both mother and child from contracting tetanus (*Clostridium tetani*) (AbouZahr et al. 2003). The antenatal period is also an opportunity for education and counselling: women can obtain information on birth-spacing and on STIs including HIV prevention to improve maternal and infant survival (UN 2011b).

While levels of provision and attendance of ANC have increased in many parts of the world during the past decade, only 46% of women in LMICs attend any ANC at all (UN 2011b). It therefore remains a high priority to provide women with adequate ANC. In addition, just over a third of all pregnant women in LMICs have the recommended four ANC visits (Lincetto et al. 2006; WHO 2014c; UN 2011b). In comparison, 66% of women attend ANC in the first trimester in Latin American and the Caribbean and in the Middle East and North Africa, while in Asia this figure is nearly half of the above rate and in South Asia there is overall a low level of use. In Nepal, for example, 38% reported attending one visit and only 9% reported four or more visits (Tuladhar and Dhakal 2012). While, in Sub-Saharan Africa women tend to wait until the second trimester to attend ANC (Mushamiri et al. 2015).

One reason for low or delayed uptake is that in LMICs women have to travel long distances and wait long hours, which deters them from attending ANC, as seen in the *three-delay model* (Section 1.3.2). There are substantial financial and opportunity costs to women for such frequent attendance, i.e. one or more antenatal visits (MOH 2002). Furthermore, women who present for one ANC visit are likely to attend additional visits (AbouZahr 2003). The WHO model of ANC separates pregnant

women into two groups: routine ANC, 75% of the total population of pregnant women who have a minimum of four ANC visits, and the remaining 25% that necessitate special care (AbouZahr 2003).

The added value of ANC leading to better pregnancy outcomes is that it can increase the likelihood of a woman seeking delivery with a skilled healthcare provider (WHO 2004b; Fujita et al. 2005). Women who had four ANC visits were on average 3.3 times more likely to give birth in a health facility. There is a strong positive correlation between at least one visit and having a skilled birth attendant at delivery. ANC can potentially serve as a strategy to increase the uptake of SBA services and ensure access to emergency obstetric care.

All women need a midwife and some women need a doctor, the former to ensure a psychosocial birthing process, and the latter to help with complications (Sandall 2012; UNFPA et al. 2014; EWEC 2015). The WHO definition of a SBA is a health worker with midwifery skills “trained to proficiency in the skills needed to manage normal (uncomplicated) pregnancies, childbirth and the immediate postnatal period, and in the identification, management and referral of complications in women and newborns” (WHO 2004b). Traditional birth attendants (TBA), trained or untrained, were excluded from the definition of SBA because they lacked the clinical skills to manage complications, for example, haemorrhage, eclampsia, or severe infection (Starrs 2006). Thus, while ANC can provide an important opportunity to target maternal deaths, it requires the addition of a skilled attendant and PNC to effectively target MDG5 and provide women with the care they need (Fujita et al. 2005). The effectiveness of only providing ANC, however, is debated - the WHO consensus is that important elements of ANC are likely to improve maternal and/or perinatal health outcomes, but not necessarily maternal survival (AbouZahr et al. 2003; Zeitlin 2013). Also the risk approach (identifying the women who are most likely to go on to develop serious complications) has been shown to have limited effectiveness, as those identified as being at risk often have normal deliveries. As stated in Section 1.3, a multi-level continuum of care approach is needed to target maternal and newborn health (MNH) (WHO 2011). Thus, interventions in LMICs should target the full continuum of care, as timely management of pregnancy and labour, with intervention if needed, can make the difference particularly where morbidity and mortality levels among women of reproductive-age are high. Maternal morbidity and deaths can be prevented through simple cost-effective measures if these are available: blood transfusions, oxytocics to prevent bleeding, and/or manual removal of the placenta by

a SBA (Bayer 2001; UNFPA 2006). Most deaths occur during labour and delivery, hence the need for skilled care during delivery, which should be emphasised to women during ANC (UN 2011b). On the basis of such evidence, the WHO guidelines advise that women should have at least four antenatal visits in pregnancy, the first within the first trimester of pregnancy, and have a skilled attendant at birth with adequate resources and PNC immediately after birth and/or for at least 24 hours after birth (WHO et al. 2014a).

1.3.2 Three Delays impact on maternal health

Improving uptake of maternal health includes those interventions that target the uptake of ANC, SBA, ID, and PNC specifically in rural areas (Section 1.4). In general, maternal mortality is higher among women living in rural areas and poorer communities. In LMICs, poor rural women are the least likely to receive adequate healthcare, especially in regions with low numbers of skilled health workers, health services, or where there is a lack of transportation and the lack of personal finances to travel to and use the health services, such as sub-Saharan Africa and South Asia (Rogo et al. 2006). Therefore, to reduce the delays, there is a significant need for interventions that are delivered within the community setting. For example, most births and newborn deaths occur at home in Nepal (Sreeramareddy et al. 2011). Hence, to reduce mortality, behavioural change interventions are required to improve care at home and care-seeking behaviour (uptake).

Access to maternal health services is a key criterion for the health status of childbearing women across the globe. The *Three Delays* model (2004) proposed by Thaddeus and Maine postulate that access to healthcare could be delayed for a number of reasons. They proposed three points at which action should be taken: (1) when there is a delay in deciding to seek care (first delay), (2) when a woman fails to reach care in time (second delay) and (3) when a delay occurs in receiving adequate treatment at the facility (third delay) (Thaddeus and Maine 1994). Explicitly put, women are hindered from receiving or seeking care during pregnancy and childbirth due to factors such as empowerment (being the main the decision-maker for their health), poverty, distance, and lack of information, inadequate services and cultural practices (Section 1.4). Thaddeus and Maine also argue that women lack assertiveness and have low self-esteem and other social determinants for MNH service utilisation (such as literacy, education level, socio-economic status and parity). They are also unlikely to access services due to a lack of financial support (equity

funds), and staff attitudes at the health facility can be a barrier to access that is not addressed by community-based health interventions (UNFPA 2014).

In order to continue progress towards improving maternal health and decreasing MMR, there is a need for evidence-based health promotion and community programmes that improve access to services. For instance, programmes that are a part of solving the “delays” are applicable to non-attenders of ANC, during labour and birth and PNC where adequate treatment if provided, can mean averting pregnancy-related mortality (Nour 2008). It is also necessary to increase the service delivery capacity of health providers and to address the four dimensions of access barriers (geographical access, availability, affordability and acceptability) (Jacobs et al. 2012; Khan & Bhardwaj 1994; UNFPA 2014). One of the main recommendations from the report on the MDGs on child and maternal mortality was the need to strengthen health systems, to improve access to maternal health services, and to introduce an evidence-based holistic approach where communities are empowered to demand high-quality services that include well-functioning referral and transport mechanisms (Lozano et al. 2011). Although emergencies cannot be eradicated through labour care, they can be reduced through skilled and motivated teams available at facilities and equipped with necessary medicines and commodities. The teams need to be able to work in enabling environments that promote evidence-based practices, and client-centred and respectful maternity care services. The availability of good quality essential and emergency obstetric and neonatal care services is crucial for further improvements in maternal and neonatal outcomes (UNFPA 2014). Thus, to continue to improve maternal health the barriers that limit access to quality maternal health services must be identified and overcome at all levels of the health system (UN 2011; WHO 2012b). By strengthening existing health systems and access to these systems in countries and improving intrapartum and postnatal quality of care, treatment can be lifesaving for women (Sharma et al. 2016a; Sharma et al. 2016b).

However, as discussed in Section 1.3, maternal health interventions alone are not enough. Nor is strengthening access to health systems with comprehensive facility-based midwifery and obstetrical care (Costello et al. 2006), as deaths occur outside the intrapartum state and the facility. Addressing equity, human rights and the economic and social benefits of saving women's lives will benefit infants and children as well (Starrs 2006). Equally important are partnerships across country and regional level between international, national, academic, governmental and non-governmental and community, donors, health professional associations, non-governmental

organisations, and academic and research institutions. The need of collaboration among sectors within countries is essential for implementation at the level of the needed interventions (Judd et al. 2001; Duflo 2004). Additionally, more evidence is needed to first develop assessment methodologies and second, to develop interventions that are cost-effective (Campbell and Graham 2006).

For instance, community-based maternity health promotion has been conducted to empower communities in rural Nepal. On the basis that several components are needed to holistically improve maternal care, the Nepali NGO GTN designed an evidence-based health promotion strategy to improve uptake, knowledge and decision-making. Access to health services was a GTN priority; the programme took into account the fact that there was a lack of information and socio-cultural factors that influenced access to care in the community (Chapter 2). The next section discusses Nepal and its health and culture policies that have improved women's knowledge of and access to maternity services in the country.

1.4 Background on Nepal

Nepal is an impoverished low-income Asian country and has a population of close to 27 million (World Bank 2013). Approximately 49% of the population live in the southern Terai region, the most fertile area of Nepal, while 44% of the population live in the Central hill zone that includes the capital and only 7% live in the mountain region of northern Nepal (DFID 2010). Kathmandu is the capital city and the principal urban centre of Nepal. Like most low-income countries; it has a significant education and wealth disparity (UNU-WIDER 2005; World Bank 2006; MOHP 2012). Unemployment is at 45%, about 43% of adults are illiterate (Table 1), and foreign aid makes up 3.4% of Nepal's economy. Additionally, the country's human development index ranks 145th out of 188 countries and experiences large gender disparities (Index Mundi 2012; UNDP 2015). The average life expectancy is 68 years and the total fertility rate is 2.3 births per woman (Table 1). Approximately a third (34.9%) of the population lives in urban areas in 2011, and urban-rural differences are considerable, with rural poverty being nearly 1.8 times higher than urban poverty (UNDP 2014). Figure 1 shows the Pharping area in rural Nepal. Furthermore, Nepal is primarily a patriarchal society, with 77% of households headed by male members in 2013/4 (CBS 2015).



Figure 1 Rural Nepal, Pharping area

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The country has been through a period of transition from an authoritarian Hindu kingdom to a constitutional monarchy and then to a democratic republic. The transition included events such as the massacre of members of the royal family in 2001, and the decade-long civil war between Maoist insurgents and the government that ended in a peace agreement in 2006. These events additionally stalled progress in the Federal Democratic Republic of Nepal. The removal of the monarchy altogether in 2008 enabled the creation of a democratic republic. Finally, 16,000 deaths were recorded at the end of the civil war (Brown and Felbab-Brown 2012; CIA 2013; Wasti et al. 2015; World Bank 2010).

The country is divided not only geographically but also by wealth, caste, ethnicity, religion, and a federal system (dividing the national government and the smaller local governments) (CIA 2013; van Teijlingen et al. 2015; World Bank 2010). Cultural diversity and complexity characterise the current social landscape of Nepal. The Census of 2011 recorded 125 caste/ethnic groups, and 123 documented languages (CBS 2012). With the introduction of the *Muluki Ain* (National Code) in 1854, the caste system in Nepal has been accepted as the primary organising principle and the major determinant of social identity. Although caste-based discrimination was outlawed in

Nepal in 1963 (in the National Civil Code), it is still present in society - dominant and subservient groups, and disparities in education and wealth are closely linked to the Hindu caste system. It divides the population into hereditary groups (circa 12). At the top of the social order are members of the Brahmin class (priests and scholars), followed by *Chhetris*, *Newar*, *Magur*, *Tharu*, *Tamang* and *Dalit* with a majority of the population being Hindu (80.6%) (MOHP 2012; Brown and Felbab-Brown 2012). Buddhists and Muslims are minorities who, along with lower-caste people (Dalits) and rural residents, have been historically marginalised (Brown and Felbab-Brown 2012).

The continued political instability contributed to stalled socio-economic development. Unemployment, poverty, socio-cultural and ethnic diversity, socio-economic exclusions, and slow economic growth remain major challenges to progress (WHO 2007). Another more recent challenge is the 2015 earthquake that has decimated selected areas of Nepal, particularly rural areas (Neupane 2015; Sharma 2015).

1.4.1 Population & health policies and programmes in Nepal

Nepal has a fairly comprehensive health policy framework. With the introduction of the Family Planning and Maternal and Child Health Plan (FP/MCH) in 1965, family planning has been a health priority. In the 1990s, health policy introduced preventive, promotive, curative, and rehabilitative care. From 1997, disparities in health status were addressed, assuring equitable access to quality healthcare services with full community participation and gender sensitivity. Initiatives were particularly aimed at vulnerable groups whose health needs are often not met, such as women and children, the poor, underprivileged, and marginalised groups. Policies also extended the primary healthcare system to the rural population, providing modern facilities and trained healthcare providers including female community health volunteers (FCHVs) and TBAs. The indicators Total Fertility Rate (TFR) and Infant Mortality Rate (IMR) were the focus of the MoHP. Policies also have had a role in liberating and empowering women in the village development committee (VDC) (Bishai et al. 2002). The Safe Motherhood Programme used evidence-based policies that stressed the importance of skilled birth attendants at every birth and embodied the government's commitment to improving women's health via skilled birth attendants. This led to the recognition of the importance of SBAs in reducing maternal and neonatal mortalities, further complemented by legislation of abortion (2002), and increased emphasis on equity issues in Safe Motherhood services (Wasti et al. 2015). Since the introduction of these policies, MMR was notably reduced (see also Section 1.4.4).

Programmes during 2001-2012 aimed to increase the quality and uptake of family planning (FP) services and MCH services by strengthening health service delivery systems, building local capacity and engaging stakeholders in the community. The Implementation Plan (2004-2009) emphasised the above with a major aim to achieve the health sector MDGs in Nepal, and a consequent reduction in poverty, through improved health outcomes for the poor and those living in remote areas. From 2010-2015, there was a further refinement of earlier policies and plans for the implementation of cost-effective, evidence-based interventions to make the best use of limited resources. Thus, maternal and child health indicators such as MMR, TFR, neonatal, infant and under-five mortality rates, contraceptive prevalence rates, and the percentage of underweight children were specifically targeted (MOHP 2010a; Dixit 2005). These initiatives were further complemented by the interim development plans drafted after the People's Movement (2006), where Nepal's Interim Constitution (2007) proposed the concept of "*health for all*". In practical terms this meant providing essential healthcare services free of charge and the right of every woman to a good standard of reproductive health. Part of the above concept was the *Aama Surakchhya* maternity incentive programme (AAMA), designed to improve indicators of maternal health, which distributed Nepali Rupees (NRs.) 400 (£ 2.4) to women for having four ANC visits, a hospital birth, and the 1st PNC visit. This programme was introduced nationally in 2010. The cash payments, given after birth at a facility, were increased in remote areas: NRs.1500 (£9.20) in mountain areas, NRs.1000 (£6.10) in hill areas, and NRs.500 (£3.10) in the Terai. Incentives also included payments to health facilities for the provision of free care covering normal delivery (NRs.1500 or £9.20 to health facilities with 25 or more beds and NRs.1000 or £6.10 to health facilities with less than 25 beds) and payments to health facilities for complicated deliveries (NRs. 3000 or £18.50) and caesarean-section deliveries (NRs.7000 or £ 43.20). Incentives to health workers for births at home had been reduced to discourage home-based delivery; if a woman gave birth at home, there was no incentive (Ensor et al. 2009; Witter et al. 2011).

Therefore, achieving equity in Nepal meant having concern for poor and marginalised populations. Providing health services, education, and employment in general and to the low-caste Dalits in particular was a priority of the government. To this end, the MoHP spends close to 51% of its funds in rural areas (which are typically poorer), 18% in semi-urban and 31% in urban areas. Despite policies aimed to reduce this marginalisation of groups from any economic, social and political participation and

representation in local and central state, the continuing caste/ethnic and regional disparities provided a medium for the growth of conflict and the decade-long Maoist insurgency, and these have not altered the status quo completely with a resurgence of ethnic and regional issues (van Teijlingen et al. 2015).

1.4.2 Health administration and health workforce

Nepal is administratively divided into 75 districts. Each district, managed by a chief district officer, is further divided into smaller units called VDCs and municipalities. The VDCs are rural areas whereas municipalities are urban. Currently there are 3,915 VDCs and 58 municipalities. Each VDC is composed of nine wards. In municipalities the number of wards varies from 9 to 35. The lowest level of formal healthcare starts from Sub-Health Posts at the VDC level to Health Posts, Primary Healthcare Centres and to specialised care at hospitals at the district, zonal, sub-regional, regional, and central levels (MoHP 2012; Wasti, 2015). In each VDC there is a health post or a sub-health post. A Primary Healthcare Centre is staffed with a Medical Officer, two staff nurses, two auxiliary nurse-midwives (ANMs), two auxiliary health workers (AHWs), and volunteers. Health posts are staffed with a Health Assistant or a Senior AHW, an ANM, two AHWs and a FCHV. Similarly, in a sub-health post the official positions are a CMA, a Maternal and Child Health Worker (MCHW), and a FCHV. Yet recruitment and retention of health workers is a problem, especially in remote rural areas (MOHP 2012). As health staffing has not increased, except for certain categories of doctors and the post of village health worker was created in response to the need for a trained health workforce. For instance, Village Health Workers were also introduced with six-weeks training in basic healthcare and ANM training courses to increase the manpower for the MCH programme. In addition, for maternity care, specialised training for ANM and SBA were also introduced in order to provide village-level delivery service care in a more efficient way. FCHVs provide basic primary health services and health education to promote community participation, to promote women's participation in the process of development, and to improve access to health services (Bishai et al. 2002). Therefore, community-based health workers FCHVs and TBAs act as links between the community, and the formal health system. Finally, volunteers are responsible for helping Village Health Workers to implement health promotion and preventive healthcare.

Although services for health, education and rural amenities have been well-planned they are often inadequately and inequitably delivered (Wasti et al. 2015). There are

few health staff and government agencies in the many remote regions of Nepal from which it could easily be assumed that not all births or deaths are accurately recorded (Ameh and van den Broek 2014). Furthermore, there are an estimated 400,000 to 800,000 traditional healers in Nepal, but only 3,500 biomedical doctors. It has been argued that traditional healers can play a central role in scaling-up community healthcare (Poudyal et al. 2003). Yet it is more imperative to increase the nurse-midwife population (as per demand). The nursing ratio is only 5 nurses per 11,825 people (Index Mundi 2012).

Organizational Structure of the Department of Health Services

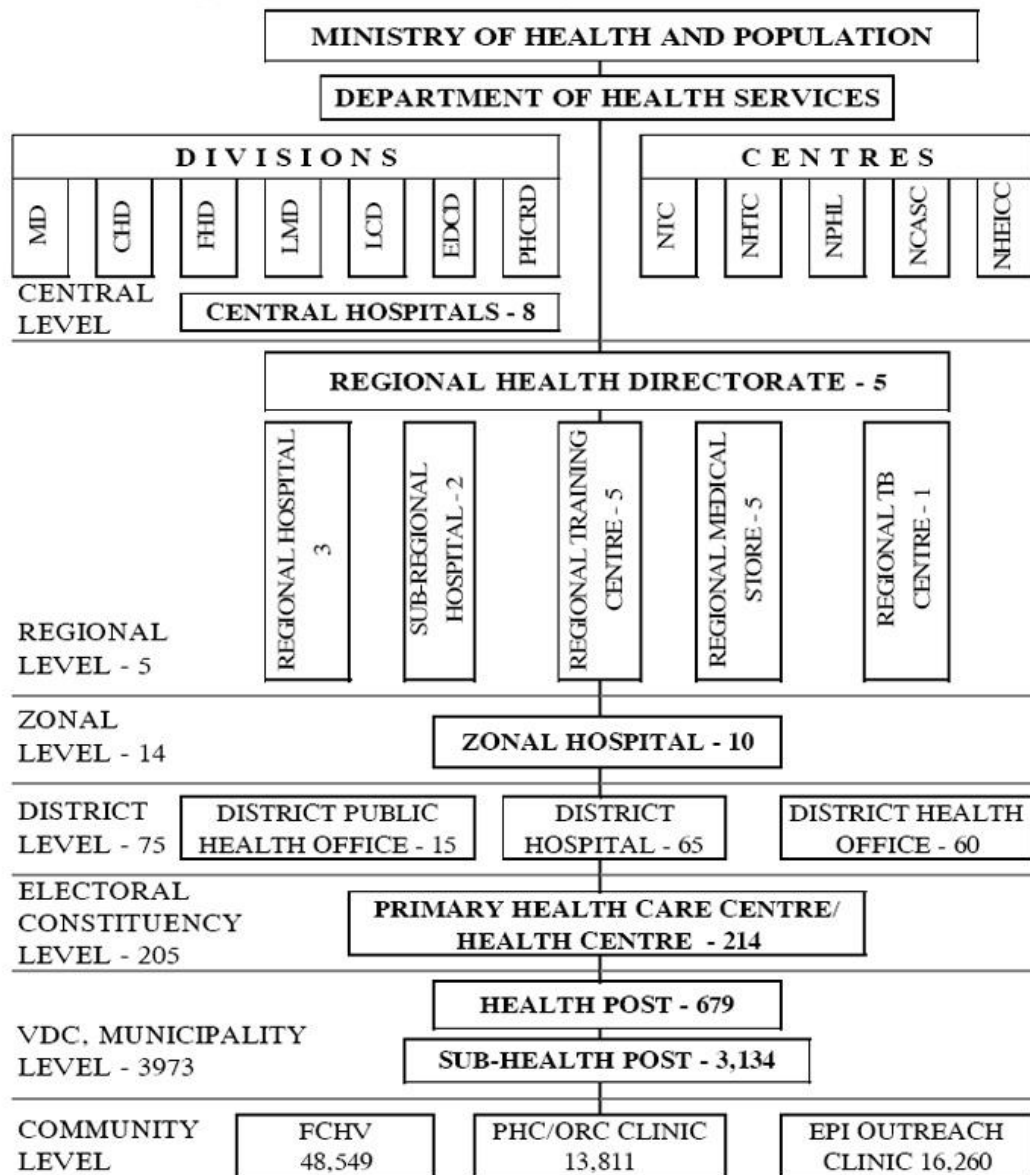


Figure 1b.1

Source: Administration Section, HMIS/MD, DoHS

Acronyms

MD	Management Division	NHTC	National Health Training Centre
FHD	Family Health Division	NTC	National Tuberculosis Centre
CHD	Child Health Division	NCASC	National Centre for AIDS and STD Control
EDCC	Epidemiology and Disease Control Division	NPHL	National Public Health Laboratory
LMD	Logistics Management Division	FCHV	Female Community Health Volunteer
LCD	Leprosy Control Division	PHC/ORC	Primary Health Care Outreach Clinic
PHCRD	Primary Health Care Revitalization Division	EPI	Expanded Programme on Immunisation
NHEICC	National Health Education, Information and Communication Centre		

Figure 2 Organisational structure of the Nepal Health System

(Source: GoN, MoH and DHS, 2014).

1.4.3 Nepal: Maternal health and delivery practices

Also lagging in progress is maternal healthcare uptake - less than half of Nepalese pregnant women attend ANC, and over 80% of births occur at home. Despite efforts by the MoHP to encourage facility-based births (WHO 2009b), only 36% of births in 2011 were assisted by a SBA (WHO 2014c; Table 1). In the maternal health context, this places women at risk, as SBA, which in Nepal, contrary to the global definition (Section 1.3.1), includes TBA with only 12 days training (Falle et al. 2009). In LMICs, the risk of maternal death during childbirth is 2–4 times higher among adolescents (younger than 18) than among women aged 20 or older. In a country like Nepal this is of concern as the median age of women's first pregnancy is 20.2 years (MOHP, New ERA & ICF 2012).

Nepal, however, is one of the few nations in the world to have made great progress in decreasing maternal mortality (Shrestha et al. 2014) despite numerous challenges, including poverty and economic disparities, long distances, lack or cost of transport, shortage of staff, facility capacity to treat serious complications, and home birth preference without a SBA (MOHP, New Era & ICF 2012). Nepal achieved its target for MDG5 of reducing the MMR by three quarters between 1990 and 2015 (UNDP 2013), a target set by the Ministry of Health at 250/100,000 (MOHP 2011). From 1990 to 2015, the MMR in Nepal declined from 770 to 258 deaths per 100,000 live births (MOHP 2012; WHO 2015). A WHO report estimated the 2013 MMR at 190 (WHO & UNICEF 2014b; World Health Organization, United Nations Children's Fund, United Nations Population Fund, United Nations Population Division and World Bank 2014), compared to the UK where it was 10 per 100,000 live births between 2010 and 2012 (Manktelow et al. 2015). As discussed in Section 1.3, there exists a certain degree of in-country variability for MMR as it is based on modelled data (Pant et al. 2008). For instance, a study in eight districts reported an MMR of 229 deaths (Suvedi et al. 2009). An independent study in the Sarlahi district (which generally has more accurate statistics in health than the national average) found a MMR of 529 deaths per 100,000 live births, in other words, double the government target (Wee et al. 2010). It should be noted that regional differences in maternal health are not uncommon in South Asia and have been reported in many studies in Nepal (Khanal, Adhikari et al. 2013), India (Sreeramareddy, Harj, et al. 2011), and Pakistan (Badshah et al. 2008). MMR

reductions are credited to several demographic drivers, as discussed in the next section.

1.4.4 Demographic drivers of decline in MMR

It seems that the progress in crucial maternal health indicators (Section 1.3.1) alone is not enough to bring about such a dramatic decline in MMR, as the reduction in maternal mortality coincided with severe political upheavals. The reasons for decline in MMR are unclear since, as discussed in Section 1.3, MMR is based on highly uncertain data. There is some evidence that a reduction in fertility, changes in education and wealth, improvement in women's education, gender empowerment, and reduction of anaemia may each explain more than 10% of the district variation in maternal mortality (Shrestha et al. 2014; Hussein et al. 2011). Some of these factors are discussed below.

Education is considered to be one of the key factors in improving standards of living in modern life. Women's improved education status can contribute to a decline in MMR. In Nepal, where the patriarchal system has a strong influence in governance (Mullany et al. 2005), the education ratio between the respective male and female populations shows a considerable disparity. For example, there is a large disparity between literacy of males and females in Nepal. In 1994/95, 2003/4 and 2010/11 the difference between the male and female literacy rates were 34.1 per cent, 30.7 per cent and 27.1 per cent, respectively (World Bank 2011). Another factor in the decline in MMR is a rise in the age of first sexual intercourse. NDHS data (2011) showed differences in age at first sexual intercourse by sex. Nepali women aged 25-49 initiate sexual intercourse at a median age of 17.7, just after marriage (MOHP, New ERA & ICF International 2012). Women in Nepal marry at a young age – for women aged 25-49 years the median age of marriage was 17.5 years old (MOHP, New ERA & ICF International 2012). Likewise, there has been a rise in the age that women have their first birth in Nepal (median age of 20.2), which has also had an impact on MMR. Women with no education had their first birth four years earlier than women with higher education (median age of 19.7 compared to 23.7) (MOHP, New ERA & ICF International 2012). However, fertility in Nepal has declined over the past twenty years. Women have on average 2.6 children, a decrease from 4.6 in 1996, 4.1 in 2001, and 3.1 in 2006 (Pradhan et al. 1997; MOH, New ERA & ORC Macro 2002; MOHP, New ERA & Macro International 2007; MOHP, New ERA & ICF International 2012). This decline in fertility has impacted

MMR as maternal mortality risk depends on the number and timing of pregnancies in a woman's reproductive lifespan, by the presence of co-morbidities, and by obstetric care (Cleland et al. 2012). However, fertility varies by residence, region, women's education and economic status. Additionally, fertility increases as household wealth decreases. As of 2011, women who had higher education had an average of 1.7 children, while women with no schooling had an average of 3.7 children (MOHP, New ERA & ICF International 2012). Concomitantly, there has also been a marked increase in the use of contraceptives from 1996 to 2006, although usage remained the same from 2006 to 2011, probably due to male overseas economic migration (MOHP 2012; MOHP, New ERA & ICF International 2012). Contraception use was at 50% in Nepal in 2011 (Table 1). Use of modern family planning methods is fairly high in both urban and rural areas (50% and 42% respectively). It is interesting to note that modern contraceptive use is lower among educated women; only 35% of women use a modern method compared to 49% of those without education. Thus, these trends in family planning led to birth spacing and reductions in the number of pregnancies (MOHP, New ERA & ICF International 2012).

FCHVS are thought to be key contributors of the reduction of maternal mortality in Nepal due the key factor of task shifting of maternity care education to the grassroots-level (i.e. FCHVS/VHW/MHCW) (Koirala 2012). This increase in health manpower was a vital point that has contributed to the reduction of maternal mortality in the country, especially in the rural part as it addressed a void in care (MOH, New Era and USAID 2014; WHO 2015).

Additional key factors in targeting the reduction of MMR are the uptake of maternal health services and indicators (Koblinsky 2003). The maternal health progress indicators used as standards in Nepal and worldwide are measured by the Demographic Health Surveys (DHS) (MOHP 2012; MOHP, New ERA & ICF International 2012). These surveys include maternal health indicators such as the number of ANC visits, the timing of the first ANC visit, components of ANC (tetanus toxoid vaccination and iron/folic tablets), place of birth (institutional delivery or ID), SBA at birth, characteristics of the birthing, birth complications, problems in accessing healthcare, items for delivery services, and essential supplies for delivery and attending PNC.

However, Nepal has areas of low uptake of maternal health services that are influenced by traditional healers and religion (Syed 2008; Sharma et al. 2016b). Home birth remains the preferred option for many (Section 1.4.3), and one key problem is the slow decision-making process at home when something goes wrong due to the lack of women's autonomy and poor recognition of complications of pregnancy (MOHP, New ERA & ICF International 2007; MOHP, New ERA & ICF International 2012).

Moreover, as detailed in Section 1.3, policy and the health system have also played a role - these legal changes have affected the provision of maternity care. For instance, until 1951, women in Nepal had no legal status and their legal rights were negligible. In 2002, the government outlawed child marriage and polygamy; legalised abortion of up to the first 12 weeks of pregnancy. The Interim Constitution of Nepal (2007) recognised reproductive health as a fundamental right, one of the first nations to do so (Nepal Law Commission 2007; Vijayarasa 2009).

Table 1 puts Nepal's progress in terms of MMR into context, as India with double the Gross National Income 5,350\$ GNI PPP and a higher health worker expenditure has the same MMR (190). Afghanistan has a similar \$ GNI PPP (1,960\$ GNI PPP) but, predictably, a higher MMR (400) due to the remoteness of regions, high instability and insecurity in the country and weak reproductive rights for women (Arnold et al. 2015; World Health Organization, United Nations Children's Fund, United Nations Population Fund, United Nations Population Division & World Bank 2014), compared to the UK, where it was 8 per 100,000 live births between 2010 and 2012; (Manktelow et al. 2015). Nepal continues to do well in other progress indicators (Table 1) despite a civil war and a low GDP rank of 97/230 (2014). The 2,260\$ GNI PPP of Nepal (2013) does not include personal remittances, mainly from Nepalese men working abroad, which helps women to pay for care – this amounts to 22.2% of GDP. The data are in current U.S. dollars. The table definitions and sources are in Appendix II.

Table 1 Demographic and health indicators

Demographic and health indicators	Nepal (Year)	Bangladesh (Year)	India (Year)	Afghanistan (Year)	U.K. (Year)
Population, millions ¹	27	153	1221	30 (2011)	63
Adult literacy rate, % of people aged 15 and above²	57 (2011)	59 (2012)	-	32 (2011)	-
Life expectancy at birth, years³	68 (2013)	71 (2013)	-	61 (2013)	81 (2013)
Maternal mortality ratio per 100,000 live births⁴	190 (2013)	170 (2013)	190 (2013)	400 (2013)	8 (2013)
Neonatal mortality ratio per 1,000 live births (2013)⁵	23 (2013)	24 (2013)	29 (2013)	36 (2013)	3 (2012)
Births attended by skilled health staff, %⁶	36 (2011)	34 (2013)	52 (2008)	39 (2011)	100
Crude birth rate per 1,000 people⁷	21 (2013)	20 (2013)	20 (2013)	34 (2013)	34 (2013)
Crude death rate per 1,000 people⁸	7	6	8	8	9
Total fertility rate, total births per woman⁹	2.3 (2012)	2.2 (2013)	2.5 (2013)	4.9 (2013)	1.9 (2013)
Contraceptive prevalence, % ¹⁰	50 (2011)	62 (2013)	55 (2008)	21 (2011)	84 (2009)
Pregnant women receiving prenatal care, %¹¹	58 (2011)	53 (2013)	-	48 (2011)	-
Health expenditure per capita, per purchasing power parity¹²	135	95	215	143 (2013)	3311
Out-of-pocket health expenditure, %¹³	46.2	14.6	58.2	73.8	9.3
(\$) GNI per capita, purchasing power parity¹⁴	2260	3190	5350	1960	37970
GDP per purchasing power parity rank¹⁵	97 (2014)	36	4	101	11

¹ rounded off to closest million

1.5 Rational for this thesis

This mixed-method evaluation aims to enable the development of a better understanding of potential causes of care-seeking behaviour in maternal health. This evaluation will assist in determining the best way to evaluate maternal health promotion interventions and whether there was an increase in the uptake of services, a change in knowledge, attitudes and beliefs and the cost of providing and evaluating health promotion. In order to evaluate the intervention from an “effectiveness perspective”, experience was gained in conducting evaluations of health promotion interventions in LMICs, specifically evaluation techniques in the field of reproductive health while at the University of Barcelona, Spain and the University of Buenos Aires, Argentina. An “effectiveness” and economic analysis was also conducted, which is a new application in this field of health promotion evaluations, in order to assess what the cost of providing these interventions and evaluations are. These activities were supported by grants from both Bournemouth University and Santander Universities.

On a professional level, this PhD leads to an understanding of potential factors affecting care-seeking behaviour in maternal health, and developed the researcher’s skills in mixed-methods research and evaluations. The latter are needed in order to understand how to measure “what works” given limited resources settings. This research will be relevant to those who wish to know how evaluations are conducted, and in evaluating whether health promotion was effective in improving maternal health. The findings may affect how interventions are evaluated in similar environments in the future. The findings may also assist relevant national bodies or NGOs in producing health promotion curricula for implementation, community mobilisation and evaluation.

Finally, this PhD focuses on issues that are important to the researcher at a personal level, as she encountered them growing up in Kenya, a LMICs country, and in the past few years spent considerable time in Nepal. She believes that this type of research can ensure accountability in programmes that aim to minimise inequalities and inequities in health, in particular in access to maternal and child health services. In research, a ‘voice’ is given through writing to those who do this important work of saving mothers’ and children’s lives and

additionally share “what works” for these women who are in great need of healthcare.

1.6 Summary

This introductory chapter has established the importance of evaluations in community-based health promotion interventions. It has also discussed an issue of importance in public health - maternal health and related causes of mortality, such as access to and uptake of services. It further described global initiatives and indicators, such as the role of MDG5, in addressing maternal health and the high MMR in LMICs, such as Nepal. The latter was also discussed to provide context to the GTN intervention. Most births and deaths occur at home in Nepal, hence to reduce mortality, behavioural change interventions are required to improve care at home and care-seeking behaviour. Evaluative research, as described here, can identify community-level maternal and newborn care practices and care seeking behaviour (or lack of), as well as inform the design and evaluation of health programmes, such as GTN, that target barriers to access to care, which will be discussed in Chapter 2.

Chapter 2 Evaluation, health promotion & GTN

This chapter describes the foundations and principles of health promotion and the Green Tara Nepal (GTN) maternal health promotion intervention (henceforth called “The GTN Intervention”) that aims to improve the knowledge and access of women to maternal healthcare in Nepal. The intervention used health promotion to empower individuals with increased knowledge of maternal health and to encourage/empower expectant and new mothers to seek care. The chapter concludes with a literature review on similar interventions.

2.1 GTN intervention aims (or approach) and health promotion

Research is often passive: it is done to observe or measure change. However, “action research”, as used by GTN, was done to facilitate change in the individual and the community. Action research is applicable to small-scale interventions (Glanz & Rimer 1997; Baker 1999). Action research aims to include service users and communities in both the delivery of health interventions and in research projects. User interactions are formed to develop more focused strategies and to cater to the needs of the members of society whose ‘voices’ are least heard, such as women and children (Osirin 2003; Akhund and Yousafzai 2011).

This type of intervention is part of solving the first delay of the “3 delays” model (Section 1.3.2), identified in the maternal morbidity and mortality conceptual framework, namely the delay in making the decision to seek care (Thaddeus and Maine 1994; Nour 2008). The key aims of the intervention were to (a) understand why pregnant women do not access existing services; (b) identify and address socio-cultural issues, psychosocial barriers and social organisation, i.e., women’s status and influence of others in decision-making, and economic, geographic and financial access to maternal health services; and (c) meet the potential increase in demand by the concomitant strengthening of the existing service provision (Simkhada et al. 2006; van Teijlingen et al. 2012).

Essentially, the health promotion intervention aimed to improve access by addressing cultural and psychosocial barriers, and by achieving empowerment and community participation by working with the community to change both

individual and group behaviour in order to improve awareness (van Teijlingen et al. 2012). The GTN intervention took the form of empowerment referred to by Hulton and colleagues (2007) - to improve knowledge, attitudes and beliefs, decision-making, and encourage uptake of health services (Section 2.1). The GTN was not a midwifery intervention. The programme took into account the fact that there was a lack of information and that socio-cultural factors in the community influenced access to maternal healthcare and could be addressed with health promotion. In order to have a better understanding of the intervention, the reader is introduced to key concepts of health promotion in the next section.

2.2 Health promotion theories

Health promotion and public health strategies are based on the understanding that health is a concept engaging social, mental, spiritual, and physical well-being. Public health is concerned with the assessment of the health of populations, formulating policies to prevent or respond to health problems, promoting healthy environments, and promoting societal efforts to invest in living conditions that create, maintain and protect health. This covers an extremely wide range of interventions aimed at improving health with various levels and types of intervention including health promotion (Waters et al. 2006).

While public health has tended to place more emphasis on the end results, health promotion has placed more value on the means used to achieving those ends (Green & South 2006). The most commonly applied health promotion definition is the one used in the Ottawa Charter (Page 1):

“Health promotion is the process of enabling people to increase control over, and to improve, their health. To reach a state of complete physical, mental and social wellbeing an individual or group must be able to identify and realise aspirations, to satisfy needs and to change or cope with the environment.”

(WHO 1986)

A “holistic view on health” or holism was identified as one of the key principles of the Ottawa Charter for Health Promotion (WHO 1986) and is linked to social ecology with the determinants of health. First, social ecology is an approach which views one’s socio-economic and policy environment as a key influencing factor of one’s behaviour (McLeroy et al. 1988; Stokols 1996). Second, the determinants of health are interactions between social and economic conditions, the physical environment, individual lifestyles and health. Due to the influence of these approaches and the resultant complicated and intricate interactions, “we” are likely to need quite multi-dimensional complex interventions and therefore an evaluation needs to be cover this complexity to support improved health and learning outcomes (Booth and Samdal 1997).

At the policy level progressively, the Ottawa Charter (1986) and the Jakarta Declaration (1997), among others, enforced the notion of health promotion with goals of empowerment and a more long-term and fundamental shift in village, family, and gender power relations (WHO 1986; WHO 2005a). Over the years, health promotion moved beyond a focus on solely individual behaviour towards a wide range and depth of social and environmental interventions (WHO 2004a). For example, health promotion policy in the Bangkok Charter for “Health Promotion in a Globalised World” came to the consensus that health promotion should be central to the global development agenda, a core responsibility of all governments, a key focus of communities and civil societies, and a requirement of good global practice (WHO 2005). Bangkok re-enforced the global commitment to health promotion and effective interventions as a strategy for health promotion (WHO 2009a).

The Ottawa Charter, and its “successors”, introduced the notion that health was a broad concept, and that the disease approaches were highly related to health education and promotion, i.e., active participation by people to directly affect their health and the broader determinants of it, or *holism* (McQueen and De Salazar 2011). Subsequently, health promotion is not a biomedical model of health. In a biomedical model, health and illness are distinct states. Medical science often looks at the human body as a complex physical system which is dysfunctional when affected by disease, i.e., a pathogen. In the biomedical model (pathogenic), the emphasis is to treat the pathogen and cure the

individual (van Teijlingen 2005). While health promotion has multiple determinants and is a multi-dimensional salutogenic concept, it emphasises the social and mental aspects of health in addition to the physical body (Antonovsky 1996). Therefore, health is something more than a state in which disease is absent (Green & South 2006). Also stated in the Charter, health promotion enables people to learn to make choices conducive to their health and throughout life to cope with illness and injuries. This learning was advocated for in school, home, work and community settings through educational, professional, commercial and voluntary bodies, and all supported with theoretical guidance (WHO 1986).

There are several theories involved in health promotion. Theories range from behaviour-change theory (at the individual, organisational and community levels) to social change theory which covers the community and policy development (Green and Tones 1999). These theories are used to help identify potential points of intervention. Regarding theory building in health promotion, evaluation is a useful contribution to fulfil the Ottawa Charter's action means for health-promotion strategies and programmes. They include the development of personal skills and motivation (e.g. to stand up to peer pressure), strengthening community action, create enabling environments and holistic policy, and reorient health services to a social model (Glanz & Rimmer 1997; Nutbeam 1998; WHO 1998; US Department of Health & Human services 2002).

To implement health promotion interventions and fulfilling the above-mentioned action means, Rootman et al. (2001) identified seven key principles concerning health promotion activities:

1. empowering: enabling individuals and communities to assume more power over the factors that affect their health;
2. participatory: involving all concerned at all stages of the process;
3. holistic: fostering physical, mental, social and spiritual health;
4. intersectoral: involving the collaboration of agencies from the relevant sectors;
5. equitable: guided by a concern for equity and social justice;
6. sustainable: bringing about changes that can be maintained once the initial funding has ended;

7. multi-strategy: using a variety of approaches in implementation.

Therefore, the attributes of health promotion can be summarised as the need to implement community-driven health reform based on social participation. The latter refers to the willingness of communities to become empowered in determining long-term priorities. Attaining this effective and equitable health promotion therefore requires an understanding of the social ecology and determinants of health (Povlsen and Borup 2011). As the ecological models lend to that, the idea that an individual's behaviour is shaped by a dynamic interaction with the social environment, which includes influences at the interpersonal, organisational, community, and policy levels (McLeroy et al. 1988; Stokols 1996). The success or otherwise of interventions relate to the degree to which recipients value the intended change and internalise in the health promotion activity (Tones and Tilford 2001; Mittelmark 2002).

It can be argued that the central tenets of health promotion are holism and empowerment. According to Wallerstein (1992), health promotion empowerment is a social process that promotes participation towards the goals of increased individual and community control, political efficacy, improved quality of life and social justice. First, empowered individuals are needed to mobilise communities. The empowered communities can generate norms and support systems that enable individuals in greater numbers to acquire the competencies and characteristics of self-empowerment (Tones and Tilford 2001). In effect, this suggests that a better strategy for empowering more individuals lies not with individual empowerment programmes, but with the process that accompanies a whole community action empowerment strategy or a positive spillover effect (de Heer 2011; Vanderweele 2013). Socio-politically-oriented community development approaches are the most "ideal" form of health promotion practice (Green 2000; McQueen and De Salazar 2011; TEngland 2012). Moreover, empowerment is an interpretive concept, embraced differently in different contexts (Section 1.3.2): empowerment in LMICs combines several notions that arise from the Charter, including individual and collective capacity and participation. Over the years, health promotion empowerment evolved to a multilevel construct of a social process by which individuals gain control over their lives, their organisations, and their communities, in the context of changing

their social and political environment, to improve equity and quality of life (McQueen and De Salazar 2011). However, changing people's health and improving their quality of life is not easily done (Hawe et al. 1990a). For instance, success in health promotion is not a given; evidence from the past 20 years indicates that many community-based programmes have had only a modest impact. For instance, the model of community health workers (CHWs) providing the first line healthcare (i.e. primary healthcare with CHWs) was a health promotion intervention adopted by many governments and non-governmental organisations after the *Alma-Ata Declaration* (Section 1.3). Yet by the 1990s, many government programmes for CHWs had disappeared because of the problems in integrating them into national programmes (Brauman et al. 1999). In terms of maternal survival, efforts of community approaches focusing on TBAs lacked clear evidence of effectiveness (Rosato et al. 2008). For example, the Projahnmo cRCT assessed the effectiveness of specially trained CHWs, who provided a home-care package showed a reduction in the neonatal mortality rate when compared with the comparison group (the two study arms). Yet the third community care arm, in which community mobilisers held community meetings with women in villages, showed no effect on neonatal mortality compared with the control arm (Baqui et al. 2008). The apparent conclusion is that the interpretation of the findings of any intervention must be considered carefully to guide policy makers (Section 1.2).

In short, the health promotion literature, over the last decade or so, has demonstrated a move from individual empowerment programmes to far more emphasis on policy-driven initiatives that work through research, particularly at the level of collective action (Whitehead 2004). In addition, the global health promotion strategy documents also recognised that active participation by people to directly affect their health and the broader determinants was imperative. They were reacting to many of the emerging ideas of the time that were outside the biomedical and public health sectors such as equity, salutogenesis, healthy cities, complexity, participation, context, and implementation. As a consequence, health promotion is implemented through various foci, such as individual, interpersonal, community, institutional and public policy and one of which is community-based interventions (Eriksson and

Lindström 2008; McQueen and De Salazar 2011). The following section delves into the latter as was applied by GTN.

2.3 Community-based health promotion

In marginalised groups, the social environment affects health, and personal behaviours play a role. As discussed in Sections 1.3 and 1.4 maternal and child health are subject to risk factors, such as isolation, lack of social support, low self-esteem, and risk conditions, such as poverty, discrimination, and steep power hierarchies. Here, community engagement with a problem-solving process can collectively change marginalised groups' circumstances such as those in rural Nepal (Section 1.4) – perhaps only to mobilise their communities to initiate localised actions based on their immediate needs, such as health access, rather than broader social and political actions (Rosato et al. 2008). As community-based health promotion is concerned with a salutogenic orientation, it is important to start from a consideration of how health is created and maintained through community-based health promotion (Judd et al. 2001). Health promotion community participation in healthcare is attributable partly to the scarcity of resources committed to primary care, the perceived failure of conventional health education and primary healthcare to deliver health benefits by engaging users to adopt positive healthcare behaviours. For instance, a local health community may have little accountability to the community and the women. As the latter may be passive due to differing perception or low awareness of need (Bolam et al. 1998; Bryce et al. 2003; Manandhar et al. 2004; Victora et al. 2011). As discussed in the previous section, trends in the field of health promotion emphasise community-based programmes employing multiple interventions as the main strategy for achieving population-level change in risk behaviours and health and community mobilisation. Followed by active participation in achieving programme goals and implementing interventions in multiple community settings (Merzel and D’Afflitti 2003). Community mobilisation’s key concepts include social planning, local development, and social action such as active community participation (Merzel and D’Afflitti 2003; WHO 2009a). Current trends in the field of health promotion emphasise that community-based programmes must influence multiple levels for achieving population-level change in risk behaviours and health in order to be effective. These multiple levels of influence are intrapersonal, interpersonal, institutional, community, and public policy (Godin et al. 2007). In essence, focusing on a community and population-based approach has steadily evolved from a shift in emphasis from individually focused explanations of health behaviour to ones

that also encompass social and environmental influences, as reflected in ecological models of health. Here, the community and its social and cultural processes have an important role in shaping maternal health promotion strategies (WHO 2015). Therefore there is not a single, objective and universal notion of what health promotion is. It seeks to permit multiple perspectives or approaches rather than focusing on a single goal or desirable outcome (Webb and Harinarayan 1999). Thus, health promotion through diverse means aims to provide positive maternal health. In maternal health, as seen in Section 1.3, childbirth is a “normal” psychosocial process for women (Sandall 2012). Whereas maternal health promotion “promotes” childbirth and not risk: i.e. a majority of women should have uncomplicated labours (Berg 2005). If a medical model is focused on in childbirth with counter-physiological practices, where pregnancy is treated as a risk, it may mean a relatively uncomplicated delivery with minimal intervention can “change” into a life-threatening emergency (Tracy & Tracy 2003; Hundley 2013, 2014). In LMICs, if women are empowered to seek supportive care throughout labour (Sections 2.4 and 2.5.1), behaviour change may mean they seek emergency care when needed (Hulton et al. 2007). Also, Rosato and colleagues (2008) and Wallerstein (1992) provided further insights applicable to health in marginalised groups (Sections 1.3 and 2.3) where many health problems are rooted in “powerlessness” (i.e. lack of decision-making), and could be addressed by social and political empowerment.

Therefore, health promotion is more holistic and empowering if it involves dialogue and problem solving rather than didactic messages where communities can develop a critical knowledge base to recognise and address the underlying social and political determinants of health (Rosato et al. 2008; Wallerstein, 1992). For instance, if there exist gender inequity constraints to improvements in maternal survival, such as in rural Nepal (Section 1.4.1), empowered groups could give women the understanding, confidence, and support to choose a healthy diet in pregnancy, and seek care or advice outside of their homes (Prost et al. 2013).

2.4 Health promotion approaches

There are several strategies to promote health in individuals and populations: medical or preventive, behaviour change, educational, empowerment, and social change. No one approach is or has been responsible for improvements in the health status of individuals or populations. Often a combination of some or all of these approaches is required (Naidoo and Wills 2000). The GTN intervention includes elements of education, behaviour change and empowerment approaches. Thus GTN used health promoters to help communities identify health and social problems, and to plan and implement strategies to address these problems.

First, the “education approach” is strongly linked to health education, a component of health promotion. Health education is an activity that seeks to inform the individual on the nature and causes of health/illness and that an individual's personal level of risk is associated with their lifestyle-related behaviours. Health education seeks to motivate the individual to accept a process of behavioural change through directly influencing their value, belief, and attitude systems, where it is deemed that the individual is particularly at risk or has already been affected by illness/disease or disability. The professional intention is that the “education” will culminate in behavioural change and lead to a positive health status outcome (Whitehead 2004). It seeks to provide knowledge and information, and to develop the necessary skills so that people can make informed decisions about their behaviour. The following assumptions exist that increasing knowledge will lead to change in attitudes that may result in behavioural change. Another is that education is intended to have a positive outcome. For example, in order to help an individual understand the effects of smoking on their health to then make a decision, whether or not to stop – the education approach here increases an individual's knowledge about healthy choices with the provision of medical or preventative information. The health promotion activity will be to help them to learn how to stop smoking. The approach can be described as a way of working which increases people's ability to change their social reality and that it is possible for them to change that reality (Macdonald et al. 1996). Here, in the education approach, the health promoters undertake community development work, often with others. For instance, the

community development professionals help communities to identify concerns and work with them to plan a programme of action to address these concerns, such as knowledge and access of maternal health (Godin et al. 2007). Moreover, health education assumes that the health professional has the necessary health-related information to impart and that the recipient is in need of and will benefit from this information. A further assumption is that if the recipient has correctly assimilated and disseminated this information - any further action on their part will involve change or modification in their behaviour. Recipients may be supported through this process, but they are ultimately personally responsible for any action that they may or may not undertake (Whitehead 2004).

Second, the “behaviour change” approach aims to encourage individuals to adopt “healthy” behaviours (exercise, good nutrition, and smoking cessation) or prevention behaviours. For example, giving persuasive education to prevent non-smokers from starting or to persuade smokers to cease (Ryan 2009; Dawson and Grill 2012). Behaviour is partly responses to conditions people live in, and the causes of these conditions may be outwith the individual control. Yet the behaviour change approach remains popular with health promotion agencies for it views health as the property of the individual (Ryan, 2012). Therefore there exist the assumption, or risk, that people can make real improvements to their health by changing their lifestyle. Furthermore, if people do not take responsibility for their actions, they are to blame for the consequences, i.e. a victim blaming approach. Over time, it is acknowledged that a complex relationship exists between individual behaviour, social, and environmental factors (Nutbeam and Harris 2004; Baum et al. 2006; Nutbeam 2006).

Lastly, under the empowerment approach comes the notion of helping people to identify their own concerns, gain skills, and make changes to their lives accordingly. In health promotion, the definition of empowerment has evolved; in the past, it was defined as a state (Green and Tones 1999b; Perkins et al. 1999). Recently it is taken as both a state of being empowered, and as a process to achieve this goal (Tengland 2012). For example, if anti-smoking is a concern and clients identify what, if anything they want to know and do about it (Section 2.1). It is also considered as the bottom-up approach where a health

promoter acts as a facilitator, rather than an expert, for change by supporting individuals and communities to make changes.

It is useful to combine these two approaches - behaviour and education - as they are complimentary. Yet to “only” change a person’s behaviour may fail to address important issues, such as powerlessness or lack of control (empowerment). Therefore a population requires both the attainment goals envisaged in behaviour change projects, and empowering instrumental goals, such as increased real/tangible opportunities in life, for example, access to health services. Therefore, the behaviour-change model may not consider the right to autonomy (i.e. strengthening the ‘whole’ individual or group). The third approach empowerment, on the other hand, respects the participant’s right to autonomy. It tends to increase the ability for autonomy as well as increasing other coping skills, and is likely to reduce (health) inequalities (Dawson and Grill 2012; TEngland 2012). When these three approaches are combined: health-related advice is provided in order that they can make sense of their actions and behaviours and consequently, will act on any tensions (stress) that may arise if they are empowered. With the assumption that an individual values and prioritises their health as important, and that it is reasonable for the health professional to act on the basis that the individual wants to avoid or reduce any negative health state by changing their behaviour. The delivery of these approaches by GTN is expanded upon in the next section.

2.5 GTN and health promotion

This section discusses the GTN intervention that was delivered in a repeated cycle in four stages: needs assessment, programme planning, implementation, and evaluation (Figure 3). The key aims of the intervention were to (a) understand why pregnant women do not access existing services; (b) identify and address socio-cultural issues and psychosocial barriers (social organisation, i.e., status and influence of others in decision-making, and economic, geographic, and financial access); and (c) meet the potential increase in demand by the concomitant strengthening of the mental health existing service provision (Simkhada et al. 2006; van Teijlingen et al. 2012). The objectives of the intervention are detailed in the implementation section.

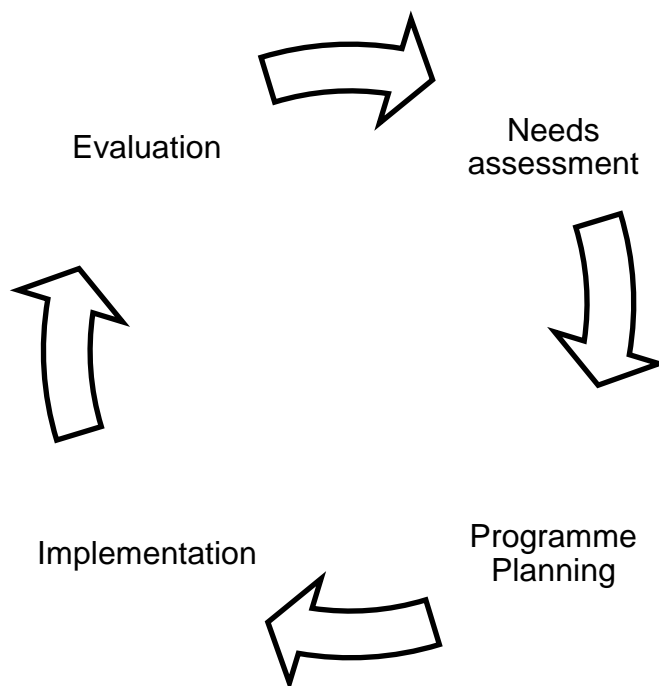


Figure 3 Health promotion intervention cycle

(Source: van Teijlingen et al. 2012)

The intervention started with a needs assessment of the rural communities, based on research evidence that supports health promotion interventions (Section 2.1). The results of this phase showed that an increased demand for local maternity service provision was deemed viable, as uptake stayed within the health system capacity for maternal care. Thus, it was more likely to be sustainable compared to the introduction of an external intervention, which is new to the community and potentially expensive (Sharma et al. 2017).

2.5.1 Needs assessment cycle

Needs assessment is the first step in planning any health promotion initiative. It helps to identify and then to analyse a health problem and the nature of the target group. This activity is for the purpose of planning any health promotion action (Hawe et al. 1990). The second step is intervention planning, which includes mapping, group creation and curriculum development. Thus the GTN

intervention was designed based on the findings of the community needs assessment, including focus group discussions in the community, and complemented by a consultation process with stakeholders, including funders, academics, local policy makers and local healthcare providers. The importance of NGOs collaborations was mentioned in Section 1.2. From the outset all stakeholders were involved in the needs assessment, deciding which area of health promotion to focus on and planning the community household mapping and monitoring (Barnett 2012; CDC 2013). The needs assessment determined that improving maternal healthcare was a key priority.

The underlying philosophy of empowerment and community participation were essential in this low-cost health intervention to make it sustainable (Section 2.2 and 2.4). This was achieved by incorporating the diverse and changing needs of the local communities in the planning and to make best use of the existing resources whether government or NGOs to ensure the intervention was low-cost (e.g. government clinics/buildings etc.) (van Teijlingen et al. 2012).

In the design, implementation and evaluation of interventions, it is necessary to include formative research at the start (i.e. needs assessment) with the participation of community-based stakeholders (Morrison et al. 2008). Formative research in this context is the description of practices and beliefs and rapid rural assessment of local needs. Thus formative research can provide information about existing practices, and this is a way in which researchers and community members can head towards a solution to optimal health (Morrison et al. 2008). This improves the chances of empowerment, intervention ownership, participation, and sustainability once the intervention has ended, as the stakeholders are part of the decision-making (ADB 2001; Judd et al. 2001; IFAD & Tango International 2009).

Once the needs assessment was concluded, step 3 was implemented. The latter consisted of a continuous evaluation (a monitoring and evaluation or M&E) to determine response/uptake to health promotion activities (Section 2.4).

2.5.2 Programme planning cycle

The community, with the facilitation of GTN staff, influenced actions to target various socio-economic barriers that could limit the utilisation of maternal healthcare services by local rural women (Simkhada et al. 2010; van Teijlingen et al. 2012; Sharma et al. 2017). To target these barriers, GTN worked with women and with the people who influence their ability to access health services, medical facilities, and money for delivery (mothers-in-law and husbands). The socio-economic barriers were grouped into social organisation, status and influence of others in decision-making, economic, geographic and financial access (van Teijlingen et al. 2012; Sharma et al. 2017). It was not in the remit of the intervention to address economic barriers; as the introduction of economic incentives, although effective, are not sustainable over the long-term (Witter et al. 2011; Powell-Jackson & Hoque 2012). The health promotion intervention was designed to be low-cost, flexible, multi-disciplinary, potentially sustainable, and participatory (vanTeijlingen et al. 2012). Participatory approaches as used by GTN are advocated in health promotion (Rootman et al. 2001). They are detailed in the implementation cycle of the intervention (Section 2.5.4.1).

The reasoning GTN applied was that better maternal care results in fewer women suffering from complications during childbirth. Health promotion here improves knowledge, attitudes, and beliefs towards seeking care, especially during pregnancy complications. For example, bleeding or feeling weak during pregnancy and seeking a SBA, or exclusive breastfeeding from birth as opposed to the current practice in Nepal of supplementing breastfeeding with un-hygienic water or glucose water (Khanal et al. 2013a; GTN 2008; Sharma et al. 2017).

The specific objectives of the GTN intervention were delivered in the cycle above:

1. to improve ANC, delivery care (DC) and postnatal care (PNC) practices in the community;
2. to strengthen the community capacity in identifying and solving the health problems related to maternal health and neonatal health;
3. to monitor the maternal health practice of each individual;
4. to support those women who have a problem by exploring appropriate solutions;
5. promotion of exclusive breastfeeding;
6. promotion of adequate and timely complimentary feeding (at about 6 months of age);
7. promotion of key hygiene behaviours (e.g. hand-washing with soap);
8. to encourage family members to provide special care to expectant women;
9. to employ local staff;
10. to encourage local women and men to commit to group participation.

Figure 4 Objectives of the GTN intervention

(Source: van Teijlingen et al. 2012)

Overall through these objectives (Section 2.5.2, Figure 4), the GTN intervention aimed to increase the uptake of ANC, a skilled attendant at delivery, ID, and PNC in rural Nepal. These are recognised measures in targeting the reduction of maternal morbidity and mortality (Fujita et al. 2005). This also links to Rootman et al. (2001) as outlined in Section 2.2.

2.5.3 Planning: intervention site and control community

The selected intervention site was Pharping, a small rural town amenable to research due to its accessibility from Kathmandu. The intervention was rolled out in two VDCs with similar socio-economic status. In order to avoid “contamination” (or selection bias, see Section 3.2.3.2) between the intervention and control group, the sites were chosen approximately 40km from one another at opposite extremes from Kathmandu, in the northeast and southwest of the capital, with no direct transport line. The control community was selected on the basis of its location, population composition, facilities available, and its similarity to the intervention community (Section 4.3.5 and Table 2). Both communities include the villages and semi-urban communities of Kathmandu. The largest ethnic groups are Tamang and Brahmin-Chhetri (CBS 2001; Simkhada et al. 2009).

Health services characteristics were also similar between the intervention and control areas. In the two VDCs that formed part of the intervention, additionally, there was a private not-for-profit hospital (providing a mix of public/private services) with maternity services (i.e. Basic Emergency Obstetric Care Centre - Appendix VI) and two government health posts (providing primary care services). In the control area, there are two health posts and a primary care centre nearby (similar to the community hospital in the intervention area). The intervention area was chosen from a few pre-selected districts not far from Kathmandu that were (a) safe to work in at the time of Maoist rebellion (1996-2006), which was still on-going when the intervention was designed (2005/2006); (b) with the local maternal health needs identified by the community; (c) with local political commitment to making a change; and (d) staff recruitment (Sharma et al. 2016a).

As Nepal is geographically and culturally diverse (Section 1.4), it follows that any community intervention must be socially acceptable and culturally appropriate. As previously discussed, the majority (about 87%) of Nepal's population lives in rural areas (MOHP, New ERA & ICF International 2012). The topography of the study area is hilly (Figure 1) so service users walk up to three

hours or more to the nearest health facility, which brings additional geographical barriers to accessing care.

2.5.4 The GTN intervention implementation & the evaluation

2.5.4.1 Implementation cycle

GTN launched the intervention on the basis of participatory learning and action research approaches (Hart 1996; Minkler 1997; Manandhar et al. 2004). The health promotion was designed by GTN and facilitated by the intervention's health promoter staff, one ANM and a CHW, with community input (Figure 5).



Figure 5 Rural Nepal, health promoters

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The implementation of the intervention consisted of 24 group sessions of health promotion delivered in a repeated cycle (Figure 3). The health promoters carried out the health promotion activities with the intervention participants. The main

step of the intervention was to discuss issues regarding maternal care behaviours in the community each month (Sharma et al. 2017).



Figure 6 Visual cards

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The content within the groups varied, as did strategies for delivery. This was due to the flexible nature of the GTN intervention. The enrolment began in 2006/7 until 2012. From 2007 to 2012, the project formed health promotion groups (Figure 8); organised different community-based training sessions focused on health promotion of maternal and neonatal health and in the supporting sub-health post outreach clinics for family planning, ANC and PNC check-ups. Mass health promotion events were also organised (for instance, during Tihar, the five-day festival of lights).



Figure 7 GTN Visual cards

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The health promoters had training in participatory techniques and a health background (Figure 5). Their role was to activate, strengthen, and support groups through an action research cycle. Participatory activities used visual cards (Figure 6 and 7) that addressed prevention, treatment, and consultation for typical problems in mothers and babies. Role-playing activities were also conducted on the importance of contraception, ANC, iron/folic supplementation, danger signs of pregnancy, safe delivery, and postnatal care (see Section 1.3).

The health promotion group strategies included:

- setting up a group;
- problem identification individually or in the groups;
- priority setting;
- introducing the aim of the group meeting;
- discussing why mothers and newborn infants die and how the intervention will work in the community;

- finding out about maternal and neonatal problems in the community and women's understanding of these issues;
- sharing health promotion information with regards to maternal and newborn health by:
 - role-playing as various family members and daily scenes they face;
 - encouraging participation by describing pictures of household chores, maternal care and danger signs recognition (bleeding, fever and feeling weak);
 - religious festivals drama enactment of maternal and child health activities;
 - identifying barriers to uptake: these were addressed adjusted and reapplied to address these barriers and meet the local needs of the population. For example, women who stopped attending the groups were identified, visited at home, and individually encouraged to re-join the activities;
- monitoring and evaluation (M&E) of GTN group attendance, household visits and costs (Sharma et al. 2017).



Figure 8 Women's group meeting in rural Nepal

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As discussed in Section 2.1, health promotion is holistic and multi-layered. Hence, in addition to groups and mass events, GTN staff visited households to support women who were considered “most in need” and who were not able to leave the household (i.e., those who were physically weak, anaemic or did not have permission from their families to leave the house or attend the groups).

Moreover, the intervention supported the existing health services of sub-health posts by providing health communication training to MCHWs, FCHVs and Traditional Healers. Furthermore members of Mother-Child Health (MCH) hospital staff were given neonatal care training. The intervention also included typical strategies for maternal or infant care, including stretcher schemes to three health posts, mobile clinics health visits (including contraception and antenatal clinics) visits, distribution of clean delivery kits, and home visits by group members to newly pregnant mothers (Sharma et al. 2016a; Sharma et al. 2017). This activity entailed interactions outside the groups, which increased

awareness of the intervention, referred to in the literature and this thesis as a 'positive spillover effect' (Israel et al. 2001; Manandhar et al. 2004; de Heer 2011; Vanderweele et al. 2013).

As incentives can encourage women to attend intervention activities (Grant and Sugarman 2004; Cryder et al. 2010), and in accordance with the programme values/objectives (that the intervention is low-cost and participatory), the incentives were small gifts of less than 10 Nepali rupees (GBP £0.10). Similarly, maternal care gifts were given as incentives: a baby blanket on completion of four ANC visits, and safe delivery kits were made available at a subsidised price and sold through the women's groups. These incentives had the aim of encouraging women to attend groups and to incentivise their health behaviour towards seeking care. Finally, GTN monitored and evaluated their activities to report back to their funders (Sections 2.5.4.1 and 3.2.3.2).

2.5.4.2 Evaluation

The GTN survey data collection (prior to this PhD evaluation) consisted of a structured questionnaire in Nepali to collect "baseline, midline, and final" survey data on women's health status and knowledge of maternal services and socioeconomic status (Section 4.3.4 and Appendix III). First, GTN conducted their own M&E analysis of the data from the baseline, midline and final that looked at how many groups were formed (as were participants' ages, caste, the attendance data and number of children). At the time of the midline survey in 2010, there were 37 active groups reaching 1100 people. In addition, 134 household visits to support women most in need, for instance those that could not attend groups and/or needed to be at home and care for their families. At the time of the final survey of 2012, there were 40 active groups and more than 100 household visits reported. The total participants were 731 (Sharma et al. 2016a; Sharma et al. 2017).

The internal M&E activity acted as an exercise to help interim changes to the programme where the process was not working as well as planned. For example, the M&E showed that the intervention had not focused enough on the

knowledge of PNC and danger signs post-delivery (GTN 2008). Therefore, GTN refocused the intervention to improve the outcomes on the indicators of postnatal care.

The purpose of this thesis was to conduct a process, impact, and outcome evaluation using these quantitative data sets and the qualitative views of the participants even after the end of study period (Figure 9). The survey data of GTN were tested for association between the intervention and attendance, for instance how to identify “the gap”: it is not known how a health promotion intervention based on community mobilisation/groups would work in Nepal. Therefore it was done all the while taking into account different factors are responsible for attendance (Section 1.3.1 and 1.4.4). The uptake of maternal health services was selected as a proxy for success of the intervention; based on the literature review on chosen indicators (Section 1.3.1 and 2.6.1) and health promotion evaluations of maternal health interventions discussed in Section 2.6.1.

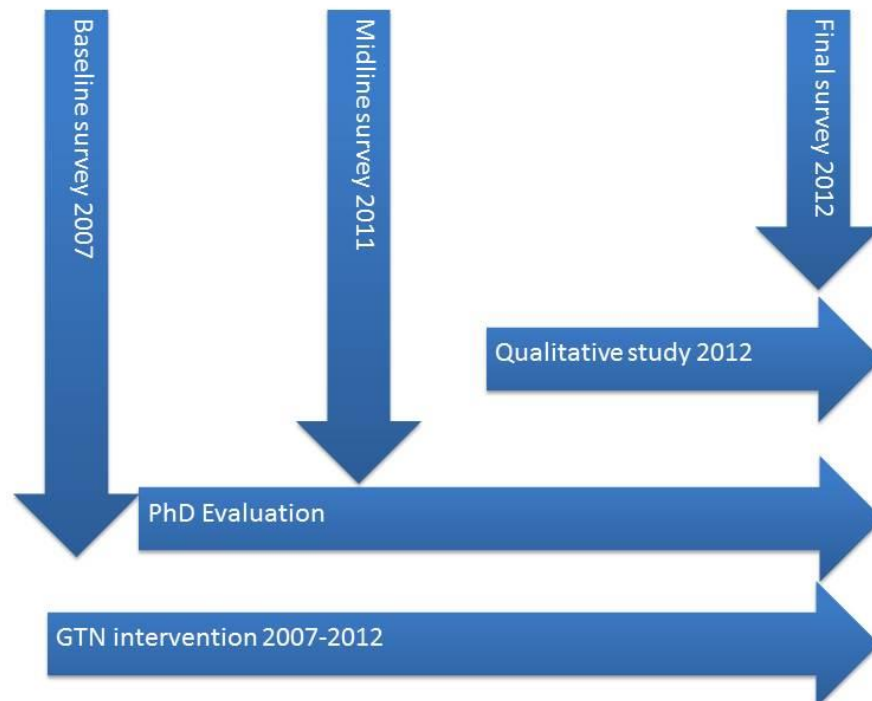


Figure 9 Timeline of the programme and PhD

2.6 Maternal health promotion interventions in LMICs

Two decades of health promotion, since the Ottawa Charter, have been very much occupied with providing evidence for health promotion (McQueen and Jones 2007). The preoccupation with providing evidence in health promotion was due to the notion of evidence-based medicine in public health that began in the early 1990s (Section 2.2). As discussed in Section 1.1, many public institutions and NGOs rose to this challenge, including community-based maternal health promotion interventions. A literature review of maternity community-based health promotion interventions in LMICs is presented in this section.

A literature review guided this evaluation to find key elements of evaluation methods to assess the effect of community-based maternal health promotion interventions in low-income countries. The literature search was done on the PubMed database, for peer-reviewed literature complemented by a hand-search of library periodicals and a search of relevant reports by the WHO and other international agencies (1980-2015). The start date coincided with the introduction of the definition of health promotion as "*the science and art of helping people change their lifestyle to move toward a state of optimal health*" (Section 2.1). The keywords were: community participation, women's groups, developing countries, health promotion, and evaluation (Figure 10). Excluded were interventions that focused on individual women or non-health related outcomes, such as micro-credit or savings behaviour. The findings of the literature review are presented in Section 2.6.1.

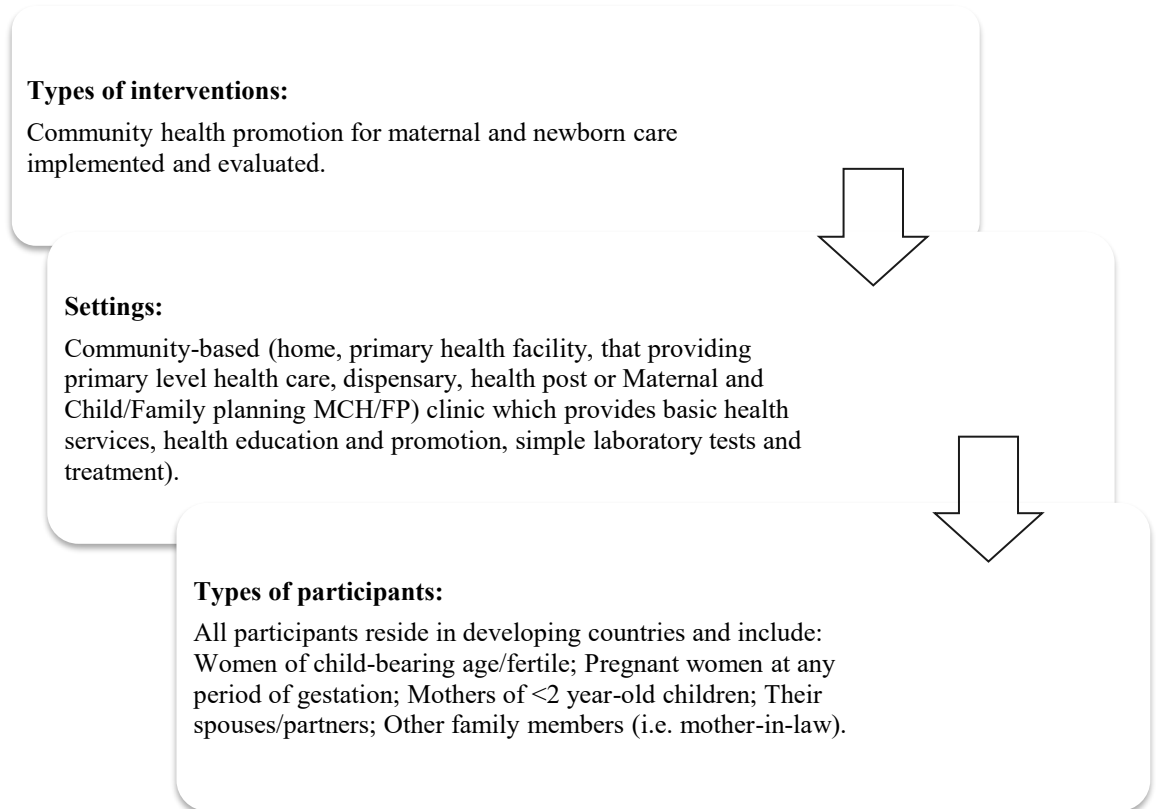


Figure 10 Flow chart of literature search

2.6.1 Literature review effectiveness of maternity health promotion

Several studies, like GTN, have tried through participatory community trials to improve maternal health. These studies have looked at the participation in healthcare uptake as a primary intervention outcome. The studies ranged from descriptive studies of organising women's groups to sophisticated randomised controlled trials (RCTs) for improving mother and child health and maternal health proxy outcomes (uptake) in rural regions such as India, Nepal and Malawi (Hadi 2001; Boone et al. 2007).

Community-based local facilitators, such as auxiliary nurses, local women trained as counsellor/supervisors or community health workers convened the groups. The topics discussed ranged from promotion of family planning, prevention and management of malaria, breastfeeding, prevention and management of diarrhoea, and uptake and benefits of antenatal, natal, postnatal, and neonatal care. Also a number of activities were performed by women's groups: training community members in safe birthing techniques, generation of community funds for maternal and infant care, stretcher provision schemes, production and distribution of clean delivery kits, home visits by women's group members to newly pregnant mothers, awareness raising with the help of video films, social and psychological support, income generation, improvement of water supply and sanitary conditions, support for early initiation and maintenance of breastfeeding, literacy classes, and management of diarrhoeal diseases (Langer et al. 1998; Bhuiya and Chowdhury 2002; Dearden et al. 2002; Kouyate et al. 2008; Dennis et al. 2009).

In other community approaches to increase care-seeking and appropriate home prevention and care practices for mothers and newborns, interventions have used approaches such as making home visits to counsel mothers, providing newborn care, and facilitating referral (Bang et al. 2005; Baqui et al. 2008; Bhutta et al. 2011; Kumar et al. 2015). A third approach has involved women's groups in a four-phase participatory learning and action cycle (Manandhar et al. 2004; Tripathy et al. 2010; Azad et al. 2015). For instance, a systematic review of cluster-RCTs (Nepal, India, Bangladesh, and Malawi) assessed the effect of women's groups practising participatory learning and action (Prost et al. 2013).

These seven trials, similarly to the GTN programme, involved participatory women's groups as an intervention to reduce maternal and newborn deaths in poor communities. The role of the group facilitator was to activate, to strengthen, and to support groups through an action research cycle. The review findings were that women's groups practising participatory learning and action led to improvements in attendance and substantial reductions in neonatal and maternal mortalities in rural, low-resource settings. The key predictors of the intervention's impact were the proportion of pregnant women participating in groups and the population coverage of groups (Prost et al. 2013).

While in Malawi, groups of women, guided by a female Health Surveillance Assistant (i.e. CHW), met monthly to work through the action cycle to identify and prioritise key maternal and neonatal health problems to design and implement strategies to address their MNH problems and evaluate progress. A mixed-method evaluation was conducted with the quantitative study looking at percentage changes and the qualitative study using interviews and focus group discussions (Mseu et al. 2014). In Bangladesh, researchers have applied before-and-after quasi-experimental studies and RCTs of upskilling TBAs and CHWs, and their impact on maternal morbidity/mortality (Darmstadt et al. 2009). They found that CHWs might play a promising role in providing pregnancy and childbirth care, mobilising communities, and improving perinatal outcomes in low-income settings. Whilst, in Nepal, a health education RCT consisted of two 35-minute maternal health education sessions, whereby the women were monitored until the postpartum period. Women who received education with their husbands were more likely to attend a postpartum visit, and were also nearly twice as likely as control group women to report making birth preparations. Moreover the study groups were similar with respect to attending the recommended number of antenatal care check-ups, delivering in a health institution or having a skilled provider at birth. The study reported an impact only on postpartum care (Mullany et al. 2007).

Additionally, Liu and colleagues (2010) aimed to evaluate the effects of the "Safe Motherhood" programme on maternal care utilisation. Pre-intervention and post-intervention cross-sectional surveys were conducted with questionnaires about the prenatal care utilisation in 2001 and 2005, respectively (Liu et al.

2010). The method of analysis difference-in-differences (DiD) was used to assess the effect of intervention on the maternal care utilisation while controlling for socio-economic characteristics (age, wealth, education and parity) of women. Additionally, a study by Ensor and colleagues (2014) on mothers' groups to improve both understanding of maternal health and access to maternal healthcare services, where they sought husbands' and community leaders' approval for care-seeking. They also used a DiD approach in two cross-sections and corrected for education (i.e., highest level achieved), household wealth, the woman's age and parity and the distance of the woman's home from the health centre (Ensor et al. 2014).

Whilst in Nepal, a cluster-RCT found that providing vitamin A supplements through these groups reduces mortality (West et al. 1999). Women's groups assessed in cluster-RCT and qualitative studies respectively have been found to reduce mortality as the groups increased awareness of maternal health collectively and build social capital for support networks, promote hygiene, and prevent the delays in seeking care (Manandhar et al. 2004; Rosato et al. 2006). For instance, a cluster-RCT community trial in Pakistan has shown that attendants can promote good perinatal hygiene and reduce mortality (Jokhio et al. 2005). Moreover, in India, a cluster-RCT found that women's groups have had a positive effect on birth outcomes (Tripathy et al. 2010). Often not evaluated is the tenuous link between health promotion and improved health outcomes (Section 1.3); although studies in Mexico and India have found that an increase in health promotion of exclusive breastfeeding reduced morbidity related to diarrhoea (Morrow et al. 1999; Bhandari et al. 2003).

In general, community interventions in maternal health, in LMICs, and those based on women's groups have had considerable success. These innovative community-based strategies, combined with health systems strengthening, may improve childbirth care for the rural poor, help reduce inequities in maternal and newborn survival and stillbirth rates, and provide an effective uptake of higher coverage for births attended by an SBA (Darmstadt et al. 2009). These studies discuss that community groups are of benefit as there is a scarcity of resources for delivery of health services to the population (Judd et al. 2001; Duflo 2004). It is difficult to deliver health interventions with low human resources, barriers to

access, illiteracy, and poor compliance. These groups in addition provide a culturally relevant solution, and perhaps a cost-effective and sustainable way to respond to needs (Akhund and Yousafzai 2011). Thus group formation has the potential to enable women to achieve the intervention goals. Groups also come together for non-health activities, for example, social capital, including saving activities (Minkler 1997; Goodman 1998). Women's groups respond best to participatory non-didactic approaches that encourage group members to share knowledge and work together (Akhund and Yousafzai 2011). These evaluations also found that groups are successful if collaboration with the community was attained at the conceptualisation phase of the interventions, by acknowledging the community's contributions, creating a sense of ownership of the group, empowering group members with clear communication of activities or skills needed in the task (for example, describing visual cards), and addressing issues of trust, respect, conflict and power dynamics (Parker et al. 1998; Koné et al. 2000; More et al. 2008). In a few studies, success was also found if group homogeneity was found to be beneficial (Chowdhury et al. 1988; Green 1998). On the hand, others found that group ethnic and social diversity was key (Asthana 1996). Also, the support of husbands was a necessary factor for the group's success (Manandhar et al. 2004). Finally, it was important that the health promoters/supervisors had support from the community (O'Rourke et al. 1998).

As a result of participation in the group, non-members also gained from a positive spillover effect (Section 2.2) due to the activities. Examples of group and mobilisation benefits include knowledge of health, personal skills development, empowerment, emotional and financial support, and lessening of stigma (Minkler 1997; Goodman 1998).

A few studies found that the men and mothers-in-law were the main decision-makers in maternal health (White 2009; Simkhada et al. 2009). Yet few studies have evaluated the impact of their involvement on maternal health outcomes in LMICs. The studies found that male involvement was associated with improved utilisation of maternal health services (SBA at birth and PNC) and that male involvement was associated with improved maternal health outcomes (Yargawa and Leonardi-Bee 2015) and with positive effects on decision-making in

women's reproductive health and family planning in Nepal (Mullany et al. 2005). Finally, Sternberg and Hubley, (2004) evaluated an intervention that targeted heterosexual men. There was evidence that the use of media approaches was a successful strategy, yet there were issues in applying behaviour change approaches. As few interventions have targeted heterosexual men, the latter finding suggests that there is a need for more interventions and/or with better evaluations, which would examine not only the process of men's involvement, but also their impact on the lives of both the men themselves and their families. Therefore, one goal of the qualitative part of this PhD evaluation is to determine, to an extent, how the men and mothers-in-law's roles determine women's access to maternal health services.

2.7 Summary of literature review and next steps

These studies have found that there is growing evidence that better utilisation of maternal healthcare services depends on mobilising the entire community and encouraging participation in the group activities. For example, in a programme for improving birth preparedness in Nepal that focused only on women, knowledge of obstetric danger signs increased but there was little change in the proportion of deliveries involving a SBA. It was suggested that the lack of progress occurred because education was provided only for women and not for the whole community (including the men) and because other barriers to healthcare, such as the cost of getting to a facility, persisted. A gap still exists; therefore the next chapter discusses evaluations and the evaluation of health promotion, evaluating non-health outcomes, and the need to evaluate to obtain evidence-based health promotion. The evaluation, in this thesis, was done in order to determine the intervention's effectiveness or impact: the latter is considered an improvement in the outcome as a result of women's group intervention and continuing activity of the group even after the end of study period. To this end, the GTN data were tested for the association between the intervention and attendance (Sections 3.2.3.2 and 4.3.9.1.4), how to identify the gap, and what worked in this setting in rural Nepal using qualitative research (Section 4.3.8).

Chapter 3 Evaluation: its nature in health promotion

3.1 Evaluation

This chapter has been divided into four sections. The first section discusses the underlying philosophies of evaluation in general and its approaches. The second discusses its practice in health promotion. The third elaborates on the process, impact, and outcome evaluation of this thesis. Finally, the fourth section presents the aims and objectives of the impact evaluation of GTN.

It is worth remembering why we evaluate namely to see if something “works”. Evaluation is a critical part of the development process for health planning to assess:

- the need for the programme;
- the programme design;
- the way the programme is being implemented (i.e., is the process going according to plan? Are programme's processes maximising possible outcomes?);
- outcome or impact (i.e., what it has actually achieved or using indicators);
- cost and efficiency (cost-effectiveness) (Craig et al. 2006; Khandker et al. 2010).

In essence, indicators are variables used in the evaluation process that help to measure changes in the outcomes or observable characteristics at issue. In addition, an evaluation has to be supported by valid, reliable, and sensitive information/data (Hawe et al. 1990). The evaluation process is intended to be used in a flexible manner and must be adapted to the circumstances in which it is to be used. Perkins and colleagues (1999) discuss the idea that it is the phases of change of a project that will help to design the evaluation, the type of evaluation that is appropriate, and the sorts of questions that are appropriate to ask.

As stated in Chapter 1, there is a critical need to measure the outcomes of health programme efforts and then apply that knowledge for best practice in

future interventions. Research ideally aims to be valid to the population under study, i.e. accountability. If applicable to a wide variety of settings, then the research in question is generalisable. Evaluation research is thus concerned with accountability, generalisability, i.e., for the potential of evaluation as a basis for scaling-up (or transferability or external validity) and effectiveness. The main threats to validity are chance, bias, and confounders (Section 4.3.9.1.3) (Altman & Bland 1998; Clancy 2002; Waters et al. 2006).

It should be noted that a trade-off occurs in any study. For instance, in ensuring generalisability, internal validity may be compromised. An example pertinent to this thesis is that study participants in rural Nepal may demonstrate preference or have existing relationships that influence research outcomes. Therefore, to some extent, the definition of “effectiveness trial” describes the necessary trade-offs between generalisation and internal validity (Altman & Bland 1998).

There exists, however, considerable debate over how to evaluate programmes, i.e., how to measure the evidence for the effectiveness of interventions. In health promotion interventions, evaluation involves making judgments about the achievement of the health promotion activity in question by comparing it with some criteria that are considered to be an indication of good performance (for example, indicators used by comparable studies). These criteria are usually derived from the aims and objectives of the project. Therefore, the planning of both the aims and objectives and the actual evaluation is essential (Perkins et al. 1999). Moreover, an activity or programme needs to have a clear rationale with both long and short-term objectives, or it becomes extremely difficult to evaluate (Perkins et al. 1999).

As discussed in Sections 2.1 and 2.2, health promotion requires a mobilisation of appropriate strategies that bring about measurable organisational and community change (Flynn et al. 1994; Tones 2000; Cresswell et al. 2003; Whitehead 2003). Thus, an evaluation of health promotion programmes should take into consideration the needs of the target group and the best current knowledge (evidence) as to how to meet these needs. Evidence in health promotion is discussed in Section 3.2.3. Additionally, an intervention ought to deliver the most appropriate or beneficial programme within the resources

available. Therefore, an appropriate choice of quantitative, qualitative, or mixed methods is needed for evaluation (Hawe et al. 1990).

Finally, in evaluation and as also seen in Sections 1.2 and 2.5, the last decade has seen a growing number of collaborations between NGOs and academics to help evaluate the impact of the former's activities in behaviour-change, community-based education and maternal health interventions (Kremer 2003; Banerjee et al. 2007; Baqui et al. 2008). The evaluation of the GTN intervention was discussed in Section 2.5.4.2. The next section introduces broad concepts of evaluation.

3.2 Evaluation, philosophical underpinnings

This section discusses the underlying notions of evaluation and evaluation approaches. There are several types of evaluations that can be conducted, including formative, process, impact, and outcome evaluations (CDC 2013). These types of evaluations will be elaborated on in Section 3.2.3; in particular, impact evaluation (Section 3.2.3.2), as this thesis evaluation was concerned with the latter.

Evaluation is research with a specific purpose (Section 1.2), namely to provide accountability and assess the worth or value of a project, a programme or an intervention (Suchman 1968). In 1978, the WHO drafted guidelines for health intervention evaluations for use with interventions and activities. It summed up the purpose of evaluation as:

“To improve health interventions and the health infrastructure for delivering them to guide the allocation of resources in current and future interventions.” (WHO 1998, p5)

The guidelines add that evaluation is a systematic process of learning from experience. The lessons learnt ought to be applied to improve current activities and to promote better planning for future action, for example, for future

programmes organised by the NGO in this case, GTN. Also used are criteria, or standards, which may be pertinent questions asked of the activity under evaluation, as seen in Section 3.2.3 (WHO 1998). Here, the indicators used in this study were defined by WHO guidelines, DHS, and the literature review of evaluations in maternal health promotion/groups in LMICs (Sections 1.4, 2.6.1 and 4.3.9.1.4).

As previously mentioned, evaluation aims to provide evidence of the effectiveness of the programme in question. Interventions tend to be complex and context dependent (White 2009; Smith & Petticrew 2010), therefore, the evidence for their effectiveness must be sufficiently comprehensive to encompass that complexity (Rychetnik 2002). Smith & Petticrew (2010) posed three challenges for the evaluation of social interventions: (1) that a broader range of outcomes were needed to evaluate the broader range of interventions; (2) that a broader range of evaluative methods were needed to deal with complexity and multi-sector evaluation; and (3) that a broader range of evaluative methods were needed to meet the needs of multiple stakeholders (Smith & Petticrew 2010). They argue that many public health and health promotion interventions are complex due to the multiple components, outcomes, and externalities that exist, such as unintended consequences. The use of a conceptual framework as described in Section 4.3.2 can help identify these challenges (Craig 2013).

It is important to note that evaluations can be negatively perceived as a means of cutting back on the scope of a programme or as only keeping the “good” aspects of a “bad” programme. Therefore, in order to make the best judgment, data are collected not only on the intervention, such as health outcome or opinion data, but also on the changes the programme has made, or “whom” the programme has reached, and its long-term effects. This is termed ‘evaluative research’ (Suchman 1968). Evaluative research is more than just making observations and measurements and then assessing what one observes based on some criterion or standard of what is considered to be an indication of good performance (Deniston 1980). It aims to define ‘what works best for whom and under what circumstances’ (see Section 3.2.3.2). Therefore, evaluative research has several components, such as specifying the subject for evaluation, ensuring

data availability, verifying the relevance, assessing measures of adequacy, progress, efficiency, effectiveness, impact and drawing conclusions for future action (WHO 1998; Hawe 1991). In other terms, evaluative research has been defined as the rigorous and systematic collection of data to assess the effectiveness of a programme in achieving predetermined objectives (Bowling 1997). Thus effectiveness is influenced by the participants (through appropriate targeting), to the exposure of the programme or intervention, resources available, quality of delivery (including training and enthusiasm), and intervention contamination (Waters et al. 2006).

3.2.1 Evidence of effectiveness

As public health interventions are often complex, the methods to provide evidence of effectiveness must be comprehensive (see Sections 1.2, 2.2 and 3.2) (Rychetnik 2002). The Cochrane Collaboration states that the definition of evidence-based care/practice standards requires effectiveness studies with a case control design (Sections 1.2 and 2.2). Therefore, the methods eligible for inclusion in Cochrane systematic reviews are generally non-RCT, interrupted time series designs, RCT, and quasi-RCT. Uncontrolled studies are generally not included in reviews as it is difficult to distinguish the effects of the intervention from the Hawthorne effect, an effect produced when participants know they are being observed, or from what would have occurred naturally over time (Bowling 2014). However, in many areas of public health, RCTs may be impossible, as RCTs tend to be suited to more “simple” and straightforward interventions or efficacy trials (Waters et al. 2006). Non-randomised controlled studies, for example, controlled before-and-after studies, are study designs where participants or populations are not randomly assigned to an intervention or control group. As in the GTN intervention, the outcomes of interest are measured both at baseline and after the intervention periods in both intervention and control groups (Deeks et al. 2003). However, as it was not possible to randomise a community at a familial level, the wider impact of the intervention on the community was analysed. The lack of randomisation in these types of studies may result in baseline differences between treatment and control groups, as randomisation is the only way to control for confounders (Section

4.3.9.1.3) that are not known or not measured (Clarke & Oxman 2003; Waters et al. 2006). First, interrupted time series (ITS) designs use “multiple observations over time that are ‘interrupted’ usually by an intervention or treatment” (EPOC 2005). These designs may or may not include a control group (Clancy 2002; Waters et al. 2006). Secondly, *RCT and quasi-RCT* refer to trials where participants or populations are randomly allocated (for example, via computer generated randomisation or a random number table) to an intervention or control/comparison group and are followed up over time to measure differences in outcome rates (Waters et al. 2006). A quasi-randomised trial uses a slightly “diluted” method of randomisation or allocation for methodological, for example, allocation by date of birth, alternate allocation, or pragmatic and policy reasons, for example, allocation by housing sector (Waters et al. 2006).

In evaluation, the ideal study design is an RCT or a quasi-experimental design, as they control for confounding variables (Section 4.3.9.1.3), achieve randomisation, and provide certainty in the causal relationship showing an unequivocal evidence of effectiveness (Macdonald et al. 1996). However, controlled studies of discrete non-complex interventions (RCTs) may exclude important parts of the “real world setting” and of the evidence base relating to complex health promotion interventions. This is due to the multi-faceted and context-dependent nature and delivery in multiple settings in the real world (Craig 2013).

Effectiveness trials measure the degree of beneficial effect under “real world” (pragmatic) settings (Gartlehner et al. 2006). In evaluation, examining evidence from community health promotion interventions can lead to a better understanding of the interaction of factors that are inherent between study design, evaluation methods, programmatic strategies, and context. These factors all influence the outcomes and effectiveness of community-based health promotion efforts (Merzel and D’Afflitti 2003). Once evidence is obtained on an intervention’s effectiveness, practitioners or programme implementers need to know what works, how it works and under which conditions it works in order to be able to continue programme activities, or implement it in other settings. However, if evaluations only examine the process, the risk is that the results are rarely disseminated beyond the local area and valuable experience is ‘lost’

(Campbell et al. 2000). Thus, if evidence-based health promotion is to progress, there needs to be practitioners' and service users' accounts of the implementation (process evaluation) as well as evaluation of the outcomes (outcome evaluation). These are expanded upon in Section 3.2.3.

An assessment of how the effects of a programme were achieved is valuable in determining impact of, or effective interventions (Section 3.2.3). An effective evaluation can aid in the (continued) development of the programme by providing healthcare planners and professionals with satisfaction that the objectives were met. Moreover, monitoring attendance and reasons why people do not attend the programme is also important (Perkins et al. 1999; Creswell 2003; Bowling 2014). In summary, to aid public health decision-making, evaluations must be conducted for reasons of evidence, effectiveness, economic, ethical, and accountability (Gartlehner et al. 2006; Waters et al. 2006).

3.2.2 Realist evaluation

In complex community-based evaluations, one should be looking for a realist approach, as evaluations should take account of the context and not only measures of success/performance, in which the intervention occurs. Of the different evaluation philosophies, the realist philosophy is most appropriate to provide context when assessing whether a hypothesis will work or not as several stakeholders (participants) make particular decisions in response to changes (i.e. the intervention). The stakeholders' reasoning is a response to the opportunities (resources) offered by the intervention and is what causes or leads to the (positive or negative) outcomes (Vogel 2012). Pawson and Tilley's seminal work on realist evaluation argued that in order to be useful for decision makers, evaluations need to identify "what works in which circumstances and for whom?" rather than "does it work?". Thus, the complete realist question is: "What works, for whom, in what respects, to what extent, in what contexts, and how?" (Pawson & Tilley 2004: 2). In order to answer the former question, realist evaluators aim to identify the underlying/generative (such as socio-economic status, ethnicity, and rural/urban residence) mechanisms that explain "how" the

outcomes were caused and the influence of context using process evaluation methods. Realist approaches to evaluation assume that nothing works everywhere or for everyone: context really does make a difference to programme outcomes (Evans and Killoran 2000).

In practical terms, impact evaluation is the most appropriate realistic evaluation approach for evaluating new initiatives or programmes that seem to work but for which “how and for whom” is not yet understood. This applies to programmes that have previously demonstrated mixed patterns of outcomes or those that will be scaled-up in order to understand how to adapt the intervention to new contexts. An impact evaluation is an evaluation that examines direct and indirect contributions (often unintended consequences) of an intervention to changes in people’s lives, especially mid-term to longer-term changes (Westhrop 2014), as discussed in Sections 3.2.3.2 and 3.2.3.3.

Realistic evaluation assesses social programmes on the basic hypothesis of social betterment. However, the social systems in which these programmes take place are complex: there exist inter-relationships between the programme, stakeholders, behaviours, events on the ground, and social conditions (Pawson & Tilley 2004; Judd et al. 2001; Duflo 2004). Evaluations therefore test the underlying objectives of the programme or intervention to determine whether and how the programme worked (what impact it had) in a particular context. As interventions never work indefinitely in the same way, in all circumstances, or for all people (Pawson & Tilley 2004), thus describing context is useful in any evaluation (Waters et al. 2006): context refers to the social, organisational, and political setting in which the intervention is implemented. Examples of contextual factors that may affect intervention effectiveness include literacy, income, cultural values, power relations, access to media, and health services (Irwig et al. 1998). For example, there may be different social beliefs about the roles and responsibilities or decision-making of women and men in different cultures, which may affect how women respond to a maternal health promotion programme. Whether communities are responsive to the intervention will also depend on a range of factors from the time they have available to attend, their own beliefs about pregnancy, or their beliefs about their reproductive health. Therefore, the context may provide alternative explanations of the observed

outcomes, and these need to be taken into account during the analysis (Pawson & Tilley 2004). The context of this evaluation with respect to maternal health, Nepal, and GTN was detailed in Sections 1.4, 1.4.3 and 2.5, respectively.

3.2.3 Evaluation in health promotion

At a global level, the need for evaluative research in health promotion and community development initiatives for health has been advocated (Hawe et al. 1990; Beattie 1995a; WHO 1981). For health promotion initiatives, evaluation contributes to theory building by providing clear implications for the practice of health promotion. Evaluations are needed as they provide evidence on health promotion effectiveness to:

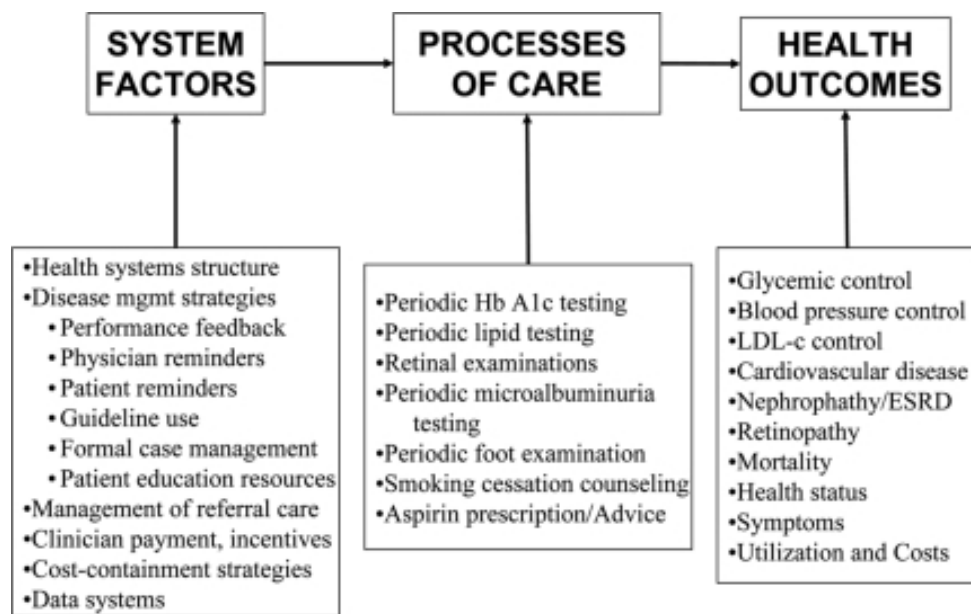
- identify the best possible ways to promote health;
- make decisions for policy development and funding allocation;
- demonstrate to decision makers that health promotion works and is an effective strategy in public health;
- support practitioners in project development and evaluation;
- show the wider community the benefits of health promotion actions;
- advocate for health promotion development (WHO 2015).

Evidence provides a clear rationale for evaluation. It sets boundaries to evaluation studies, focuses future implementations, and acknowledges the importance of context and settings of the study and the use of evaluation methodologies. The purpose of evaluation is therefore linked to the broad values and goals of health promotion, and at the level of practice, with personal beliefs, values, and perceptions of stakeholders (Perkins et al. 1999). Evidence of health promotion effectiveness came to the forefront of global priorities as seen in Section 2.2. Evidence and effectiveness in health promotion are an integral part of the Ottawa Charter.

Health promotion is a different endeavour to clinical practice as it seeks to permit multiple perspectives rather than focusing on a single goal or desirable outcome (Webb & Harinarayan 1999). It is concerned with enabling and empowering individuals and communities to increase control over, and thereby improve their health. This means that a narrow focus on health outcomes borrowed from evidence-based medicine does not adequately encompass all, or even most, of the questions that evaluation in health promotion should eventually address. Many have argued that health promotion is equally concerned with evaluations that focus on issues such as equity, empowerment, access to health services, community involvement, and health public policy (Macdonald et al. 1996; Whitehead 1991; Ziglio 1997). Yet at a practitioner level, an evaluation of the long-term health outcomes of a health promotion initiative is rarely feasible or even appropriate as seen with the MMR indicator (Section 1.3). Thus standard scientific approaches to evaluation have limited value for health promotion (Milburn et al. 1995; Nutbeam 1998; McQueen 2001). A health promotion evaluation should take into account the cost (Section 3.4), time, and resource constraints (Section 3.5). These impose considerable limitations on the type of work that can be attempted. Hence, as a result, a pragmatic approach to evaluation, as in this thesis, is often conducted. This approach takes into account which questions can be answered within the available resources (data, travel, skills, funding, time, etc.). The latter is central to achieving a useful evaluation and to ensuring that the evaluation is not a “failure”. Furthermore, if there are not enough time, skills, and funding, or the evaluation has been done “elsewhere”, i.e., the successes and failures are well documented and the reasons clearly understood, or the results are not considered for future implementation of planning and support is not available from the programme (managers, participants, etc.) (Wright 1999), here perhaps, a monitoring and evaluation (M&E) exercise will be sufficient (see Section 3.2.3.2).

Health promotion evaluation in theory is commonly divided into three sub-sections: (a) process; (b) impact; and (c) outcome evaluation (Hawe et al. 1990). This evaluation is similar but not a straightforward application of Donabedian’s clinical model (Donabedian 1988). The Donabedian model proposes a framework for evaluating quality of healthcare using three categories: structure,

process, and outcomes (e.g. haemoglobin, risk factor for blood pressure, low-density lipoprotein cholesterol and end stage renal disease, Figure 11). The latter model is, however, too clinical a model and does not separate impact and outcome models – which health promotion attempts to. In a clinical model, health system organisation is widely known and understood. While in a health promotion model, the organisation is not as rigid and easily measurable. The evaluator community here works with the wider community, which is the system referred to in Donabedian’s model. To guide a mixed-method approach, one uses the qualitative research (process) to explain the quantitative assessment (outcomes) to determine impact/effectiveness of a programme. Finally, in this evaluation, a variant of realistic evaluation was applied given the philosophy of the GTN intervention, which was context specific as outlined in Figure 4, in Section 2.5.2.



*Haemoglobin (Hb), risk factor control for blood pressure (A1c), low-density lipoprotein cholesterol (LDL-c), end stage renal disease (ESRD)

Figure 11 Donabedian model

(Source: Selby 2010)

It should be noted that a formative evaluation can be conducted with pre-programme implementation, which was conducted by GTN (Section 2.5) in the first instance. It aimed to ensure that the (new or adapted) programme was feasible,

appropriate, and acceptable before it was fully implemented. This thesis was concerned with a process, impact, and outcome evaluation, as an intervention ought to be evaluated to ensure that it is having the desired effect (Sections 3.2 and 3.3). Therefore, the evaluation assessed the results of the intervention and determined whether the objectives of the health promotion programme were met. As commented upon in Section 1.2, in LMICs, too many programmes are not evaluated or are inappropriately evaluated.

Health promotion has its own methodologies for evaluation, which take into account the aims, values, and processes that distinguish health promotion from other healthcare disciplines as discussed in the second part of this chapter. Speller and colleagues (1998) discussed this complexity of evaluating health promotion: as health promotion research does not have the benefit of clinical studies on safety and feasibility (with several phases of drug development, for example, phase I and II in drug development), researchers must therefore evaluate the intervention itself (Speller et al. 1998). In a field such as health promotion, this proves complex as most health promotion interventions involve individual behaviour change with attempts to intervene at the community level (Britton et al. 1998). Britton and colleagues (1998) suggest integrating evaluation methods will improve understanding of interrelations between behaviour and social structures, and the inclusion of a qualitative process leads to a more robust evidence base for health promotion.

In the evaluation of health promotion, the “classical” methodological and research designs are established on psychosocial and epidemiological research (Waters et al. 2006). However, most readily measurable constructs in health promotion are found in the personal skills (Section 2.2), while social and biomedical researchers have for many years been creating measures and methods that lend to an empirical approach (Waters et al. 2006). Britton and colleagues (1998) caution researchers to avoid viewing non-randomised studies as ‘inferior’, as Speller and colleagues (1998) question whether RCTs are always the best or most appropriate method of evaluating health promotion. The authors also mention that the goals of evaluation are: (1) attribution of the effects of an intervention and (2) the relative costs involved. Thus, lack of evidence from RCTs should not be viewed as a failure in the quality of research; rather, more attention should be given to refining and

strengthening other trial methodologies (such as community trials or before-and-after trials). Additionally, the focus on only effective outcomes too often ignores the process of an intervention. While insisting upon RCTs in low-income countries ignores some of the unique features of health promotion interventions, which often take place at a community level. The expected proportional benefits to individuals can be small, and beneficial outcomes are delayed (Britton et al. 1998). Thus, this thesis combines a quantitative outcome of mid-goals evaluation (impact) with qualitative process, and evaluation to understand the interrelation between people's behaviour and the social structure in which they live.

In implementing a health promotion programme, caution is recommended. As, in health promotion, potential contamination and confounding factors (Section 4.3.9.1.3) may mean that attribution can rarely be a certainty, and even when it can be, the possibility of replication of the intervention may be limited due to the differing contexts in which an intervention is implemented (Britton et al. 1998; Waters et al. 2006). The issues and difficulties that need to be taken into account in health promotion evaluation include:

1. focus on populations and communities rather than (only) individuals;
2. difficulties characterising and simplifying complex multi-component interventions rather than single interventions;
3. analysis of process as well as impact or outcome measures;
4. effect of involvement of community members or potential participants in programme design and evaluation;
5. effect of using health promotion theories and beliefs;
6. analysis of use of different types of both qualitative and quantitative research;
7. need to account for the complexity and long-term nature of public health intervention outcomes (Jackson et al. 2001);
8. integrity of the intervention highlighting what factors may have influenced the (in-) effectiveness of the intervention, such as participation (including appropriateness), exposure of programme or intervention, resources, quality of delivery (e.g. training, enthusiasm), and limiting intervention contamination (bias), (Dane & Schneider 1998; Waters et al. 2006).

For these reasons, analysing all the available evidence can be a complex task, requiring researchers to have (or have access to) sound data and methodological knowledge. Yet a well-conducted process, impact and outcome can offer valuable insights for the success of a particular project as they take into account the various types of data and methods (Creswell 2003; Duflo 2004).

3.2.3.1 Process evaluation

A process evaluation, one of the sub-sections of a health promotion evaluation, determines whether programme activities have been implemented as intended. This process evaluation is the measurement of the running of the activity or intervention. It assesses how well the latter was implemented and helps to judge whether the “vehicle is suitable for the journey”. Process evaluation is used to document a programme implementation and assess how well this has been done (Saunders et al. 2005). Process evaluation can increase our understanding of the relationship between specific intervention elements and the overall impact or outcome. It can help unravel the factors that are responsible for successful outcomes, implementation of the intervention, and intervention reliability (truth). The process data assists with characterising “failure to achieve success” (Steckler & Linnan 2002; Waters et al. 2006). These process evaluations are likely to be more feasible for health promotion practitioners than formal outcome studies due to the recognition of the process of change. Where local evaluation studies have explicitly aimed to identify features of settings that might affect the process or outcomes of a health promotion programme, they have produced evidence that has had important implications for practice. For example, all programmes should be subject to process evaluations to ensure that funds (cost) are spent as intended and to receive feedback from stakeholders on how programmes could be improved (Duflo 2004). On the other hand, outcome evaluations, which provide evidence on the results (effects) of the intervention, are usually specific to a particular context and setting, and may provide little guidance about transferability. In other words, rolling out the programme in certain settings will provide little indication of potential progress (Wright 1996; Perkins et al. 1999).

Process evaluations, such as qualitative studies, are often published separately from outcome evaluations. Yet they can be published (in systematic reviews for example) alongside quantitative studies to assess the adequacy of the delivery of the intervention and the context in which the intervention was evaluated (Moore et al. 2015; Waters et al. 2006). Moreover, process data have conventionally been drawn from observational quantitative research but increasingly use qualitative and quantitative research methodologies where appropriate (Waters et al. 2006). However, while process evaluations are necessary, they are insufficient to determine programme impact. Therefore, a process evaluation is useful alongside an impact or outcome evaluation.

3.2.3.2 Impact evaluation

Impact is the overall effect of a programme on health and related socio-economic development (Rootman et al. 2001). Impact is the treatment effect. Therefore impact evaluation requires an appropriate comparison group for counterfactual analysis, using either prospective (ex-ante) or retrospective (ex-post) evaluation design (Gertler et al. 2011). Prospective evaluations begin during the design phase of the intervention, involving collection of baseline, midline and endline data from intervention beneficiaries (the “treatment group”) and non-beneficiaries (the “comparison group”) (Duflo 2004; White 2009; Khandker et al. 2010). A well-designed impact evaluation covers both process and outcome evaluation questions. As the study can address questions of why, or why not, an intervention had the intended impact, not just whether it did. Evidence-based policy making is thus enhanced by an impact evaluation (White 2009).

An impact evaluation assesses the medium or longer-term changes of selected outcomes that can be attributed to a particular intervention, such as a project, programme, or policy, both the intended ones as well as ideally the unintended ones (Fitz-Gibbon & Morris 1987; Christiansen 1999; IMS 2001; Rootman et al. 2001; Khandker et al. 2010; Bhutta et al. 2011; Baqui et al. 2015). Both impact and outcome evaluations test the causal chain of events that has been

postulated by the programme (White 2006; Gertler et al. 2011). The assumption is that changing knowledge (e.g. about the benefits of iron intake in pregnancy) will lead to a change in certain behaviours (e.g. increased uptake of iron) and subsequently a reduction in maternal morbidities (e.g. anaemia). The difference between impact and outcome evaluation does not depend on what is measured, but is defined by the sequence of measurement of outcomes (medium outcomes measuring maternal services attendance versus long-term avoiding morbidities). It depends entirely on the causal chain of events that has been proposed and where the intervention stands in relation to these events. Thus evaluations can range from relatively short intervals, for the assessment of progress and efficiency, to much longer intervals for the assessment of effectiveness and impact (Hawe et al. 1990). The notion of time is further explored in Section 3.5. In addition, impact and outcome evaluation both involve the assessment of programme effects, but at different levels. In this way, some of the outcome evaluations may incorporate notions of effectiveness as well as cost-effectiveness in order to assess the efficiency of a programme (Duflo 2004).

Traditional approaches to evaluation also include M&E. For example, a community-based design that includes results about the needs of a community can subsequently inform the design of further phases of the project (Creswell & Plano-Clark 2007; Plano-Clark & Creswell 2010). M&E are a set of management tools used to audit project implementation on the ground, to assess whether the project is developing according to plan and to make amendments where needed. M&E are often either a simultaneous or short-term assessment of activities and procedures, the use of resources and associated costs. It lends to that an effective impact health promotion evaluation should therefore be able to assess precisely the mechanisms by which beneficiaries are responding to the intervention. The question of causality, or changes in outcome that are directly attributable to a programme (Gertler et al. 2011), makes impact evaluation different from M&E and other evaluation approaches. It should be noted that the main question of impact evaluation is one of attribution: isolating the effect of the programme from other intervening factors (confounders) and potential selection bias of participants (Fitz-Gibbon & Morris 1987; Christiansen 1999; Khandker et al. 2010; J-PAL 2015). Impact evaluation answers the question of causality between the intervention and the outcomes observed, wherein lies the

difference from M&E (see Section 3.2.3.2), (Fitz-Gibbon & Morris 1987; Christiansen 1999; Khandker et al. 2010; WHO 1981). Therefore, impact evaluation is concerned with the assessment of the mid-term effects of the programme and usually corresponds with the measurement of the programme objectives (outcomes), i.e., has there been necessary change as a consequence of introducing an intervention in increasing overall health or socioeconomic development. Hence, it may not be appropriate to draw conclusions on the effects of a project until a process evaluation suggests that they have been successfully adopted, implemented, and are running smoothly (WHO 1998; Perkins et al. 1999).

In contrast to an outcome evaluation, which examines whether targets have been achieved, impact evaluation is structured to answer the question: how would individuals (who did benefit from the programme) have fared in the absence of the programme? Or, how would those who did not benefit have fared if they had been exposed to the programme? This involves a counterfactual outcomes analysis (that is, outcomes for participants had they not been exposed to the programme). Impact evaluations can be rigorous in identifying programme effects by applying different models to survey data to construct comparison groups for participants (Duflo 2004; Khandker et al. 2010). Impact evaluation designs are identified by the type of methods used to generate the counterfactual and can be broadly classified into three categories: experimental (RCTs); quasi-experimental (difference-in-differences analysis or DiD); and non-experimental designs (before-and-after or interrupted time series with no comparison group). This study conducted an evaluation based on a quasi-experimental design (see further in Chapter 4).

Evaluation designs vary in cost, feasibility, and involvement during the design or after implementation phase of the intervention, as well as degree of selection bias (White 2006). Impact evaluation using an appropriate counterfactual is a key component. It is defined with reference to a control group. The latter is identified to avoid selection bias with the use of either experimental or quasi-experimental approaches. The design is further strengthened with the use of a control/baseline (White 2009). In addition to selection bias, important issues to consider in the design are spillover effects (the control group is affected by the

intervention) or contamination (the control group is affected by other interventions). A before-versus-after analysis yields a valid counterfactual in this case, and a treatment versus control analysis of hospital improvements and resource/materials acquisition is likely to be a stronger design (White 2009; Gertler et al. 2011).

It is difficult, however, to answer these counterfactual questions, as at any given point in time, an individual can only be observed either exposed to the programme or not. Comparing the same individual over time will not, in most cases, provide a reliable estimate of the impact the programme had on the individual, i.e., as in an interrupted time-series or before-and-after, as many other things may have changed at the same time that the programme was introduced. Evaluations cannot obtain an estimate of the impact of the programme on each individual. They obtain an average impact of the programme on a group of individuals by comparing them with a similar group that was not exposed to the programme. As referred to in Section 3.2.1, the critical objective of impact evaluation is to establish a credible comparison group. This is a group of individuals who, in the absence of the programme, would have had outcomes similar to those who were exposed to the programme. This is done with either an RCT or DiD (Duflo 2004; White 2006).

Lastly, evaluation does not impose the use of particular methods. The choice of data collection, analysis methods, and tools are guided by the types of data that are needed to answer the evaluation questions, or more specifically, to test the aim in all its dimensions. Usually, both quantitative and qualitative data are collected in an impact evaluation, often with quantitative data being focused on context and outcomes, and qualitative data on generative (process) mechanisms (Pawson & Tilley 2004). A review of quantitative methods and models of impact evaluation can yield measured changes in wellbeing that are attributable to a particular project or policy intervention (see Section 2.3). In this thesis, a mixed-methods impact evaluation (Section 4.2) was used to assess the programme effectiveness in achieving its ultimate goals, which are the aims and objectives of GTN (CDC 2013). Section 3.3 discusses the mixed-methods impact evaluation approach.

3.2.3.3 Outcome evaluation

An outcome evaluation measures the intervention's effects on the target population by assessing the progress in the outcomes or outcome objectives that the health promotion programme has achieved. Outcome evaluation is concerned with the subsequent or longer-term effects of the programme, which usually corresponds to its aim. For example, a community-based healthy-eating project may use impact evaluation to assess changes in dietary habits (for example, for a reduction in anaemia) and outcome evaluation to assess the incidence of a related condition (here, improvements in diet over the long-term) in that community.

An outcome evaluation on its own provides no information about how the results were achieved, thus limiting implementation, repetition of success or rejection of programmes that have not been effective (Macdonald et al. 1996). Therefore, as discussed in the previous section, conducting a process and impact evaluation alongside an outcome evaluation is common.

In this thesis, a quantitative study was applied to measure the outcomes of the intervention (Section 4.3.9), i.e., the uptake of maternal health services (see Sections 1.4 and 2.5).

3.3 Evaluation methodologies & mixed-methods

According to Patton (1996), the key issue for health promotion practice is the usefulness of data, not the method by which it is obtained. This means that evaluation methodologies should be chosen to support the intended use of the evaluation by its intended users (Patton 1996). If practitioners adopt a participative approach when planning evaluations, this process helps define the questions (aims and objectives) that the evaluation should answer. These together with the time and resources available guide the choice of methodology. Denzin and Lincoln (1994) refer to a "*quiet methodological revolution*" that has taken place in evaluation studies (page vii). There is a considerable body of evaluation practice that has moved beyond scientific, quantitative methods to also embrace more interactive, qualitative approaches (Perkins et al. 1999).

This is relevant, as impact evaluation aims to understand not just what works, but why (White 2009). Qualitative methods can answer the “why” and quantitative “how much”. Thus, both types of methodologies are useful and can be combined or “mixed” (Brannen 1992; Milburn et al. 1995). This mixed-methods combination provides an illumination of the process, the outcomes, and thus the impact achieved (Perkins et al. 1999).

Finally, the evaluation designs that provide useful evidence for practice are those that combine several methods in relation to evaluating community development for health programmes (Beattie 1995b). However, the combination of such methods should not be used uncritically (Sanford 1981; Mays and Pope 1995; Milburn et al. 1995a; Patton 1996a). Mixed methods are further expanded on in Chapter 4.

3.4 Costing of evaluations

The world is dominated by costs and evidence. Consequently, there is also a need for an evaluation to detail how funds are spent (Section 3.1). The WHO’s definition of evaluation (Section 3.2) emphasises this by saying that costing an intervention in a process evaluation may help guide the allocation of resources. In this instance, it is beneficial to account for costs of implementation and evaluation to conduct a cost-effective exercise (Duflo 2004).

The main cost of evaluation is the cost of data collection/analysis (evidence), as health promotion activities seek to use evidence-based practice in order to deliver public health policy and to show progress towards meeting public health targets (Levin & Ziglio 1996). Yet, few research studies have looked into practical guidance regarding the cost and duration of evaluation studies (Hulton et al. 2007). The Makwanpur trial (Nepal) suggests that community mobilisation through women’s groups is a cost-effective approach to improve birth outcomes and reduce neonatal mortality rate in hard to access villages compared to home visits by outreach workers (Manandhar et al. 2004; Borghi et al. 2006). Therefore, a cost-effective exercise helps to account for resources and accountability in order to scale up (Van Lerberghe & De Brouwere 2001; Koblinsky et al. 2015). In addition to process evaluation, cost evaluations are

likely to be more feasible for health promotion practitioners than formal health outcome (MMR) cost-effective studies. Aside from the cost and the methodological difficulties of these outcome studies, recognition of the process of change means that it is not even appropriate to attempt to measure a project's outcome until it has been successfully adopted, implemented and has been running smoothly for some time, usually several years. As seen in Section 1.2, there is a danger of implementing an ineffective or perhaps harmful intervention. The cost of the evaluation is described in Section 4.3.9.1.7.

3.5 Time & indicators

The development of useful evaluation criteria consists of selecting indicators (here, outcomes) for measuring change at different stages in a project's development and over different periods of time. These will link immediate objectives (focused on implementation), with intermediate goals (focusing on impact), and long-term objectives (focused on outcomes). There is a wide range of "off the shelf" indicators available. In particular, the global agencies have put considerable efforts into developing health promotion indicators, such as the WHO (or MDGs) indicators of uptake of maternal health services, used in LMICs, as discussed previously in Section 1.4.

Indicator data helps to measure knowledge, motivations, skills, behaviour and health status (WHO 2000). They can be used to evaluate certain health promotion projects (see Section 4.3.9). They are also transferable to the evaluation of local (community) level health promotion projects, as they replicate work done at a national level (Section 1.3.1). The use of standardised indicators can be helpful for comparison with other settings or transferability of the project, such as access to maternal health services in LMICs (Sections 1.3.1, 4.3.3 and 4.3.9.1.4).

3.6 Evaluations strengths & weaknesses

Limitations of the more traditional methods of evaluation are discussed in this section. There exists a risk of implementing an intervention that is ineffective or even harmful, as seen in Section in 1.2. Moreover, evaluation is sometimes

viewed as “negative/castigatory” or as a measure of performance or way of determining whether standards were met. It can also be unfairly conducted if subjected to time and funding limitations (Perkins et al. 1999).

Furthermore, the research literature is lacking in practical guidance on how much various kinds of evaluation studies cost and how long they take (Perkins et al. 1999). Evaluation is also difficult when project managers, funders, and staff disagree about the project’s aims and objectives, about the relative importance of different objectives, if the project shows weak definition of goals and objectives, planning or methodology, etc. Another potential difficulty is the influence of donors or external partners on the project trajectory and resulting implications on the evaluation process. For example, outcome evaluations that are imposed on health promotion projects by external decision-makers and funders have been known to select outcome criteria that were not the stated goals of the project. Thus, the evaluation process will usually reveal any differences between the various stakeholders’ expectations about what the project and evaluation should achieve.

Another limitation is that despite the increased acceptance of the health promotion’s broad goals, nationally defined indicators continue to be mainly set within a clinical health gain framework (Section 3.2.1). Relying solely on the rigorous standards of evidence (for example, RCT) and inclusion criteria adopted by effectiveness reviews (systematic and Cochrane reviews) has excluded a lot of evidence that is useful to health promotion practice (Perkins et al. 1999). Due to the difficulties of meeting the stringent requirements of the randomised control trials and “scientific outcomes” in health promotion, the health promotion evaluations may be deemed weaker evaluations designs, such as quasi-experimental designs. As a result, health promotion evaluation is subjected to both design and validity criticisms from those committed to the RCT “gold standard” and complaints from practitioners that the results are not useful for clinical application, because they do not contain sufficient information (Macdonald et al. 1996). In addition, the naturalistic (context specific) and multifaceted nature of health promotion programmes means that it is difficult for scientific outcome designs to meet/converge.

Furthermore, in many circumstances, there are limits on the range of other potential causes that can be monitored (or controlled for). Where this is the case, the outcomes frameworks (such as the Donabedian model – Figure 11) provide a structure for assessing whether the planned outcomes were achieved, whether the interventions designed to achieve them were implemented as planned, and whether there may be other explanations for the outcomes observed (Craig et al. 2011).

There is also the risk of failure, which is related to the evaluation planning and to the evaluator bias. For example, an evaluator may set aims that are too ambitious (outnumber the programme aims) or a set of shared aims with the NGO/client or evaluators may impose predisposed notions and definitions of evaluations on clients, and fail to incorporate the cultural differences of individuals and programmes within the evaluation aims and process (Reeve & Peerbhoy 2007).

This Ph.D. study, therefore to mitigate the above, uses a comprehensive mixed-methods evaluation approach. With regard to the quantitative research, the underlying hypothesis was that the measured aspect (outcome of the evaluation) of the GTN intervention of health-seeking behaviour should improve in the intervention area relative to the control. In order to evaluate the GTN intervention for effectiveness (impact), a specific set of indicators of progress (i.e., uptake of services) was chosen based on the literature on maternal health access (Section 1.3). Further complimenting the quantitative research was the cost of providing health promotion. The qualitative research or process evaluation aimed to identify users' perceptions (knowledge, attitudes, and beliefs) regarding the effect of the intervention, barriers, and facilitators to the uptake of services and changes in decision-making of those that were part of the intervention compared to those who were not. Together the data from the two approaches assisted in determining the impact of the intervention and how to evaluate maternal health promotion interventions in LMICs. The aims and objectives of the evaluation are detailed next.

3.7 Aims & objectives

The aim of this doctoral research was to compare the effectiveness (here, impact) of GTN's health promotion strategy to the existing level of health promotion given to mothers in a LMICs community setting with defined indicators.

The objectives of this evaluation are to:

1. measure the uptake of maternal health services by comparing the baseline (2007), midline (2010), and final (2012) data between intervention and control communities regarding ANC, delivery care, and PNC, and to evaluate the effectiveness of the Nepali intervention quantitatively as a “before-and-after” cross-sectional study;
2. assess the usefulness of the chosen regression analysis (difference-in-differences) as an analytical tool;
3. measure perception of changes in the community, around maternal health;
4. assess users' and healthcare providers' perceptions of the effect of the intervention and factors that influenced uptake; and measure the barriers and facilitators to uptake;
5. measure perceptions of the intervention decisions around seeking delivery care in the community;
6. account for unintended consequences (methods) and;
7. measure the cost of the intervention.

3.8 Summary

There is enormous diversity in the approaches to evaluation and health promotion evaluation (approach). Evaluation aims to provide a “rounded” picture of the problem at hand - in this case, the intervention. Too many interventions in low-income countries are not evaluated, thus running the risk of supporting potentially wasteful or less successful interventions at the expense of more effective ones. Therefore, at the outset, it is worth investing time and effort in establishing why an evaluation is needed and negotiating this with the stakeholders who will have an interest in its results. Thus, interventions should be clearly and fully described (implementation and process) and they should be assessed against agreed criteria, including indicators of acceptability and implementability (based on the literature), appropriate outcome measures, and research methodologies (mixed methods). Impact evaluations are increasingly seen as beneficial as they account for the counterfactuals and unintended consequences of interventions. Lastly, the limitations and strengths of health promotion evaluations should be accounted for.

Chapter 4 Methodology & Methods

4.1 Introduction

This chapter will discuss the methodology and methods of this mixed-methods evaluation study design. A mixed-methods approach was chosen to:

- determine the impact of the GTN intervention in contributing to improved access, knowledge, attitudes, and beliefs of maternal health services (determined by multiple regression analyses on secondary data);
- assess women's control over the decisions in regard to their health and the community's perspectives of the intervention (obtained from qualitative interviews with primary data).

A combination of qualitative and quantitative approaches offered a thorough evaluation of the impact of the programme. Together the two approaches provided a deep insight into the key maternal health issues, examining whether there was a change in women's behaviour towards maternal health when community health promoters carried out health promotion activities. The quantitative data were triangulated, or "mixed", with qualitative data consisting of interviews and focus groups with health service providers and users (women) and their families. This mixing was done using an appropriate qualitative methodology to investigate the changes found (or lack thereof) between the data collection points. The use of the complementing and the "mixing" of methods are discussed in this chapter.

This section of the thesis addresses: (a) the mixed-methods approach; (b) qualitative interpretivism; and (c) quantitative positivism. Also outlined in this section are the strengths and weaknesses of the use of primary (qualitative) and secondary (quantitative) data, and the methodological strengths and weaknesses.

4.2 Rational of mixed methods

Mixed methods fit into a particular set of philosophies. It is worth noting that some purists, both from a quantitative and a qualitative perspective, argue that mixed-methods approaches are “incompatible”, i.e. mixed methods approaches cannot be done because qualitative and quantitative approaches are unsuited to one another (Howe 1988). Obviously, this researcher supports the belief that quantitative and qualitative can and should be mixed. With this in mind, the following definition of mixed-methods research has been adopted:

"Research in which the investigator collects and analyses data, integrates the findings, and draws inferences using both qualitative and quantitative approaches or methods in a single study or a programme of inquiry" (Tashakkori & Creswell 2007, page 4).

In mixed methods, each project is reported separately as a distinct study, but, overall, the programme of inquiry is mixed-methods research (Baskerville et al. 2001). The use of qualitative and quantitative approaches gives the researcher an ability to use both numbers and words to combine inductive and deductive thinking to address the research problem (Creswell & Plano Clark 2007). Furthermore, using mixed methods addresses different questions within the same study. The process is essentially an amalgamation of two different research philosophies that offer the “best” in realist evaluation and philosophical underpinnings of monitoring and evaluation (Bamberger et al. 2010; Westhorp 2014).

Mixed-methods researchers, in practice, use and make explicit use of data from diverse philosophical positions. These positions are often referred to as dialectal (opposite) stances that bridge post-positivist worldviews with social constructivist worldviews and complemented by transformative perspectives (Green et al. 2007). In other words, mixed methods “mix” scientific methods of inquiry to critique the knowledge/evidence obtained where the researcher can influence what is observed yet he/she is conscious of biases with the knowledge/evidence stems from interactions in the social “human” world, namely pragmatic all the while acknowledging that change is possible in the self, beliefs and in lifestyle choices. These are a number of reasons for undertaking

mixed-methods research. Essentially, mixed-methods research is concerned with “what works”. It represents an opportunity to transform different methods into new knowledge through a dialectical discovery: i.e. a discourse between two “people” each holding different points of view about a subject. Yet through this dialogue the researcher wishes to establish the truth through reasoned arguments (i.e. research). In general, studies draw upon one or more theoretical frameworks from social, behavioural, or biological sciences to inform all phases of the study; however mixed-methods studies integrate a variety of theoretical perspectives, as previously seen (Pasick et al. 2009). The mixed methods used in this thesis included a pragmatic approach (“doing what works best”) that draws on employing “what works,” using diverse methods, giving importance of the research problem and question, and valuing both objective and subjective knowledge, i.e. that which can be “observed” or reproduced considered alongside the researchers’ personal perspective and belief (Morgan 2007). Moreover, mixed-methods design should be informed by a theoretical and conceptual framework, the latter model is intended to assist the research community in evaluation and to bring about change (Meissner & Sprenger 2010; Meissner et al. 2011).

Mixed methods permit the researcher to “view problems” from multiple perspectives to enhance the meaning of a singular perspective or to contextualise the information at the macro or micro level - either to obtain a picture of a system such as a hospital or add in information about individuals (e.g. attending care). Mixed methods complement the picture of an evaluation by merging quantitative and qualitative data to give a more complete understanding of the problem by comparing, validating or triangulating the results. Furthermore, the use of mixed methods allows the researcher to examine (alongside) the outcomes, processes, and illustrate the context for intervention trends/changes (Plano-Clark and Creswell 2010).

Additionally, mixed methods may use both primary and secondary data. The two main approaches in the primary and secondary research are qualitative and quantitative. Primary data sources are those collected directly from the original or primary source by researchers (Patton 1996; Dawson 2009). Primary data can be seen as collected first-hand data by the researcher. Therefore primary

research is 'new' research (i.e. collecting new data), carried out to answer specific questions using qualitative, quantitative or mixed-methods approach (IWH 2015). The quantitative methods may use a questionnaire as one research tool (survey questionnaire). Meanwhile, the survey is often based on personal interviews using questionnaires at or near health points. Therefore, the questionnaire surveys are very effective in systematically collecting data from a great number of people and at a low-cost, in order to produce summarised and quantitative descriptions.

Secondary data, on the other hand, often include information from the national population census and other government information. One type of secondary data that is used increasingly is administrative data. This term refers to data that are collected routinely as part of the day-to-day operations of an organisation, institution or agency, (e.g. NGO). There are many examples: motor vehicle registrations, hospital intake and discharge records, workers' salary, and more. Compared to primary data, secondary data tends to be readily available and inexpensive to obtain. In addition, administrative data tends to have large samples, as the data collection is routine and comprehensive, and are collected over a long period. That allows researchers to detect change over time (months or years). Secondary data can be examined in addition to the information provided by primary data (i.e. survey results/focus groups) by 'mixing' to provide a more rounded interpretation of the findings (IWH 2015).

4.2.1 Mixing the data & data collection using different designs

Morse and Niehaus (2009) state that there is a point where mixing occurs and the latter may differ depending on the mixed-methods design. Mixing may occur during data collection (for example, when both quantitative items and qualitative open-ended questions are collected on the same survey), during data analysis (for example, when qualitative data are converted into quantitative scores or constructs that are compared with a quantitative dataset), and/or during data interpretation (for example, when results of quantitative analyses are compared with themes that emerge from the qualitative data), (Morse & Niehaus 2009).

Therefore, in a single study of a multiphase programme of inquiry, some projects employ a design that is known as a "stand-alone" design, while other

studies use a design with phases that build on each other and contribute to an overall programme objective. The study designs or approaches that can be used include: a) a convergent (or parallel or concurrent) designs; b) sequential (or explanatory sequential or exploratory sequential designs); c) embedded (or nested) designs; and d) multiphase designs (Creswell and Clark 2011). However, more complex designs exist and are driven by specific questions and aims in particular investigations (Morse & Niehaus 2009), as detailed below.

Creswell (2003) stated that the mixing of data is a unique aspect: by mixing the datasets, the researcher provides a better understanding of the problem than if either dataset had been used alone. In single or multiple studies, the data can be mixed by:

- a. Convergent or parallel or concurrent design: integrating multiple forms of data/merging or converging the two datasets by bringing them together. In mixed-methods studies, data are integrated or combined rather than conducting two separate endeavours to collect data. Challenges exist in integrating the data, therefore it is a priority to “maximise” the strengths of both data and “minimise” the weaknesses. Some suggest using systematic integrative procedures by merging data, connecting data, and embedding data (Creswell and Clark 2011).
- b. Connecting data in a sequential (or explanatory sequential or exploratory sequential) design: connecting the two datasets by having one build on the other. Here, integration means to analyse one dataset (e.g. survey data) and use the information to inform the design and collection of qualitative data (e.g., interview questions, or identification of participants to interview). The analysis of results begins in the initial phase with the data collection followed by the second phase of research where the analysis is completed (Dawson 2009). A slight variation on the sequential design would be where a study conducts an intervention and embeds qualitative data within the intervention to aid understanding. An example of this would be exploring how participants experience the treatment/intervention.
- c. Embedded (or nested) designs, embedding data: embedding one study or method of data collection provides a supportive role for the

other study, or method of data collection. Here, integration means embedding a secondary priority within a larger, primary design, for example before a trial to structure procedures or post-trial to inform development or results of the trial. This would provide “complementing” qualitative data about how participants felt about a clinical trial during the intervention; Miaskowski and colleagues (2004) conducted an evaluation of both the outcomes and process of the intervention. In the RCT study, the qualitative data were collected with the use of audiotapes of the intervention sessions. The notes from nurses and patients provided a fuller picture of the issues, strategies, and interactions experienced during the intervention.

- d. Multiphase designs are frequently used in health sciences. These designs emerge from several/multiple projects conducted over time with sequential elements. They are conducted to develop, test, implement, and evaluate a health prevention programme where the project can be a) qualitative; b) quantitative; and c) mixed. In short, study designs are conducted over time with links in place so each phase builds upon another with the common overall objective of testing the health prevention programme.

In the study in this thesis, both quantitative and qualitative data were collected in a single study rather than in multiple studies over time. As, increasingly used in health research, mixed methods begin with the understanding that investigators wish to understand the social and health world by analysing the data yielded. Mixed methods, or the combination of quantitative and qualitative data, are based on an assumption that to understand the social and health world, one needs to gather evidence on the nature of the research question and theory. Therefore, social inquiry is targeted at and influences a given problem (e.g., policies, organisations, the family and the individual). Mixed-methods research is thus more than just simply collecting qualitative data from interviews or collecting multiple forms of qualitative evidence (e.g., observations and interviews) or multiple types of quantitative evidence (e.g., surveys and diagnostic tests). It involves the intentional collection of both quantitative and qualitative data as well as the combination of the strengths of each to answer research questions by mixing the data. Quantitative (mainly deductive) methods

are ideal for measuring "known" phenomena and patterns of association, including inferences of causality; while qualitative methods identify unknown processes, explanations of "why" and how phenomena occur, and the range of their effects (Pasick et al. 2009).

4.2.1 Advantages & challenges in mixed methods

Mixed methods have several advantages. For instance, quantitative analysis, as compared with the qualitative approach, seeks to gauge potential impacts that the programme may generate, while the latter seeks to highlight the mechanisms of such impacts, and the benefits, or lack of, to recipients from in-depth and group-based interviews. Whereas quantitative results can be generalisable, the qualitative results may not be. Nonetheless, qualitative methods generate information that may be critical for understanding the mechanisms through which the programme helps beneficiaries. Thus, mixed methods allow the researcher to use both numbers and words, and to combine deductive, i.e. the "top-down" approach that uses theory to test the observations/measures in order to address the hypotheses, and inductive or the "bottom up" approach that moves from specific observations/measures to detect patterns, or formulate, some tentative hypotheses to develop broader generalisations and theories. In conclusion, inductive reasoning by its very nature is more open-ended and exploratory, especially at the start of a research project. Deductive reasoning is more narrow in nature, and is concerned with testing or confirming hypotheses to address the research problem (Creswell & Plano-Clark 2007).

There are also challenges with sampling in mixed methods. There are analytic and interpretive issues with specific designs. When the investigator mixes the data in a sequential design; the findings may be conflictive or contradictory. Therefore, strategies to resolve differences between the two methods need to be considered before and/or after gathering more data by revisiting the databases – i.e. there is a "point of interface" where the investigator decides what results from the first phase will be the focus of attention for follow-up data collection (Teddlie & Yu 2007; Meissner et al. 2011).

There are challenges and benefits of a team approach to mixed methods, for example, forming the mixed-methods research team that includes both quantitative, and qualitative researchers. The subsequent data collection involves multi-disciplinary, inter-disciplinary, and/or trans-disciplinary teamwork, which means different approaches, and where congruency in design and interpretation takes time and effort to be reached. Therefore, there are methodological challenges in mixed methods, which include issues around teamwork, resources, data collection and analysis, and interpretation. For instance, it takes time and resources, almost double, to carry out data collection and analysis (audio recorders, transport, building infrastructure, and resources) (Tashakkori & Teddlie 2010; Meissner et al. 2011). Furthermore, caution is advised, as there are instances where priority is given to either the qualitative or quantitative research despite the methods being equally emphasised. For instance, priority could be unintentionally placed on the secondary data when it is embedded into a larger, primary design (Cresswell et al. 2003; Plano-Clark & Creswell 2010).

Finally, limitations also exist in the reporting of mixed methods. Many publications, for example journals will have word limitations, and this also affects publication of mixed-methods studies in scholarly journals. Researchers, therefore, need creative ways to present material: quantitative findings are often presented in tables, while the qualitative findings can be illustrated as themes (Stange et al. 2006; Meissner et al. 2011).

4.2.1.1 The critique of quantitative and qualitative methods

4.2.1.2 Quantitative research & its evidence

Quantitative research is a mode of deductive inquiry used to test theories or hypotheses, gather descriptive information, or examine relationships among variables, which are measured and yield numeric data that is statistically analysed (such as maternal health services uptake outcomes). Unlike qualitative data, quantitative data provides measurable evidence to help establish probable causes and effects. Efficient data collection procedures can be more likely to replicate and generalise a population, to facilitate the comparison of groups and

provide insight into a range of experiences. The approaches used in health sciences include descriptive surveys, observational studies, case-control studies, randomised controlled trials, and time-series designs (Pasick et al. 2009).

Strengths and weaknesses of the quantitative approach

Of the three levels of quantitative research (descriptive, correlational and causal), each has its own individual merit, starting with descriptive studies, which give an indication of the frequency with which something occurs, while correlational studies investigate a relationship between variables (e.g. age, size, etc.). Finally, the strength of causal (or experimental) research lies in its exploration of the relationship between variables once an intervention is introduced, i.e. establishing a relationship between cause (independent variable), and effect (dependent variable), whilst attempting to hold extraneous variables constant (Walker 2005), such as applying a control. Using a control strengthens quantitative research – first, it acts comparison group, and secondly reduces systematic bias and erroneous conclusions of a study hypothesis (Section 3.2.3.2). Standardised statistical analysis lets us derive important information from research data, including trends, differences between groups, and demographics. With regression analysis for instance the number of characteristics can be controlled for in order to reduce variation among cases (Duflo 2004). Therefore reliability/interval validity and generalisability beyond the study sample can be ensured (Duffy 1985). Additionally, quantitative estimates can be obtained of the costs and benefits of interventions (Colburn et al. 2015).

Quantitative research also provides information regarding the relationship between the variables of interest to predict future outcomes. The latter is possible as the researcher is able to “manipulate” an independent variable in order to study its effects on the dependent variable, for example controlling for gender or age and measuring changes in school attendance with (and without) the provision of “free” school meals (Corner 1991). The strength in producing numbers lies in assisting health policy-makers and managers in prompt decision-making on application of resources (e.g. equipment, staff, beds, etc.), and cost-effectiveness of discharge planning and length of time a patient stayed out of hospital (Carr 1994).

Quantitative studies often require as a prerequisite appropriate sample selection of the population under study, and in experimental studies, conducting a power calculation to determine at what size of the population we will see an effect (Walker 2005). Clear documentation needs to be provided regarding the content and application of the survey instruments so that other researchers can assess the quality of the data and the validity of the findings. As samples of individuals, communities, or organisations can be selected to ensure that the results will be representative of the population studied- the principal strength of the quantitative approach is that findings can be generalised to the population about which information is required (Duffy 1985; Walker 2005).

Weaknesses of quantitative methods include that the administration of a structured questionnaire creates an "unnatural" situation that may alienate respondents. While in some instances, the studies are expensive and time-consuming, and it takes time to obtain the preliminary results. This may be a concern if results are promptly needed to make a decision to implement, continue or upscale an intervention (Choy 2014). Moreover, the why-question is often not answered in quantitative research, for example, why individuals have a preference for one choice over another, therefore a qualitative approach is complementary (Johnson and Onwuebuozie 2004). Furthermore, self-reported data obtained in a questionnaire may be inaccurate or incomplete (Walker 2005). Recruitment and attrition are common problems in sampling, and participants' dropping out of an intervention limits the generalisability (Walker 2005). Often there is no information on contextual factors to interpret the data or explain the variations in behaviour between participants that have similar demographic and socio-economic characteristics. Furthermore certain groups, such as people who are illiterate, or ethnic minorities may be harder to access using quantitative methods. Another concern in quantitative methods is that its tools are 'inflexible' as the instruments cannot be modified once the study begins (Choy 2014).

There may occur weaknesses in sample-size calculations as they rely on an estimation of the expected degree of change in the dependent variable and are therefore limited to studies where research on the subject already exists

(McMahon 1994). Moreover, in statistical analysis, there may be issues in the data analysis/interpretation for instance in the case of “missing” data. While, the correlations produced may mask or ignore underlying causes/realities, or that the results may be due to “random” events, hence the need for a control in time and area. Additionally, errors in the hypotheses tested may yield a misinterpretation of programme quality or influential factors, and errors in the selection of procedures for determining statistical significance can result in erroneous findings regarding impact. Finally, a weakness in health evaluation studies (dealing with holism) includes the diminishing of experiences of the individual as quantitative analytical methods may regard human beings as merely reacting and responding the environment (Corner 1991; Carr 1994).

4.2.1.3 Qualitative component of mixed-methods study

Qualitative research in evaluation can contribute to assessing interventions by illuminating processes, exploring diversity, and developing new theories. There are many methods employed to collect primary data such as structured or unstructured interviews, questionnaire surveys, and case studies. Qualitative methods are most appropriate for exploring complex phenomena or areas not (easily) amenable to quantitative research (Tashakkori & Teddlie 1998; Campbell et al. 2000). They are a distinctive approach to research in their own right (Bryman 2007). Qualitative interviews can enable respondents to express themselves in their own words (Gill et al. 2008; Ulin et al. 2012). Clearly the study of perceptions, awareness, and views lends itself very much to a qualitative approach. Therefore, the approaches in qualitative health research systematically and rigorously investigate (theory), and include a broad range of methods such as in-depth interviews, action research, participant observation, conversation analysis, case study, ethnography, phenomenology, review of documents, conversation analysis, grounded theory, and/or a narrative study (Al-Busaidi 2008; Lewin et al. 2009; Pasick et al. 2009). Qualitative research focuses on the meaning and experiences of participants in the context or inductive of theory-development driven research. Qualitative researchers aim to understand processes, sometimes emerging over time. The data (quotes) can

set a context of the participants 'voice'. Therefore, the collection of data provides an in-depth understanding of concepts (Ezzy 2013).

Strengths and weaknesses of the qualitative approach

There are benefits of a qualitative descriptive approach. In this section, the strengths and weaknesses of this approach are detailed alongside examples of use. Qualitative description is a useful qualitative method in medical research, bearing in mind there are limitations of the approach which ought to be considered when undertaking the research. It is especially relevant in mixed-method research, in questionnaire development, and in research projects aiming to gain knowledge of patients', relatives' or professionals' experiences with a particular topic. Qualitative analysis, as compared to the quantitative approach, elucidates the programme's impact, their mechanisms, and the benefits to the participants using in-depth and group-based interviews. Whereas quantitative results can be generalisable, the qualitative results may not be. Nonetheless, qualitative methods generate information that may be critical for understanding the mechanisms through which the programme helps beneficiaries (Denzin and Lincoln 1994; Lewin et al. 2009).

The human element in qualitative research is both its strength and weakness: one strength is that it provides an understanding of human insight and experience, which influences interaction in the physical setting, and on the other hand, a weakness as qualitative research is subject to the researchers' skills and training (Patton 2002). Therefore, the role of the researcher is in accordance with the research tradition used. A researcher aims to minimise their personal assumptions (bias) when collecting data. Yet, there is no avoiding the "effect" the researcher has on the interview and in defining the shape of the study. Here, for example this had an implication as the perception of being an "upper caste" researcher and perceived as 'better' (more intelligent or wealthier) may have influenced responses from participants who are classed in Nepal as "lower" castes. Britten (1995) suggests that qualitative researchers ought to consider how they are perceived whether it be due to their social category/class, caste/race, and sex during an interview. As a result, participants may try to give a "desirable" response, aiming to please the interviewer (Britten 1995). The

latter is defined as *social desirability response bias* (Randall, 1991), where participants may feel a need to justify their responses. Therefore, the objective of a qualitative research interview is to aim to discover the interviewee's own meaning and avoid prior assumptions with "preset" categories, such as those above. Listening and observation are useful skills. Furthermore, a good level of self-awareness is necessary in the researcher in order to reduce the aforementioned possible biases (Britten 1995).

4.2. Summary of methodology

The first part of this chapter has delved into mixed methods and its two main methodologies – the quantitative approach and qualitative approach. Mixed methods research generates questions and hypotheses that form the basis of decision-making or further research. Despite the application of rigorous procedures, including measures to control systematic error and bias, the use of mixed methods is subject to a number of methodological and ethical concerns. The previous section has stressed that neither approach is superior to the other: quantitative methods facilitate the discovery of quantifiable information, and qualitative research is useful for the exploration of subjective experiences of participants. In research, combining both approaches in a mixed methods study, if time and money permit, is valuable in evaluation studies for evidence-based decision-making. The next section expands on the methods used in this evaluation.

4.3 Mixed methods in this thesis

It is clear the aim of this thesis (Section 3.6.1) requires a variety of different research methods. The primary aim of this study was to first address positivist (deductive, i.e. quantitative methods) effectiveness questions, while the secondary aim was – to explore sequentially interpretivist/realistic (inductive and deductive, using qualitative and quantitative methods) explanatory questions. Therefore, the thesis adapted a pragmatic mixed-method approach. In this study, qualitative and quantitative data were collected, entered, and analysed as part of the process and impact evaluation. The integration of process evaluations to an impact or outcome evaluation enables the external validity of the findings to be assessed. This may help in the successful replication of the programme. Process data (qualitative) allow the researcher to explain the results obtained (quantitative), while impact data (mixed data) provide details to the results obtained. This is an impact evaluation due to only five years of data and no health outcome data (Section 1.3).

The next section outlines the individual methods applied in the thesis. These include:

- qualitative: (a) focus group discussions; and (b) face-to-face interviews;
- quantitative: (a) survey method; (b) Difference-in-Difference regression (DiD) analysis; and (c) the cost study.

There will be an introduction to more generic issues concerning all of these methods, including the selection of areas (locality), translation issues, triangulation of findings, and research ethics. In addition, for each of the methods there will be details on sampling frame, the sampling process, data collection, analysis, and reporting.

4.3.1 Mixed-methods evaluation

The mixed-methods approach reported in this thesis combined the strengths of the two different methodological approaches in four phases starting with:

1. review of the literature on evaluation of maternal health promotion/group interventions in developing countries (Chapter 2);
2. quantitative data (maternal health services uptake) analysis of the baseline, midline and final datasets (Chapter 5);
3. cost data analysis (Chapter 5);

4. qualitative data analysis of face-to-face semi-structured interviews with health professionals, women and men (Chapter 6).

In this evaluation the studies were mixed sequentially, where the qualitative followed quantitative study. The latter explored various barriers that could have hindered antenatal, delivery care and postnatal care utilisation, and to investigate the changes found (or lack thereof) between the data collection points. The mixing of methods is schematised in Figure 12. Once the quantitative and qualitative analysis was completed, the data sets were mixed to examine if there is a change in uptake, knowledge, attitudes, beliefs, and behaviour when health promotion activities are carried out by community health workers (auxiliary midwives) with women of childbearing age (with children <2 years old) and their families (typically their mothers-in-law) compared to the control area. These are presented in Chapter 5 and 6. The quantitative data is presented in tables, while in the qualitative component the participants' details are in tables and the findings illustrated as themes accompanied by examples (quotes).

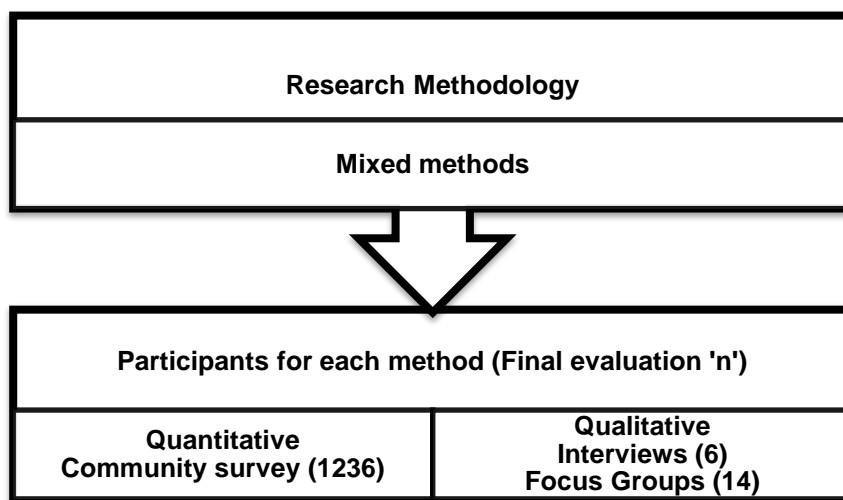


Figure 12 Overview of mixed methods

In this thesis, the findings were mixed or triangulated in a particular way to provide a fuller picture or better understanding of the impact of the intervention on the community by elucidating the mechanisms of change (i.e. uptake), see Chapters 5

and 6. Here, the data analysis consisted of combining the data and comparing the two sets of data and results using a sequential study design. In sequential design one method of inquiry follows the other: that is, qualitative exploration is followed by quantitative or *vice versa*. The in-depth qualitative data can help explain the underpinnings or the responses of the underlying quantitative results. Here, the exploration the quantitative data collection was followed by the design of a qualitative instrument, and then administered to a sample of the target population. Figure 13 depicts the sequential nature of this thesis research.

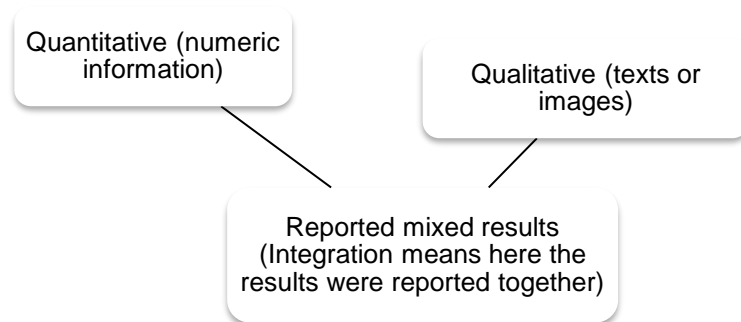


Figure 13 Merging the data in a single study

It was useful in this evaluation to combine the qualitative data in the form of texts or images with the quantitative data in the form of numeric information. This integration means that results are reported together - first the quantitative statistical data, followed by qualitative quotes or themes that support or refute the quantitative results. Sandelowski (2000) refers to transforming datasets e.g. counting the occurrence of themes in a qualitative dataset or, and through tables or figures displaying both the quantitative and the qualitative results (i.e. data displays).

In this evaluation, the survey outcomes fed into the focus groups and individual interviews with the health promoters, eligible participants, and health workers from the experimental group to help determine why the programme “worked” (Section 3.2.3.2). These results were then compared to the similar individuals in the control

group. The GTN evaluation was a three-stage design consisting of a controlled, non-randomised, repeated quantitative cross-sectional study of the GTN community-based health promotion intervention, mixed with qualitative data that explored the changes if any post-intervention. The evaluation was complemented with a costing of the intervention.

4.3.2 Maternal health services uptake conceptual framework

In the mixed-method evaluation, a conceptual framework to explore factors contributing to (non-) attendance was needed. A literature review guided the choice of the conceptual framework for this evaluation in order to find key elements of evaluation methods to assess the effect of community-based maternal-health promotion interventions in low-income countries. The full details of the literature review were described in Section 2.6.1.

A conceptual framework supports the theory of research, i.e. to support to what is investigated, by providing a strategy to evaluate an intervention's effect on chosen outcome indicators (Graham and Kelly 2004). To conceptualise the analysis for the study, the framework used by Dharmalingam and colleagues (Dharmalingam et al. 2010) was adapted (Figure 14). The latter conceptual framework was adapted in order to expose the causal link of socio-demographic and maternal health service factors to maternal health services uptake. Dharmalingam and colleagues (2010) suggest that the likelihood of uptake is directly or indirectly caused by two major factors: underlying factors (maternal socio-demographic characteristics, such as family's economic status, husband's education, residence, decision-making, etc.), and proximate factors (maternal characteristics such as body mass index, service use, birth interval, smoking, type of cooking fuel used, etc.),

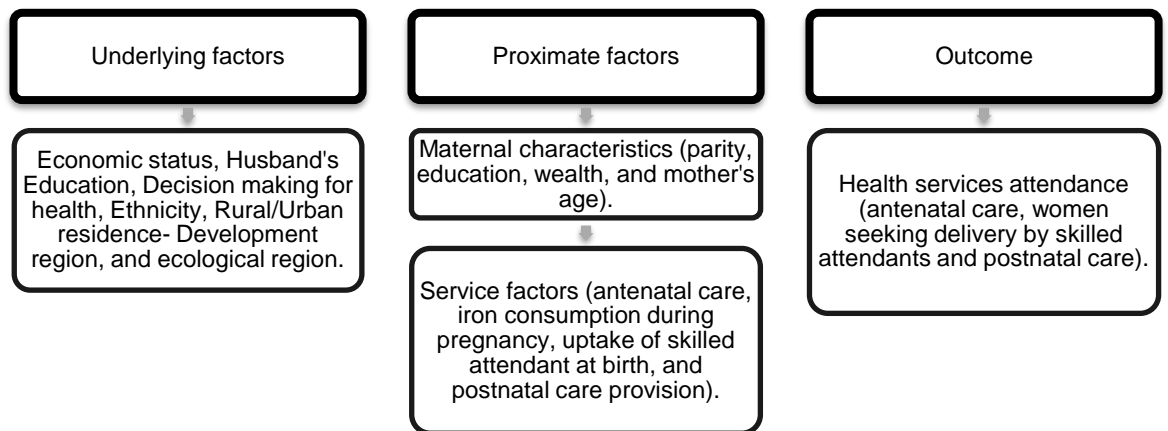


Figure 14 Conceptual framework used in the evaluation of GTN

In this thesis' conceptual framework, there exist two major independent groups of factors (variables). The first group includes the underlying (confounding) factors that an RCT controls for, including community economic status and education, decision-making for health, socio-demographic characteristics, such as ethnicity, rural/urban residence, development and ecological region – i.e. how developed the area is and climate effects on crop and food yield. The second group includes the proximate factors that the researcher in a quasi-experimental study chooses to control for. The choice of these proximate factors/independent variables was based on data from previously published DHS studies (Khanal et al. 2013b), and DHS datasets from other LMICs (Sections 1.4 and 2.6.1). They included time, area, and maternal characteristics such as mothers' age, education, wealth, parity, and health service use/uptake. These latter outcomes included service use variables including the uptake of ANC, iron consumption during pregnancy, uptake of skilled attendant at birth, and PNC uptake (Dharmalingam et al. 2010; Wallerstein 1992; Nair et al. 2000; Sreeramareddy et al. 2011).

By using the above conceptual framework (Figure 14) in a mixed-methods approach, the study was able to explore how proximate factors influenced maternal healthcare attendance (outcomes) during women's most recent pregnancies while

taking into account the underlying factors (i.e. context of rural Nepal study in which women live in rural areas, are not necessarily the main decision-maker, pay for/walk to services etc.). The latter were taken into account in the qualitative component of the study.

In the quantitative component, the adapted maternal health attendance conceptual framework was used to explore factors contributing to (non-) attendance (n = 1,236) from the survey, as seen in Figure 12. Attendance was compared in multiparous women aged 14 years or older (n = 621) with that of control group (n = 615). In the qualitative component, focus groups and interviews were carried out using non-probability/purposive sample (n=47). The sample for the mixed-methods study consisted of 1,283 participants.

First, changes in health services' uptake were compared by using multiple regression analysis (or DiD) and second with the women's perspectives and current knowledge on the intervention topics all while considering the underlying factors. These (latter) qualitative methods, which looked at some underlying factors, are detailed in Section 4.8.

4.3.3. GTN survey & survey population: sampling

This section describes both the qualitative and quantitative sampling methods. Sampling can be described as a process, or a technique of selecting a suitable sample, or a representative part of a population for the purpose of determining parameters or characteristics of the whole population. Two sampling procedures were used for primary (qualitative) and secondary (quantitative) data. For the latter, this delves into how the baseline and subsequent data (midline and final) was collected.

4.3.4.1 Qualitative Interview sampling

Both probability and non-probability sampling are used in qualitative research. Non-probability sampling is often referred to as purposive sampling, as one may be purposely inclined to obtain information from a specific group. In this case, the researcher assembles individuals with known or demonstrated experience and

expertise in the area being researched. Therefore, in this study, the qualitative sampling was both purposeful and homogenous (non-probability), which strengthened the study (Thwala et al. 2012). Data collection took place over one month in 2012 (Sharma et al. 2016b). Participants were women with a recent pregnancy, their mothers-in-law, the husbands, local rural healthcare providers, and the GTN health promoters. Face-to-face interviews were conducted with selected healthcare professionals as identified by the sampling methodology (Kitzinger 1995; Coyne 1997). The qualitative research included face-to-face interviews and focus group discussions. The focus group participants were recruited purposively from existing mother, men and mother-in-law GTN groups, and non-GTN groups (saving/literacy groups). They took place in a range of community settings including fields, village halls and schools. In two locations, local link community health workers (maternal and child health workers and auxiliary nurse-midwives) helped to arrange the focus groups, and these were held in the premises of the local community hospital and healthpost. The interviews were conducted in the local health post, hospital, and GTN offices for the healthcare providers. As this was an evaluation, some of the participants were from the GTN health promotion groups (purposive sampling); this was done in order to determine: a) the exposure to GTN activities; and b) the level of maternal health knowledge in each area.

It should be noted that there are issues with the sampling and sample size that ought to be considered; for instance, women who opt out of the intervention, (may) also opt out of the research (Section 4.2.1). The author is conscious that two types bias may occur during the qualitative component of this evaluation. The first is social desirability response bias (Randall 1991). The author is aware that her surname is a Brahmin surname (Sharma), that she is a “foreigner” (from the U.K.), and that of the qualitative interpreter is a Newari surname (not disclosed). Both these are considered upper castes in Nepal, and these may be considered a potential bias and weakness that may arise from the author or qualitative interpreter. Furthermore, based on past experience from forming health promotion groups (where men would not speak to the female health promoters), the researcher decided that a male interviewer should conduct the focus group with the male participants. In the evaluation of the programme, a Nepali and Newari qualitative female researcher and Nepali male researcher worked with the author, and they also acted as translators. Furthermore, the team of qualitative researchers

were perceived as “different” (being foreign/from the city) from the rural/village participants, which may have influenced the responses in this study, as participants may have felt a need to justify their choices or may or may not have interacted fully (openly/honestly etc.) with the interviewer. Finally, as some of the women were from the health promotion groups - this may have led to selection bias (Sandelowski 1995; Higginbottom 2004).

4.3.4.2 Quantitative sampling

In the quantitative study, the GTN surveys were not based on random or opportunistic sampling; it was methodologically much stronger as it was based on total community sampling (Hultsch et al. 2002). The data collectors attempted to include/cover all eligible women in the community in the survey. They were identified through house-to-house recruitment, and the surveyors reported that there were very few refusals to participate. A sampling issue that should be noted is that there is no unique identifier for individuals surveyed. Thus it was not possible to identify overlap between the two surveys – that is, the people making up the population “technically” differed or may not have differed, i.e. it was women with a baby in the two years prior to the study each time. This may have led to recall bias (McColl et al. 2001).

4.3.4.3 GTN survey

The final copy of the questionnaire was in English based on the DHS and literature. It was then translated into Nepali for data collection; and during data entry translated into English. Questionnaires were refined after a pre-test/pilot; and the surveys took place over a two-week period in 2007, 2010, and 2012 (Appendix III).

Women were interviewed in their homes by trained fieldworkers. If they were not available, interviewers returned on several occasions. Following a third attempt, the women were dropped from the study participant list (Simkhada et al. 2009). Health and socio-economic data were collected at the individual, household, and village level using a structured questionnaire. Data was obtained on awareness and

utilisation of maternal and child health services (antenatal, delivery and postnatal), decision-makers in the household, data on knowledge and attitudes of maternal health, women's background characteristics (education, age, marital status, parity, etc.), pregnancy history, socio-economic, caste status, and the population-based information on intake of iron and folic acid. Each cross-section survey consisted of individual women interviewed in four Village Development Communities (VDCs), two in the intervention and two in control area among women, pregnant or not, aged 15-49, and children under 2 years of age.

There are some similarities with the DHS survey as some DHS questions were included in the GTN survey (Section 1.4.4). However, the DHS survey is in selected parts of Nepal and no individual areas (districts) are identified in the survey. Therefore, there is no data comparison possible between Pharping, and DHS data; also, census (district) data is not reliable. DHS data is not divided by district, hence the need for a control group. It was necessary to have a control group for comparing changes across time (Simkhada et al. 2009).

In addition, having data from the baseline, midline, and final evaluation allow for comparison over time on demographic and health-related uptake behaviour correlation. The survey data helped GTN for planning, monitoring, and implementing the programme (Sections 2.5.2 and 2.5.4). It should be noted that a small number of question between the surveys were changed based on the responses, new questions were added by the midline and some were removed by the third survey.

4.3.4.3.1 Training of field staff for sampling

Field research included the supervision of training, data collection, and data entry during the final survey in 2012. Prior to sampling, a team of 15 enumerators and two mappers were recruited and trained (role playing, class demonstrations, and field practice), and instructions were given. Field staff was recruited on the following criteria – a degree in the field of health, experience in fieldwork data collection, entry and statistical analysis with fluency in Nepali and English. The training on paper questionnaire took place over three days prior to each survey. The training included

theoretical and practical sessions such as practical demonstrations, practice interviewing in small groups, and several days of field practice. During training, enumerators were encouraged to ask questions to better understand the questionnaire. Mock interviews focused on questions related to sensitive topics (of reproductive health). It was noted that enumerators had perceived certain topics too sensitive. Enumerators found it hard to ask questions on mortality, abortion, and domestic violence, yet respondents were comfortable in answering them.

Furthermore, the enumerators were confident in carrying out field tasks, and they had a good rapport with the quality control team and trainers. Despite their young age/experience, they were able to recommend alternative phrasing, formatting of the questions, or order of questions. The enumerators were a mixture of men and women, as certain respondents preferred a female interviewer. The enumerators were divided into two teams each day for various wards and given gifts like toothbrushes/soap. Nail clippers and toothbrushes were given to respondents as a thank you for their time. A trained reproductive health researcher, who also acted as the programme manager for GTN, supervised the training, data collection and entry. This individual, as well as the two-field coordinators, monitored data quality (data quality team n=4) and feedback was provided to the enumerators. The communication was regular and via mobile phones.

4.3.4.3.2 Data management

The data processing and entry was done once the research team agreed on the codes and categories. The data management consisted of questionnaire responses checked by the field coordinators and re-checked by the data auditor before the data was entered in the GTN offices. Because the volume of data was considerable (~300 variables and each round of survey with ~400 respondents) checking data entry quality was essential. This was ensured through observation by the data quality team including the author and then random checks from the hardcopy questionnaire. They observed 10% of survey interviews. Hard copies of the records were stored in a filing system in a lockable room, while the electronic output was anonymised. All data were recorded and analysed anonymously during fieldwork. The three sets of survey data were coded and entered with STATA™ (version 11.0, Stata/SE 11.0s Stata Corporation, College Station, TX, USA).

4.3.5. Study area & population

Control area/area selection

GTN selected two districts in Pharping with similar socio-economic characteristics, one north and one south of Kathmandu, each with a total population of fewer than 9,000 inhabitants. Pharping is in the mountains of Kathmandu Valley (Figure 15); it is a fertile land near a tarmac road to Kathmandu (Simkhada et al. 2009; GON 2014) (Table 2). There were four VDCs in the study area. All four VDCs contained nine wards each. Two of the four VDCs were used as the control community (VDC A and VDC B). The control community is located 20 kilometres northeast of Kathmandu Valley while the intervention community is located 20 kilometres southwest - reducing any possible contamination bias from the intervention site, also consisting of two VDC areas with rural small towns and villages, VDC C and D. Some of the wards of VDC D are connected by road to Kathmandu: VDC C is three km from VDC D and the number of households is similar to VDC D.

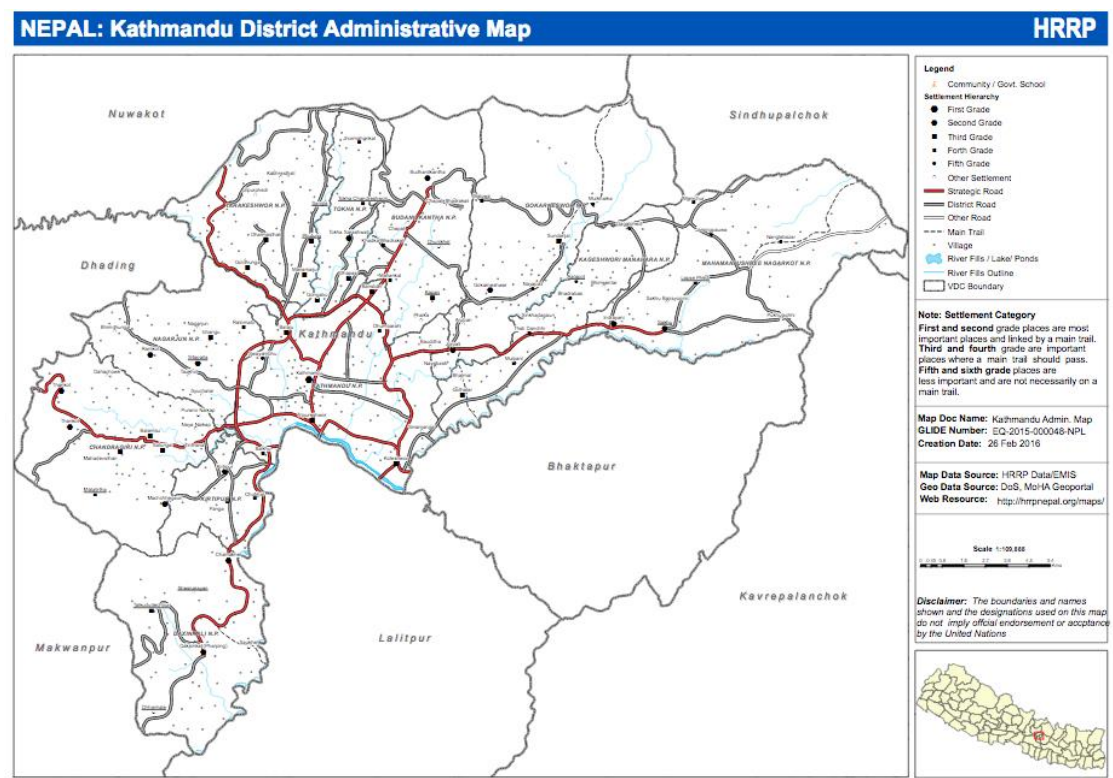


Figure 15 Map of area as part of Kathmandu district

(Pharping: bottom left hand corner of Kathmandu district, Source: HRRP, 2015).

The control (C) community was selected on the basis of its location, population composition, ethnicity, and literacy rates (Table 2), facilities available and its similarity to the intervention community (Section 2.5.3). In the control area, there are two health posts and a primary care centre nearby (similar to the community hospital in the intervention area) (Table 2). In the control community, there are a total of 1,574 households with a total population of 8,292: 4,111 are male and 4,186 are female (CBS 2001). On the other hand, in the intervention community, there are 1,646 households and a total population of 8,569 with 4,142 males and 4,427 females (CBS 2001).

Table 2, compares the intervention and control communities: the population size and the number of households were similar in both communities, although slightly higher in the intervention (I) community. Ethnicity was evenly distributed in both communities, with a majority of Tamang and Brahmin-Chhetri (CBS 2001; Simkhada et al. 2009). Health services centres were comparable in the two areas (Section 2.5.3).

The control and intervention area were chosen from a few pre-selected districts (Section 2.5.3). Of the pre-selected districts, the intervention area scored the highest for implementation: GTN was able to recruit health promoters from that area and build upon existing groups and had support from the community hospital, and local health post (Sharma et al. 2016a).

Table 2 Characteristics of intervention and control community

Characteristic		Intervention	Control
Households		1646	1574
Total population (Census 2001)		8569	8292
	Male	4142	4111
	Female	4427	4186
Literacy (%)		59.75	51.34
Ethnicity (%)			
	Brahmin	10.3	8.7
	Chhetri	19.6	21.1
	Tamang	32.9	30.4
	Newar	31.4	33.5
	Dalit/Rai	1.8	2.8

Source: Census (2001)

4.3.6 Baseline data

The project timeline was over six years, from November 2006 to September 2012. The prospective baseline enrolment took place from November 2006 to September 2007. This was done to ensure the baseline data were collected prior to the start of the intervention. Finally, the intervention ran from 1st January 2007 to 31st December 2012 (5 years).

4.3.7 Study population

The study population included all married women in the reproductive age group 15-49 years old. These women were residing in the study area and delivered their last baby within the last 24 months preceding the study. Since there were no accurate data recorded at the local level (VDC SHPs) to act as the sampling frame

(Simkhada et al. 2009), the study population was calculated on the basis of the last census data (prior to the baseline in 2001). According to the last census data (CBS 2001), it was estimated that the two-year olds comprised 4.2% of the total population. On this basis, the sample size was roughly calculated from all women with a child of less than two years. The total sample (population) size for the four VDCs was 708 women with a child under the age of two [4.2% * 16,861]. In 2008, using trained Nepalese fieldworkers; GTN subsequently visited every household in each VDC over a two-month period to collect baseline information.

Having visited all households in all four VDCs, GTN could only find evidence of 485 women with a child under the age of two. Of these 485 women, 412 women agreed to complete the survey, 36 declined to participate, and 37 could not be found despite several visits to their homes. The women who refused to participate or who could not be found were reported to be reasonably well distributed across the four VDCs.

There are several possible logical explanations for this discrepancy in population numbers:

1. both data sets are right but there has been a change in the population over time;
2. the way census data are amalgamated introduced anomalies (Simkhada et al. 2009);
3. the census data are imprecise or incorrect;
4. the GTN data might be incorrect, although this is unlikely as all houses were visited in person;
5. finally, it is possible that both data sets are incorrect as there are 3 million Nepalese working abroad (Kollmair et al. 2006);
6. this data discrepancy has meant an over-estimation of women that were eligible to participate in the study.

4.3.8 Qualitative methods

The semi-structured interviews and focus groups were conducted with the assistance of a Nepali translator and a maternal health qualitative researcher (Pitchforth & van Teijlingen 2005; Pitchforth & van Teijlingen 2006). The three

facilitators (the author, the maternal health researcher and the male interviewer) used a semi-structured topic schedule, developed in English and informed, in part, by themes emerging from the literature, (Sections 1.3.2, 1.4.3. and 2.6.1) around barriers from women's perspectives and discussions within the research team. The interview schedules also took on board the initial review of the quantitative analysis.

The interview and focus groups schedule were piloted on a number of Nepalese students at BU. Pilot studies can help: (a) identify practical problems in the research protocol; (b) develop and test the adequacy of research instruments; and (c) determine the feasibility of a full-scale study (van Teijlingen & Hundley 2001). Open-ended interviews were also conducted and translated into Nepali once the pilot had been conducted.

Focus group interviews took place in a neutral meeting place. They were conducted by the Nepali researcher, lasted no longer than 40 minutes, and were digitally recorded, with consent. Any identifiers were removed on transcription (Thomson et al. 2005). The qualitative open-ended interviews were conducted in Nepali with the help of two local translators (one female and one male) who were familiar with the subject matter, since cross-cultural qualitative research is difficult in a language other than the researcher's primary language and reliable and valid information can be "lost" when conducting the research. Furthermore, no standards exist for translation of qualitative research (Lopez et al. 2008). Pitchforth and van Teijlingen (2005) have discussed the challenges of language barriers and working with interpreters in qualitative research. They suggest that an effective relationship be developed with the interpreter and awareness be maintained of the interpreter's impact on the research process and how accurate the translation is. The final study's Nepali transcripts were then translated into English. Two students of Nepali origin from Bournemouth University individually transcribed four of the interviews.

This study (Section 3.6.1) aimed to explore the enablers and the barriers to the uptake of health promotion initiatives for improved pregnancy outcomes in rural Nepal and the influence of these barriers on maternal service uptake, especially in the rural areas. This study also aimed to analyse the improvement in the intervention area (in the last five years, since 2007) with a particular focus on change in health and maternal health behaviour and uptake, and what could have led to such improvements compared with the other/control VDCs. This might

elucidate health inequality for various reasons including those mentioned above, and provide an understanding of social complexities and changes since 2007 within the study areas.

Also included in the research was the women's ability to make healthcare decisions. This was taken as an indication of maternal autonomy. The factors that were taken into consideration were the women's previous experience, the choices they were given about place of delivery, the factors they considered when making their decision, and who or what had influenced the decision-making process. The questions were categorised into (i) women, (ii) women and husband together, and (iii) husband and others (family members). The focus group discussions were planned to examine the "group dynamics" within each group and between groups (i.e. daughters- and mothers-in-law, wives, or husbands) to identify the constructs that facilitate attending health services. See Appendix V for the interview schedules.

4.3.8.1 Interviews data collection

4.3.8.1.1 Focus groups

The primary method of data collection among the various sub-groups of the general public was conducting focus groups (van Teijlingen & Pitchforth 2006). The discussion of the focus groups should be in a safe and quiet "controlled environment". For instance, in Nepal, where women are not the main decision-makers for their reproductive health, it should mean a place where women can freely discuss these issues (van Teijlingen & Pitchforth 2006; Pitchforth et al. 2008). The interviews (ID) and focus groups (FG) typically lasted 40 minutes and were recorded with two digital recorders. The demographic data and recording was then double-checked and any last questions were answered. In total, 18 groups were approached to reflect the range of people (listed in Table 3), taking into account that not all of them may consent to be a part of the study.

Table 3 Focus group target population

Control area	Intervention area	Not eligible
2 groups of pregnant women;	2 groups of pregnant women;	1 group of women (15-49) with no children
2 groups of women with a child up to the age of 2;	2 groups of women with a child up to the age of 2;	
2 groups of women of childbearing age (18-49 years), not pregnant;	2 groups of women of childbearing age (18-49 years), not pregnant	
2 groups of mothers-in-law;	2 groups of mothers-in-law	
1 group of men (married) 18-49 years	1 group of men (married) 18-49 years	

4.3.8.1.2 Semi-structured interviews

A semi-structured interview is described as a structured conversation. These interviews were driven by the questions set in this study that were used for FG (See Appendix V Annex-1: qualitative topic guide, Intervention area and Appendix V Annex-2: qualitative topic guide, Control area). Open-ended questions were created to investigate knowledge, attitude, and beliefs towards maternal care (See Appendix V, Annex-1: qualitative topic guide, Intervention area and Appendix V, Annex-2: qualitative topic guide, Control area). This part of the study ran for a one-month period (June 2012) with the analysis being conducted as the transcripts became available. Thus, the interviewer pursued in-depth information around the topic, and this was useful to further investigate their responses.

4.3.8.2 Qualitative data analysis

Description, field analysis & observation

Qualitative research can produce vast amounts of data (Pope et al. 2000), particularly here when the ID and FG were conducted in Nepali, and Newari (a

dialect of the Newar caste). The research anticipated for these two eventualities. In addition to the verbatim notes of the transcribed recordings of interviews or focus groups, more detailed “field notes” of observational research and the researcher's reflective notes (observations) were collected during the research as well as once the ID and FG were completed with the translator. As such, transcripts and notes are complementary to provide explanations since the researcher has to make sense of the data by sifting and interpreting them (Pope et al. 2000). Therefore, the data analysis was concomitant with data collection to continuously refine questions and pursue new themes (groups). In addition, because qualitative research uses analytical categories to describe and explain social phenomena, qualitative methods therefore need critical and creative thinking when conducting a study and interpreting its results in a balanced manner (Patton 2002).

Here, a qualitative approach was in addition necessary to ascertain whether there might be some information that requires an update - as the situation of the respondent may have changed since the last survey. Also, emerging insights, which could have been missed out by quantitative analysis alone, cannot be completed with qualitative methods. In general, qualitative research does not seek to quantify data or propose causality. In practical terms, the data was read and reread by two researchers to identify and index themes or categories, which may centre on particular phrases, incidents, or types of behaviour. The themes and categories were added to reflect as many of the nuances in the data as possible, rather than reducing the data to a few implicit or simple numerical codes (Mays & Pope 2000). Indeed, quantitative analysis provides a statistically representative set of respondents and may provide a useful summary of some aspects of the analysis. Yet, results in relative frequencies may be misleading, and simple counts are used (Mays and Pope 2000).

Usually in qualitative research analysis, the data is preserved in its textual form and “indexed” into analytical categories and theoretical explanations. Field notes and transcripts were used as textual data for content analysis in parallel with quantitative data since this permits the elucidation of those data parallel or opposite to the emerging hypotheses (Mays & Pope 2000). For instance, sometimes interesting or

unfamiliar terms used by the group studied can form the basis of analytical categories (groups). These discrete incidents may include multiple themes particular to rural Nepal, where new themes arise due to the new or unfamiliar context. With analytical and theoretical ideas developed during the research (using a conceptual framework, see Section 4.3.2), these categories were further refined into groups (Mays & Pope 2000). Thus the groups or patterns across the data sets are important to the description of the phenomenon (event or idea); and here they were associated with specific research questions (Section 3.7).

The transcripts were first coded by hand, using a form of inductive thematic analysis (Mason 2002; Forrest Keenan et al. 2005) to ensure the codes were agreed upon for all the interviews conducted by the research team (Section 4.3.8). Inductive thematic analysis typically involves six phases: familiarisation with data; generation of initial codes; searching for themes among codes; reviewing themes; defining and naming themes; and producing the final report (Thomas & Harden 2008). Therefore, all the data relevant to each category was then identified and examined using a process called constant comparison, in which each item was checked or compared with the rest of the data to establish analytical categories. This requires a coherent and systematic approach so that every sentence/line of text was coded once the key words, concepts/images came to light (Thomas & Harden 2008). This particular approach led to the elucidation of themes by a rigorous and systematic classification process of coding to identify patterns/codes that emphasise the reliability and replicability (meaningfulness) with these specific units of information. By using thematic analysis to “distil” data, first broad patterns are highlighted that permit “granular” themes to be elucidated, i.e. narrowed down in a more fine-grained analysis. In practical terms, the pilot and initial interviews assisted in defining the categories or codes from broad patterns to fine-grains. In this type of analysis - the data itself is used to derive the structure of analysis; and guided by the conceptual framework (Section 4.3.2). In other words, the themes emerge from the data that is gathered and are not imposed or predetermined by the researcher. This type of analysis permits “flexibility” of analysis, and the themes are strongly linked to the data since they emerge from it – reducing bias or a limited interpretation of the data. This approach is comprehensive and therefore time-consuming and is particularly useful when little is known about the event or topic under study.

Finally, the methods of analysis were discussed and the use of mixed methods was critically examined with regards to the qualitative approach. The software Nvivo™ (Version 18) was for coding the qualitative analysis. Two team members independently analysed the transcripts to discuss the emerging analysis and major themes and ensure a degree of quality control. The team of three researchers coded all of the transcripts, using the thematic approach, independently. They then discussed with the researcher (SS) and agreed upon emergent themes and extracted quotations from the participants' transcripts to illustrate the themes (Chapter 6).

4.3.9 Quantitative study of this mixed-methods study

In order to conduct the evaluation of the GTN intervention and determine if it was effective and why, a quantitative analysis of the evaluation data and design was conducted. The quantitative study was a controlled before-after, cross-sectional, and non-randomised study. Women were interviewed using a questionnaire in the four VDCs, including measurements at three points in time, from the three surveys in 2007, 2010, and 2012 (van Teijlingen et al. 2012).

The baseline data collection began in 2007 (time 0 or T0) using the health behaviour and socio-economic questionnaire in the intervention and control area (Appendix III - Questionnaire for Women). Similarly, a midline (time 1 or T1, 2010) and a final round of data collection (time 2 or T2, 2012) used the same questionnaire to see if there was an increase in the uptake in maternal health services from T0 compared to T1, and then to T2. The notion of “time” (T) in the DiD method is referred to in the text as T1 or T2, and in the regression as ‘after’ (TA1) and ‘afterafter’ (TA2), respectively. At this point, the analyses of changes in health behaviour were done (Sections 4.3.9.1.4 and Table 4), using the variables of maternal health attendance: i) between the baseline and the midline; ii) between the baseline and the final; and iii) between the midline and the final. The inclusion of a midline survey as the data analysis from the midline permitted the researcher to determine the effects of time on the intervention. As discussed in Section 1.3, negative health outcomes such as mortality are fortunately very rare and therefore are hard to evaluate. This intervention focused on proxy outcomes, in this case non-health outcomes as they have an impact on obstetric (health) outcomes (Bhutta et al. 2005; UN 2011a; UN2011b). The outcomes were: (1) antenatal clinic (ANC) attendance at least once during the whole pregnancy and (2) during the first trimester and (3) number of ANC visits, (4) consumption of iron and folic acid during pregnancy, (5) presence of a skilled birth attendant at birth (SBA), (6) birthing in an “institution”, that is a hospital or clinic (ID), and (7) attending postnatal care (PNC).

The evaluation aimed to capture positive “spillover” or herd effect since the programme can have an impact on not only women receiving directly the intervention but also the overall community (Baez 2007; White 2013; de Heer et al. 2011; Vanderweele et al. 2013). Therefore, women were surveyed independently from their participation in the intervention groups.

4.3.9.1 Data analysis: secondary analysis, GTN

Data was analysed with STATA™ (version 11). The statistical value was calculated and tested for significance at the 5% level. The determined p-values were considered statistically significant when 'p' was equal to, or less, than 0.05. In statistics for the majority of analyses a value of 0.05 is used as the cut-off for significance of effect of the treatment/intervention. If the p-value is larger than 0.05, it cannot be concluded that a significant difference exists between the means (STATA 2017).

Descriptive statistics (i.e. frequency analysis) measured demographic, cultural and socio-economic characteristics such as caste and socio-economic indicators (wealth, age, and education, etc.) as well as chosen indicator/outcomes data (summarised as percentages). Analysis measured the impact or the individual probability of engaging in one of the intervention binary outcome variables (measured at baseline then at 30 and at 60 months after the intervention). Cross tabulation, the Chi-Square test (Pearson's Chi-Square test) and Difference-in-Differences (DiD) were applied for continuous and categorical data (binary or dichotomous variables) to assess the association between variables (detailed in the following section). For instance, the attendance data was presented in proportions, percentages, odds ratios, and confidence intervals (CI). The analysis at the level of the individual was done using logistic regression models, DiD analyses, on dependent variables. These dependent variables were adjusted for independent variables, as they have an impact on the selected outcomes.

4.3.9.1.2 Dependent & independent variables

The following variables were considered potential independent variables: age (continuous), wealth (categorical), parity (categorical), woman's education level (categorical), time, and intervention.

Binary dependent variables were the following outcomes: ANC attendance (1 visit, 4 visits, and 1 visit in the first trimester), examination, taking iron or folic acid, institutional delivery, skilled attendant at birth, and postnatal care.

4.3.9.1.3 Chi-square test

A Chi-square test was used to determine a relationship for selected confounding factors (covariates with an association) variables, for example, between taking part in the intervention and seeking maternal care. A confounding variable is a perceived relationship between an independent variable and a dependent variable that has been misestimated; this failure to account for a confounding factor is termed *omitted-variable bias*. They are factors that aim to make a link between attending health services and living in the intervention area. For example, in the case of researching/conducting risk assessments that evaluate the magnitude and nature of risk to human health, it is important to control for confounding factors, i.e. those covariates that have an association to the outcome of interest to isolate the effect of new “treatment”, i.e. the intervention. For prospective studies, it is difficult to recruit and screen for volunteers with the same background (age, diet, education, geographical location, etc.); and in retrospective or historical studies, there can already exist similar variability. Due to the inability to control for variability of volunteers and human studies, confounding is a particularly big challenge. For these reasons, a Chi-square test is used to see if there is a relationship between two categorical variables, here the test was applied to check for an association. It is a two-tailed test with a 5% significance level. First, the association between ANC, ID, SBA at birth, iron/folic acid supplementation and the intervention were measured. Secondly, the association was tested between the intervention and categorical independent variables of interest (age, wealth, parity, education etc.). Both were determined by using first a Chi-square test (s^2) (the *BMJ* 2015), then with the Difference-in-Differences analysis.

4.3.9.1.4 Difference-in-Differences analysis

Difference-in-Differences (DiD) addresses a gap in the evaluations of community maternal health promotion using longitudinal analysis on programmes with a control to measure intervention effect (impact) on health services uptake behaviour (Alderman et al. 2009). DiD is a technique often neglected in the evaluation of health promotion programmes. Therefore, it was applied as an evaluation tool

(Bonell et al. 2011). DiD analysis measured the impact of the intervention on the individual probability of engaging in one of the intervention binary outcome variables chosen (Vyas & Kumaranayake 2006; Howe et al. 2008; Liu et al. 2010). DiD measured the difference in each outcome between intervention and control groups, and before and after treatment while controlling for potential confounding factors. Differences between outcomes were valued over three periods for two groups, at the baseline (2007), midline (2010), and final (2012) survey. One of the groups was exposed to a treatment (intervention) in the second and third period but not in the first period (baseline). The second (control) group was not exposed to the treatment during either period. With repeated cross-sections, the regression model with the intervention, time, and their interaction were determined. Control variables (detailed below on Page 136), in addition to the ones representing the impact of the intervention, were chosen based on the literature (Sections 1.4 and 2.6) and previously published DHS data based studies (MOHP, New ERA & ICF International 2012).

For a binary outcome variable of maternal health uptake behaviour, the DiD estimate is the difference in 2010 (midline or TA1) and 2012 (final or TA2) in changes from 2007 (baseline or T0) in the proportion of women having an event, i.e. attending health services – this is denoted as a 1. Consequently, the zero refers to not attending health services (Table 4). The DiD estimator (*treatafter* or *TA*) is the coefficient of the interaction term between the intervention and time in a linear regression model with intervention, time, and their interaction as covariates (Liu et al. 2010). Here, the estimator is presented as an odds ratio (OR). In essence, the *treatafter* estimator represents the difference between the pre- and post-intervention respondents' differences in the treatment and control groups (or T0, TA1 and TA2).

Table 4 DiD Estimation

<i>treatafter</i> (μ) coefficient – post-intervention for outcome variables	2007 (Baseline, T0)	After 2010 (Midline, TA1)	Afterafter 2012 (Final, TA2)
Intervention (I)	0	1	1
Control (C)	0	0	0

The analysis first measured the impact of the intervention on the binary outcome variables, which were first summarised by the percentage of women who had an outcome (maternal health uptake). Then, chi-square tests and bivariate regressions followed to explore the determinants of the indicators of interest/independent variables (time, area, age, education, parity, and wealth). Only the variables that had a significant relationship with the response variables at the $P < 0.05$ level were then entered as independent variables to be included in each final regression model. The criterion for removal in the regression analysis was $P > 0.05$. The DiD multivariate regressions were then applied to determine the factors that were most strongly correlated with the outcomes of interests presented as DiD (OR). Thus, the DiD estimation was used to assess the effects of intervention on the outcome variables (for example, the number of ANC visits) while controlling for the following covariates: socio-economic and other personal characteristics such as parity, age, wealth, and level of education women in the framework of the linear regression model (Appendix IV – Variables Description).

Marital status and religion were not adjusted for, since all the women in the sample were married and Hindu. There was no need to adjust for the *Aama Surakchhya* maternity incentive programme as it was operating in both the intervention and control areas.

The DiD estimation strategy can be used to analyse these cross-sectional data even though they are not repeated observations. Had they been repeated observations,

i.e. balanced panel data, a correction for correlations around the same unit of observations would be needed here. One of the limitations of DID is when something other than the treatment (intervention) changes in one group but not the other at the same time as the treatment (Bertrand et al. 2004; Imbens & Wooldridge 2007).

With the aim of evaluating the intervention at two points in time, two different types of regressions were estimated: (a) regressions on the sample constituted by women interviewed at baseline and at midline; (b) regressions on the sample constituted by all women in the sample, including baseline, midline, and final evaluation. The former (point - a) permitted the evaluation of the impact of the intervention after 2.5 years and the latter (point - b) the evaluation of the overall impact of the intervention after 5 years from the start. The two regressions were run at both time points (midline and final) and not as one regression with one time point, since time was treated as a continuous variable in the regression. For instance, what is captured in the second regression is an overall effect of the intervention from baseline to the final. Because the intervention is not run in stages or steps, the evaluation cannot be conducted as distinct points in time (T0, T1 and T2).

The linear regressions from baseline to midline were the following:

$$Y_{ni} = \alpha_0 + \beta_1 \text{intervention}_i + \alpha_2 \text{after}_i + \beta_3 \text{after} * \text{intervention}_i + \alpha_4 \text{age} + \beta_5 \text{age}^2 + \beta_6 \text{wealth index}_i + \beta_7 \text{education}_i + \alpha_8 \text{parity}_i$$

[1]

The regressions from baseline to final evaluation were the following:

$$Y_{ni} = \alpha_9 + \beta_{10} \text{intervention}_i + \alpha_{11} \text{afterafter}_i + \beta_{12} \text{afterafter} * \text{intervention}_i + \alpha_{13} \text{age} + \beta_{14} \text{age}^2 + \beta_{15} \text{wealth index}_i + \beta_{16} \text{education}_i + \alpha_{17} \text{parity}_i$$

[2]

In the above, i indicates women participating in the surveys. Since there were seven outcome variables, many regression analyses were necessary with the combined dependent variable. The attendance variables taken as Y_n were the binary response variables. The binary outcome (dependent) variables (n) were the following:

(n=1): antenatal clinic attendance at least once during the whole pregnancy;

(n=2): antenatal clinical attendance during the first trimester;

(n=3): at least four antenatal care (ANC) visits during pregnancy. The WHO recommends a minimum of four ANC visits and that the first ANC visit should be within the first trimester of pregnancy (AbouZahr & Wardlaw 2003);

(n=4): the presence of a skilled birth attendant (SBA) at the time of delivery. SBA in Nepal are defined as nurse-midwives, auxiliary nurse-midwives, obstetricians and gynaecologists. The following groups were excluded: traditional birth attendants, health attendants, medical students since they are not classified by the WHO as SBA (WHO 2004b);

(n=5): institutional delivery (ID), including delivery in a hospital, primary health centre, private hospital or clinic. This was chosen as an outcome because it is recognised as a strategy to improve maternal and child health outcomes (Kesterton et al. 2010; Asefa et al. 2013; Kestler et al. 2013);

(n=6): attending postnatal care (PNC). PNC was defined as the mother and newborn being seen within 24 hours of delivery. This outcome was included based on the evidence that 60% of maternal deaths in the low and middle-income countries occur postpartum (Middleberg 2003; WHO 2013; Li et al. 2014);

(n=7): taking iron or folic acid. In Nepal, iron and folic acid supplementation is provided at government health facilities throughout the country (MOHP 2012) as a measure to prevent anaemia and neural tube defects (WHO 2012b).

Control variables were:

Intervention = {equations [1] and [2]} denoted the observations of two groups: intervention and control.

After, or $A1 = \{\text{equation [1]}\}$ denoted time (treated as categories), before (baseline or T0), and after (T1 and T2) the intervention started.

*After**intervention, or $TA1 = \{\text{equation [1]}\}$ is the variable that identifies the group of observations belonging to the intervention group after the intervention started as compared to the remaining observations (namely all the observations belonging to the control group and the observations of the intervention group before the programme started). Its estimated coefficient, $\beta_{3 \text{ hat}}$ represents the impact of the intervention.

Afterafter, or $A2 = \{\text{equation [2]}\}$ identifies the observations collected both at the midline, and in the final evaluation as compared to baseline.

*Afterafter**intervention or $TA2 = \{\text{equation [2]}\}$ was the variable that identified the group of observations belonging to the intervention group at the midline (=1) and at the final (=2) evaluation as opposed to the baseline and to all the observations in the control group at any time (=0). Its estimated coefficient, $\beta_{12 \text{ hat}}$ represented the impact of the overall intervention.

Age = $\{\text{equations [1] and [2]}\}$ was a continuous variable representing the age of the individual at that point in time.

Wealth index = $\{\text{equations [1] and [2]}\}$ was a categorical variable extracted from a series of assets owned (details on the construction are in the next section). The inclusion of this variable aimed at testing the hypothesis of attendance depending on the women's socio-economic status (Tuntiseranee et al. 1999; Simkhada et al. 2008; Ahmed et al. 2010). This variable was included instead of caste in force of a statistically significant relationship between the two variables (Pearson $\chi^2(14) = 326.15$; $Pr = 0.000$).

Education = {equations [1] and [2]} was a categorical variable indicating women's level of education and taking values 0 = none, 1 = primary school and lower, 2 = secondary school or higher.

Parity = {equations [1] and [2]} takes values 1 if the women are primipara, 2 if they have two children, or 3 (or more) if they are multipara.

4.3.9.1.5 Wealth index construction

DiD estimation was used to assess the effects of intervention on the outcome variables while controlling for a constructed wealth index and other personal characteristics, such as parity, age, and level of education (Vyas & Kumaranayake 2006; Howe et al. 2008; Liu et al. 2010). Since attendance depends on women's socio-economic status ("wealth") (Tuntiseranee et al. 1999; Ahmed et al. 2010; van Teijlingen et al. 2012), a wealth index was constructed using Principal Component Analysis (PCA). Using PCA women were "placed" into socio-economic tertiles (not weighed according to a standardised socio-economic index). PCA is commonly used to construct socio-economic indices when household expenditure or income data are not available (Filmer & Pritchett 2001).

PCA can be used to create a wealth index score for each respondent (Vyas & Kumaranayake 2006). It was constructed here using a number of variables such as assets owned by women's families (Vyas & Kumaranayake 2006; Howe et al. 2008). The method used to construct the PCA was based on the World Bank (1994) paper written by Filmer and Pritchett (2001) on how to construct socio-economic indices on non-expenditure data. The methodology can be used as a proxy for expenditure (Filmer & Pritchett 2001). In this evaluation, the marital status variable was not used since all females in the study were married, as expected in Nepal. PCA assets for the wealth variable construct were the following household assets/components: 1) dummy variables (bicycle, motorcycle, goat, land, and car), and 2) categorical variables - type of access to hygienic facilities (sources of drinking water, types of toilet), number of rooms in the dwelling, and construction materials used in the dwelling (materials used for flooring, walls, and roofing),

(Pitchforth et al. 2007). Land was also included. Land in Nepal is measured in “ropanis” and one ropani in the hill area is 0.05 hectares. The respondents’ land ownership was distributed as wealthier for those with more than 3 ropanis (3 ropanis representing the median of surveyed population), and poor for those with less than 3 ropanis. A description of variables included in the PCA is provided in the Table S1 in the Appendix (Appendix IV – Variables Description).

In STATA™, the combination of the variables produced a wealth index score. The first component extracted explained 20% of total variability: a potential difference explained in the sample 1/5 of the differences seen. The scores based on the first component were grouped into tertiles, with the lowest (Group 1) representing the poorest and the highest (Group 3) representing the richest women in the sample. This score was then used to divide the respondents into wealth categories (from low to high) for inclusion in the regression analysis.

4.3.9.1.6 Caste

Caste and the constructed wealth index were compared to ensure they are comparable. First, caste/ethnicity was classified as (i) relatively advantaged - Brahmin, Chhetri, Thakuri, Gurung and Newar; (ii) relatively disadvantaged - Janjati including indigenous groups; and (iii) relatively disadvantaged - Dalit, the lowest caste (or untouchable) (Section 1.4). Among all caste groups, Dalits have traditionally experienced high levels of social exclusion and marginalisation in Nepal (Khanal, Sauer, et al. 2013b). Secondly, the distribution was split according to high, middle, and low castes, according to the published definition of caste (MOHP 2012, Government of Nepal; National Planning Commission Secretariat 2014b). Distributions per caste are high caste (=1): Brahmin, Chhetri, Newar; middle caste (=2): Tamang; or low (=3): Newar Dalit, Balami, Dalit, and others (Christian or Muslim). Finally, caste was compared with the wealth index to ensure that they were correlated using Chi-square (χ^2) (see Section 4.3.9.1.3) and then presented visually as histograms in Figures 16, 17, 18 and 19 (Section 5.8.1). Wealth was strongly correlated to caste ($\chi^2 = 383.0, p < 0.05$) and the latter was therefore not included in the regression as a more precise proxy (score) than caste.

4.3.9.1.7 Cost analysis extrapolation

A cost analysis was conducted as outlined in Section 3.4. It has been shown that community mobilisation through women's groups is a highly cost-effective and an affordable strategy to reduce maternal and neonatal mortality (Prost et al. 2013). Combining community mobilisation with quality improvement of health facilities is more effective and expensive, but also highly cost-effective and potentially affordable in this LMICs context (Colbourn et al. 2015). For any intervention aimed at improving maternal healthcare, it is important to know whether it is scalable and cost effective (Ensor et al. 2014). Therefore, the effectiveness of community mobilisation through women's groups to use and understand the health facility quality plays a role in reducing maternal morbidity and mortality. In order to conduct effective and cost-effective analysis, health outcomes are needed. In maternal health, they are typically taken as maternal mortality, prevalence of low-birth weight, neonatal mortality, infant mortality, and any kind of medical complication during delivery. In the GTN datasets, there were no data on these health outcomes. Thus as cost-effectiveness analysis needs such outcomes, a cost analysis was conducted. The difference between the two types of analyses is that cost-effectiveness measures outcomes against inputs (money, staff or resources), whilst cost analysis calculates the cost of the implementing and running of the intervention (Bhattacharya et al. 2013). The cost data were collected from hand-written and computer records from the office of GTN and its field workers. The substantive cost data of the intervention were "cleaned," i.e. categorised and allocated to two cost centres: a) implementation costs, and b) programme running costs. This is necessary to be able to allocate the accumulated cost data to the appropriate cost centre. The cost centres had missing data. In order to extrapolate for the missing costs, the mean costs were calculated for each year using the recorded months' average. This monthly average was then multiplied by the number of missing months and the total was then added to the recorded months' total. The annual costs were entered by "year" as defined by GTN. The cost data was converted from Nepali rupees (NRs.) to British pounds (GBP) for this U.K. university thesis using the median of the annual exchange rate and for the baseline, midline and final surveys the conversion rates for each survey year were the following, (Oanda 2015):

Average/Median 2007, GBP 1=NRs. 130.51

Average/Median 2010, GBP 1=NRs. 111.63

Average/Median 2012, GBP 1=NRs. 137.35

Finally, the GTN intervention cost on likelihood of attendance is ascertained by dividing the total cost by a DiD proportion change for a population of 8,569 accounting for the spillover effect (Section 2.2).

4.4 Validity, reliability and goodness of fit of study methods

Validity and reliability in research refer specifically to the measurement of data that will be used to answer the research question; the collected data can only be useful (reliable) if it is measured through a good instrument such a survey or interview schedule which is designed based on evidence, previous studies and is pilot-tested (Ryan et al. 2001). Validity can be internal or external. Internal validity relates to conclusions warranted from the observations (data), and external validity refers to the replicability/generalisability of a study (Clancy 2002; Steckler & McLeroy 2008). According to Ryan and colleagues (2001) validity in qualitative research involves determining the degree to which the researcher's knowledge matches the reality. Reliability, on other hand, relates to credibility, trustworthiness, consistency and dependability (of the data). Reliability is important in research because it ensures the researcher's confidence in the measure taken. Similarly, validity is important because it tells the researcher that the chosen measure will measure what it is supposed to and not something else (Ryan et al. 2001). With regard to this study, the researcher ensured the validity and reliability of the data collected. For the qualitative study, first the validity of the methods was ensured via constructive feedback from experts of Bournemouth University and who had experience and expertise in maternal health. The methodology was revised and improved according to the advice given and suggestions made. The reliability of the instrument was improved through piloting. The qualitative approach was used to collect the primary data through interviews. The Ph.D. student first piloted the interview/FG schedules then conducted all face-to-face interviews and then data was analysed (by two researchers) to see whether or not this technique is reliable to answer the research question. The qualitative data was analysed using a thematic approach by two researchers to minimise bias and to ensure the reliability of data (Forrest Keenan et

al. 2005). The two researchers compared notes and agreed (or disagreed) on themes that arose from the interviews and focus groups to ensure consistency.

For the quantitative component, a pre-test was conducted by GTN among nine women who have a child of less than two years. The women were interviewed in both the control and intervention area. The main purpose of the pre-test questionnaire was to find out its appropriateness, obtain clarity and determine the length of time needed to complete the questionnaires. Some corrections to the questions were made after the pilot study and inappropriate questions were excluded. Second, the investigation method was chosen based on the literature which suggested that DiD is highly suitable for cross-sectional data (Section 4.3.9.1.4).

In addition, for DiD, predicted probabilities were used to ensure the “goodness of fit” of the DiD regressions (Section 5.10). Goodness of fit in logistic regression assesses how well a model “fits” the data. It is applied once a “final regression model” has been selected. Of course, any selected regression model aims to contribute towards final conclusions/inferences. For instance, predicting probabilities refers to measuring the “specificity” (i.e. how many true responses: ‘Yes, I attended ANC =1’) of a diagnostic tool/regression model to detect positive (=1), and negative (=0) cases for predicting probabilities of attendance of maternal health services. The function ‘predict’ in STATA™ is applied to see if the predicted association is random between the dependent variable (Y) and the intervention. We remind the reader that the dependent variable (Y) was classified as at least once attending ANC (=1) etc. Y, thus, is a predicted function (i.e. regressed) of being in the intervention/control area in function of time, age of woman (of the attendance variable), etc. Running a logit of a combination of these factors generates an OR using DiD. As stated previously, the chosen regression model DiD is applied in order to determine the impact of each factor (age, parity, education, and SES) on attendance likelihood (detailed as an OR), i.e. will an increase in age will have a consequence impact on the OR in question. A goodness of fit models was applied, as errors exist. In the regression, there is an error term (E). The inclusion of E accounts for those factors that cannot be included in a regression or those that have been but have a degree of error, e.g. confounders and those included variables that are measured as proxies. For example, all the independent variables such as the variable wealth are constructed as a proxy, so there may be missing variables/information or the latter

is a proxy based on assumptions or how the data is design/assigned (Sections 4.3.9.1.4 and 4.4). Therefore when the DiD model is applied, it calculates the 'fitted' value of the regression. In order to classify, a cut-off value was chosen on the probability scale, e.g. 50%, this helps classify all predicted values above that as a 'predicting' an event, and all below that cut-off value as not 'predicting' the event (i.e. attendance).

4.5 Ethical Considerations in mixed-methods

Ethics are essential to ensure the rights of participants are maintained (Orb et al. 2001). Furthermore, ethical approval in developing countries is necessary. It raises issues of registering health research, protecting participants and their privacy (Clinton 2010; van Teijlingen et al. 2012). The ethical approval letter can be found in Appendix I. Ethical considerations in qualitative research are complex since some issues in qualitative interviews are unique (Corti et al. 2000). First, the attempt must be made, at all times, to guarantee promises of confidentiality made to research participants, where possible. For example, if data files are stored in a secure manner in archived data, it helps maintain the informed consent agreements for confidentiality purposes.

The most important ethical issue in both quantitative and qualitative research is informed consent - that must be obtained from the interviewee after they have been carefully and truthfully informed about the nature of the research. Consent needs to be obtained while confidentiality is ensured since the respondent's anonymity needs protection, and their identity or any other personal information will be excluded from the research (Shaw 2003). Prior to the collection of data for the project, authorisation was sought from the Nepal Health Research Council (NHRC), relevant VDCs local authorities, and the ethics committee at Bournemouth University for the fieldwork, survey data collection and qualitative in-depth interviews. The study was approved by the NHRC on 1st August 2011 (Reg. No. 37/2011), and by the Bournemouth University Ethics Committee on September 13, 2011. For the quantitative study, informed consent was obtained from each individual participant, and participants were guaranteed anonymity and confidentiality and assured that they could withdraw, if they so wanted. All names and other forms of personal identification were omitted in all reporting. The survey, semi-structured, and focus

group interviews took place in a neutral meeting place to guarantee the aforementioned.

In practical terms for the qualitative study, the study was explained and participants were asked to sign an informed consent form. The consent process was explicitly and clearly detailed in Nepali. Once the anonymity and confidentiality was discussed, the semi-structured interviews were conducted in participants' homes, open fields, or the village health post. Participants could withdraw from the study at any time. The interviews and focus groups lasted approximately 40 minutes and were digitally recorded with permission. Afterwards, they were transcribed and translated. Being a mix of female and male research team allowed for certain issues to be explored more in-depth with regards to maternal practices with the various participants (Sein 2013), and male participants felt comfortable being interviewed by a man. Participants were given the opportunity to ask the researcher questions. Accordingly, the researcher has not mentioned any of the personal information of the interviewees. Finally, topics such as stillbirth or death of a child or power relationships (such as a male relative coming to listen in) might arise. Thus, respondents were reminded that they could stop the interview at any time (van Teijlingen et al. 2006). Finally, the rich nature of qualitative data lends itself to descriptions of the interviewees, their lives and their surroundings, and as such dilemmas are presented to the researcher in how much detail to reveal, for example, how to completely disguise a workplace or a village for confidentiality reasons. The situation may become more complex if the data is re-used. Therefore, anonymisation must be stringent so that respondents are suitably protected using qualitative data archivists (Corti et al. 2000). The qualitative data was accordingly protected, the tapes were kept securely, and the transcripts were not identifiable by participants' names.

In this thesis, in the sequential design, the findings are presented in Chapter 5 and 6; the data was integrated in Chapter 7 for discussion.

4.6 Summary

This methods chapter discussed the following:

- the research methodology and the subsequent methods used in the impact evaluation research;
- the difference between qualitative and quantitative research;
- the choice of the qualitative approach as a tool for primary data collection;
- the quantitative approach as a tool for secondary data collection and;
- the way the data was “mixed” taking into account issues of validity, reliability and ethics.

Chapter 5 Quantitative study findings

5.1 Introduction

This chapter presents the results of the study and describes the impact of the intervention on the utilisation of antenatal care, delivery care, and postnatal care among the rural women in Nepal. The relationship between socio-demographic and socio-economic variables and the epidemiological data analysis of the baseline (2007), midline (2010), and final (2012) datasets are presented. The validity and reliability of the regression analysis and cost data of the intervention are also presented.

5.2 Findings

A total of 1,236 women (611 in the control and 625 in the intervention area) completed the surveys, with an overall average response rate of 84% (Table 5).

Demographic and Health Survey data from the Central hill area are similar to the study site where the median age at first marriage was 19.4 and where there was a rising age of marriage in the country. With regards to women having their first child the median age was 21. Furthermore, literacy rates were steadily increasing (MOHP 2012). In the GTN study, a large majority were Hindu, as is typically representative of Nepal (in both areas over the past 5 years it was 71.50%). There were some similarities with the DHS survey. However, as DHS is in selected parts of Nepal and no individual areas are identified in the survey, DHS data is not divided by district, hence the need for a control group (Section 4.3.7).

Table 5 Number of surveyed women with last child <2 years by area and year

Survey (year)	Baseline (2007)	Midline (2010)	Final (2012)
Control area	204	204	203
Intervention area	208	217	200
Total (n= 1236)	412	421	403

5.3 Socio-demographic & socio-economic characteristics of samples

At the baseline, the control and intervention samples were similar in terms of age, religion, and ethnicity (Table 6). In addition, the baseline characteristics (wealth and maternal health indicators) were not statistically different between the intervention and the control district; therefore the groups can be said to be comparable (Table 6). The majority of women were from the Tamang caste (40.67% overall). The minimum age was 15 years and the maximum age was 49 years. The overall mean age of respondents was 25.35 ± 5.08 years, the mean age of marriage 19.59 ± 3.33 years, and the mean age of first pregnancy was 20.86 ± 3.27 years. At baseline, the majority of women in both groups were married before the age of 20; this proportion dropped to 41.38% in the control group and 48.50% in the intervention group in the five years period. The reported age of first pregnancy was lowest at 14 and the oldest reported age was 49. The main occupation of respondents was either housewife or farmer (89.56%). Most of the women were multigravida (56.07%) and the second largest group was primigravida (43.93%).

As religion, caste/ethnicity, age of 1st marriage, age of 1st pregnancy, literacy, and education was not significantly different based on the control and intervention sites. The choice of study sites and the survey data on these variables confirmed that the control and the intervention group women were similar at baseline (Table 6).

Table 6 Characteristics of the Control and Intervention area

		Control				Intervention				Difference in baseline characteristics between control and intervention area
Characteristic used as denominator	n	Baseline 2007	Midline 2010	Final 2012	p-value*	Baseline 2007	Midline 2010	Final 2012	p-value*	p-value*
Religion	1236	%			0.001	%			0.004	Pearson chi2 = 1.1 p = 0.8
Buddhist	323	34.80	18.14	31.03		31.73	22.58	18.50		
Hindu	884	62.25	80.39	67.98		66.35	74.65	77.50		
Other (Christian, Muslim)	29	2.94	1.47	0.98		1.92	2.76	4.00		
Caste/Ethnicity	1236				0.21				0.003	Pearson chi2 = 5.9 p = 0.06
Brahmin	323	10.29	10.78	6.90		19.23	13.82	13.50		
Chhetri	187	20.59	18.14	17.24		14.90	7.83	12.50		
Tamang	504	38.24	35.78	38.42		39.90	51.15	40.50		
Newar non Dalit	258	25.49	27.45	26.11		14.42	13.36	19.00		
Newar Dalit	20	1.47	2.45	2.46		1.44	0.46	1.50		
Dalit	29	1.47	1.96	2.46		1.92	3.23	3.00		
Balami	39	0	0	0		6.25	5.53	7.00		
Other (Gurung etc.)	45	2.45	3.43	6.40		1.92	4.61	3.00		
Age of marriage (yrs¹)	1236				0.01				0.01	Pearson chi2 = 25.4 Pr = 0.2
10-19	648	50.00	53.94	41.38		60.58	60.37	48.50		
20-24	493	38.42	40.69	45.32		37.02	35.02	43.50		
25-29	82	10.78	5.39	10.34		1.92	4.15	7.50		
30 and above	13	0.98	0.98	2.96		0.48	0.46	0.50		

Age of 1st pregnancy	1236				0.01				0.0001	Pearson chi2 = 24.9 p = 0.2
14-19	461	37.75	37.44	27.59		51.44	37.79	31.50		
20-24	619	47.06	51.96	52.71		42.79	52.53	53.50		
25-29	132	13.73	8.82	15.27		4.81	8.76	13.00		
30 and above	24	1.47	1.96	4.43		0.96	0.92	2.00		
Literacy	1236	64.22	76.96	70.44	0.01	66.35	73.27	81.00	0.0037	Pearson chi2 = 0.2 p = 0.6
Education	1236				0.12				0.0025	Pearson chi2 = 0.7 p= 0.7
None	424	43.63	31.37	33.00		39.90	33.18	24.50		
Primary	448	28.43	41.67	34.48		31.73	42.86	38.00		
Secondary and higher	364	27.94	26.96	32.51		28.37	23.96	37.50		

¹ Yrs – Years, *p-values are based on Kruskal Wallis test to compare each categorical variable across time.

5.4 Household decision on the utilisation of maternal care

Women were asked who made the decision with regards to them obtaining care (Table 7). In terms of decision-making, the proportion of women who reported to have autonomy on maternity care and place of delivery decisions increased over the duration of the study period. The increasing trend was for all the family members to make the decision about ANC, place of delivery, and healthcare jointly. In both areas, the patterns for decision-making in seeking ANC and delivery care were similar (Table 7). Finally, the majority of women said that their most recent pregnancies were planned.

Table 7 Decision-maker for healthcare in the household: percentage changes over time & area

Outcome	n	Control				Intervention			
		Baseline 2007	Midline 2010	Final 2012	p-value*	Baseline 2007	Midline 2010	Final 2012	p-value*
		%				%			
Planned pregnancy		69.10	81.30	82.20	0.5	74.5	73.73	86.50	0.0001
Decision-maker	1090				0.1				0.002
ANC¹					0.1				0.0001
Myself	518	39.02	41.38	54.1		39.20	58.50	50.00	
Husband	346	41.10	37.36	25.3		37.50	25.71	25.51	
Mother-in-law	85	13.41	6.30	3.5		15.34	6.67	2.55	
All Family Members/Jointly	141	6.10	14.93	17.0		7.95	9.05	21.90	
Place of delivery	1232				0.4				0.0001
Myself	569	42.16	42.16	52.00		42.31	58.06	39.70	
Husband	378	30.39	39.71	25.50		36.06	25.81	26.63	
Mother-In-Law/Grand	138	24.02	8.82	4.00		16.35	9.68	4.02	
Mother-in-law	141	2.94	-	-		1.44	0.92	-	
Father-in-law	6	0.49	9.31	18.50		3.85	5.53	29.65	
All Family Members/Jointly									
Healthcare in family	1235				0.002				0.6
Myself	459	38.24	24.51	36.14		37.02	41.94	45.00	
Husband	440	38.24	44.12	32.18		41.35	32.72	25.00	
Mother-in-Law/Grandmother-In-Law	141	17.16	6.37	6.44		19.71	14.29	4.00	
Father-in-law	65	5.88	15.20	2.97		0.96	5.07	1.50	
All Family Members/Jointly	130	0.49	9.80	22.28		0.96	5.99	24.50	

¹ANC-Antenatal care, **p-value*** are based on Kruskal Wallis test to compare each categorical variable across time.

Table 8 reports the details of household assets used to construct the wealth index. The majority of respondents lived in their own dwelling on their own land and had their own piped or common piped water and a flush toilet. Most respondents owned electric goods such as a television and radio as they had electricity. Few respondents owned a fridge. With regards to the road access, the majority of women lived less than a 5-minute walk away from a road. There was no data on the distance to the facility. By 2010 and 2012, all respondents owned one or more goats, toilets, land, and piped water; perhaps an indication of the cohort getting richer.

Table 8 Household Assets of Respondents

Household assets	n	Control			Intervention		
		Baseline 2007	Midline 2010	Final 2012	Baseline 2007	Midline 2010	Final 2012
Own House	1236	94.61	91.67	87.19	90.38	92.63	94.00
Dwelling roof	1236	28.92	25.00	27.09	34.62	35.48	49.00
Water	1212						
Own piped	531	43.14	36.76	42.36	48.08	36.87	51.00
Non piped source	72	9.31	6.37	9.36	4.83	1.39	4.02
Common pipe	609	48.0	48.5	49.8	48.1	55.3	45.5
Toilet	881						
Flush Toilet	739	50.00	62.75	62.56	58.17	58.53	67.00
Pit Latrine	142	22.06	8.82	5.91	11.06	12.90	8.00
More costly items							
Radio, cassette tape	1236	77.94	76.47	61.08	78.37	68.66	58.00
Television	1236	81.47	79.41	80.79	77.88	73.73	79.00
Fridge	1236	8.33	15.20	16.26	6.25	11.98	17.50
Electricity	1236	98.04	99.02	96.55	95.67	96.77	93.5
Bicycle/rickshaw	1236	4.90	9.80	4.93	1.92	6.91	4.00
Ownership of agricultural land	1236						
Own less than 3 ropani (<0.27 hectares)	577	46.57	53.92	34.48	44.23	53.00	47.50
*Median is = 3 Ropani							
Own between 3-20 ropani (0.27-0.54 hectares)	659	53.43	46.08	65.52	55.77	47.00	52.50
Road <5 minutes away	1236	52.45	91.18	70.44	74.52	94.01	78.00
Goat	1236	55.88	100.00	100.00	44.71	100.00	100.00

*1 ropani = 0.05 ha (Hills)

5.5 Confounding factors

A Pearson's Chi-square test was performed to explore whether living in the area where the intervention took place was a confounding factor using the baseline survey data. In this analysis, there is no statistically significant relationship between living in the intervention area and (a) seeking ANC, (b) seeking ANC in the first trimester, (c) having four ANC visits, (d) having an institutional delivery, (e) seeking a skilled birth attendant, (f) attending PNC, (g) taking iron and folic acid, (h) age, (i) wealth, (j) parity, (k) education, and (l) time (Table 9).

Table 9 Correlation of intervention outcomes and living in the intervention area at baseline

Outcome	N	Intervention	
		Baseline (2007) χ^2	P
Seeking ANC¹			
At least once	412	1.27	0.26
In the 1st Trimester	334	2.09	0.15
4 or more visits	412	2.83	0.09
Taking Iron/Folic Acid during pregnancy	331	0.57	0.45
SBA⁴	412	0.75	0.39
ID³	412	1.14	0.29
Seeking PNC²	408	2.83	0.06
Age	412	31.23	0.26
Wealth	412	0.50	0.79
Parity	412	1.05	0.59
Education	412	0.72	0.70
Time	412	0.09	0.76

¹ ANC - Antenatal care; ² PNC – Postnatal care; ³ ID – Institutional delivery; ⁴SBA – Skilled birth attendant

*Significance is at $p < 0.05$

5.6 Utilisation of maternal care

In Table 10, at the baseline, 80.39% of women in the control area attended ANC compared to 84.62% in the intervention area. In the intervention area, from baseline to final evaluation, the proportion of women who sought ANC at least once significantly increased from 84.62% to 98.00%. The proportion seeking ANC in the first trimester significantly increased from 47.70% to 62.37%; those seeking ANC four or more times significantly increased from 67.31% to 81.00%. In addition, a greater proportion of women reported taking iron/folic acid (from 86.54% to 95.98%) and seeing a SBA (from 60.60% to 82.00%). Significant increases were also seen in seeking an institutional delivery (from 60.58% to 76.00%) and PNC (from 52.20% to 85.86%). Use of safe delivery kit significantly increases from 5.00% to 34.29%. Improvements were also registered in the control group but not all were significant.

Table 10 Maternal Health Uptake (%) of health services in the intervention and control area

		Control				Intervention			
Outcome	n	Baseline 2007	Midline 2010	Final 2012	p-value	Baseline 2007	Midline 2010	Final 2012	p-value
			%				%		
Seeking ANC¹									
At least once	1236	80.39	85.29	88.67	0.06	84.62	96.77	98.00	0.0001
In the 1st Trimester	1086	55.62	68.32	61.10	0.05	47.70	61.17	62.37	0.007
4 or more visits	1236	59.31	64.22	69.95	0.08	67.31	86.18	81.00	0.0001
Iron/Folic Acid during pregnancy	1236	76.35	79.90	79.31	0.6	86.54	94.47	95.98	0.0006
SBA⁴	1236	55.39	63.24	75.37	0.0007	60.60	70.05	82.00	0.0001
Institutional birth³	1234	55.39	54.68	71.43	0.0006	60.58	66.67	76.00	0.003
Seeking PNC²	1234	42.86	61.76	73.82	0.0001	52.20	76.85	85.86	0.0001
Use of safe delivery kit	388	11.49	17.11	11.63	0.5	5.00	40.30	34.29	0.0001

¹ ANC - Antenatal care; ² PNC – Postnatal care; ³ ID – Institutional delivery; ⁴SBA – Skilled birth attendant *significance is at p<0.05

5.7 Impact of the intervention

Tables 11 and 12 show the estimated odd ratios for the midline and overall evaluations, respectively. From baseline to the midline, there is a significant increase women's likelihood of attending ANC at least once during their pregnancies [OR=6.96, 95%CI (2.26; 21.39)] in the intervention group. A significant increase was also seen in the probability of taking iron/folic acid [OR=3.03, 95%CI (1.16; 7.87)]. The probability of seeking four or more antenatal care visits was doubled, [OR=2.15, 95%CI (0.99; 4.67)] (Table 11).

Over the five years (from baseline to the final term), women were three times more likely to seek ANC at least once [OR=2.97, 95%CI (1.52; 5.81)]. Women were nearly twice as likely [OR=1.89, 95% CI (1.12; 3.18)] to take iron/folic acid, and one and a half times as likely to attend for postnatal care [OR=1.50, 95% CI (1.05; 2.15)].

Over the five years, the intervention had no impact with regards to women attending ANC in the first trimester, or on SBA at birth, or on ID either in the midline, or in the overall evaluation. Impact was seen on four ANC visits only from the baseline to the midline. Three of the outcomes improved (as seen in Table 12) that were clinically relevant (but not statistically significant); there were an increase in the proportion of women with a prenatal visit in the first trimester (47.70% to 62.37%), increases in institutional deliveries (60.58% to 76.00%) and the proportion of women who had a skilled attendant at birth (60.60% to 82.00%) in the intervention area (Table 10).

Table 11 DiD analysis of maternal health uptake at midline evaluation (OR & CI)

	Seeking ANC ¹ at least once	Seeking ANC in the 1st Trimester	Seeking ANC 4 or more times	Taking Iron/Folic Acid during pregnancy	SBA ²	ID ³	Seeking PNC ⁴
Observations	832	714	832	831	832	830	832
Treat	1.33 (0.72; 2.44)	0.67 (0.42; 1.07)	1.21 (0.72; 2.04)	2.26 (1.24; 4.09)**	1.19 (0.74; 1.90)	1.24 (0.79; 1.96)	1.46 (0.94; 2.27)
After	1.16 (0.61; 2.18)	1.59 (0.98; 2.57)	0.87 (0.52; 1.45)	0.99 (0.56; 1.73)	1.26 (0.78; 2.03)	0.80 (0.50; 1.27)	2.28 (1.45; 3.56)**
Treat-after	6.96 (2.26; 21.39)**	1.22 (0.63; 2.35)	2.15 (0.99; 4.67)*	3.03 (1.16; 7.87)**	1.45 (0.74; 2.83)	1.72 (0.90; 3.30)	1.64 (0.86; 3.12)
Wealth							
Wealth 2	3.38 (1.91; 5.99)**	1.65 (1.11; 2.46)**	1.24 (0.81; 1.90)	2.59 (1.54; 4.36)**	2.69 (1.85; 3.90)**	2.21 (1.53; 3.20)**	1.70 (1.17; 2.47)**
Wealth 3	5.98 (2.27; 15.73)**	3.05 (1.91; 4.87)**	5.24 (2.55; 10.76)**	2.78 (1.33; 5.82)**	11.03 (6.27; 19.39)**	7.59 (4.55; 12.66)**	4.01 (2.49; 6.44)**
Age	0.90 (0.87; 0.95)**	1.01 (0.97; 1.05)	1.00 (0.96; 1.04)	0.92 (0.89; 0.96)**	0.98 (0.95; 1.02)**	0.98 (0.95; 1.01)	0.99 (0.96; 1.02)
Education							
Education 2	5.21 (2.69; 10.07)**	1.53 (1.03; 2.29)**	0.95 (0.61; 1.48)	3.98 (2.28; 6.95)**	1.95 (1.33; 2.86)**	1.95 (1.33; 2.85)**	2.05 (1.40; 3.00)**
Education 3	9.34 (3.11; 28.04)**	2.58 (1.60; 4.16)	2.01 (1.04; 3.87)**	10.10 (3.94; 25.84)**	4.73 (2.76; 8.08)**	4.28 (2.59; 7.07)**	4.47 (2.75; 7.26)**
Parity							
Parity 2	0.67 (0.37; 1.23)	0.62 (0.43; 0.91)**	0.57 (0.36; 0.90)**	0.53 (0.30; 0.92)**	0.52 (0.35; 0.77)**	0.53 (0.36; 0.78)**	0.65 (0.45; 0.95)**
Parity 3	0.48 (0.25; 0.93)**	0.56 (0.35; 0.89)**	0.64 (0.37; 1.10)	0.31 (0.17; 0.57)**	0.62 (0.39; 1.00)*	0.59 (0.37; 0.93)**	0.75 (0.48; 1.17)

¹ ANC - Antenatal care; ² SBA – Skilled birth attendant; ³ ID – Institutional delivery; ⁴PNC – Postnatal care

***p*value<0.05; Afterafter=at 5 years of the intervention, treatafterafter= those exposed to the intervention in 2012, treat=intervention area, wealth 2=middle-wealthy and wealth 3=the wealthiest.

Table 12 DiD analysis of maternal health uptake at final evaluation (OR & CI)

	Seeking ANC ¹ at least once	Seeking ANC in the 1st Trimester	Seeking ANC 4 or more times	Taking Iron/Folic Acid during pregnancy	SBA ²	ID ³	Seeking PNC ⁴
Observations	1235	1086	1235	1233	1235	1233	1235
Treat	1.49 (0.84; 2.64)	0.68 (0.45; 1.03)	1.48 (0.91; 2.40)	2.41 (1.38; 4.18)**	1.32 (0.86; 2.03)	1.52 (1.01; 2.31)**	1.51 (1.00; 2.26)**
Afterafter	1.18 (0.85; 1.62)	1.02 (0.81; 1.30)	1.01 (0.77; 1.31)	0.87 (0.66; 1.15)	1.34 (1.05; 1.72)**	1.26 (0.99; 1.59)**	1.75 (1.39; 2.21)**
Treat-afterafter	2.97 (1.52; 5.81)**	1.21 (0.88; 1.67)	1.06 (0.71; 1.58)	1.89 (1.12; 3.18)**	1.04 (0.73; 1.48)	0.93 (0.66; 1.30)	1.50 (1.05; 2.15)**
Wealth							
Wealth 2	2.49 (1.55; 4.00)**	1.75 (1.27; 2.42)**	1.37 (0.95; 1.96)	2.63 (1.71; 4.04)**	2.55 (1.86; 3.49)**	2.20 (1.62; 3.00)**	1.68 (1.22; 2.31)**
Wealth 3	4.74 (2.15; 10.44)**	2.80 (1.93; 4.06)**	3.33 (2.00; 5.56)**	2.37 (1.35; 4.15)**	9.29 (5.88; 14.68)**	6.97 (4.59; 10.57)**	3.82 (2.55; 5.74)**
Age	0.93 (0.91; 0.97)**	1.00 (0.97; 1.03)	1.00 (0.97; 1.03)	0.96 (0.93; 0.99)**	0.99 (0.96; 1.02)	0.99 (0.96; 1.02)	1.00 (0.97; 1.03)
Education							
Education 2	4.69 (2.72; 8.09)**	1.35 (0.97; 1.87)	1.04 (0.71; 1.51)	3.31 (2.13; 5.13)**	1.90 (1.37; 2.63)**	1.88 (1.37; 2.58)**	2.23 (1.61; 3.08)**
Education 3	11.02 (4.18; 29.04)**	2.24 (1.53; 3.27)**	1.80 (1.09; 2.98)**	9.27 (4.55; 18.90)**	4.55 (2.91; 7.10)**	3.97 (2.63; 5.99)**	4.70 (3.10; 7.13)**
Parity							
Parity 2	0.61 (0.37; 1.00)*	0.72 (0.54; 0.96)**	0.72 (0.51; 1.04)	0.55 (0.36; 0.85)**	0.45 (0.32; 0.62)**	0.48 (0.35; 0.65)**	0.56 (0.41; 0.76)**
Parity 3	0.44 (0.25; 0.78)	0.64 (0.44; 0.94)**	0.69 (0.44; 1.09)	0.32 (0.19; 0.54)**	0.50 (0.33; 0.75)**	0.52 (0.35; 0.77)**	0.66 (0.44; 0.98)**

¹ ANC - Antenatal care; ² SBA – Skilled birth attendant; ³ ID – Institutional delivery; ⁴PNC – Postnatal care

***p*value<0.05; Afterafter=at 5 years of the intervention, treatafterafter= those exposed to the intervention in 2012, treat=intervention area, wealth 2=middle-wealthy and wealth 3=the wealthiest

5.8 Impact of covariates on outcomes

5.8.1 Wealth and caste

Caste was first separated into three categories (Section 4.3.9.1.6); Caste 1 = 48.46%; Caste 2 = 40.78%, and Caste 3 = 10.76% (Table 13). Wealth was a significant factor; it explains a high proportion of the variation in all the outcomes both in the midline and in the overall evaluation. In particular, being richer (3rd tertile) compared to being poorer (1st tertile) substantially increased the probability of having an SBA in the midline [(OR=11.03, 95% CI (6.27; 19.39)] and in the overall evaluation [OR=9.29, 95% CI (5.88; 14.68)].

Wealth was also strongly correlated to caste ($\chi^2 = 440.19$, $p < 0.05$).

Table 13 Caste distribution

Caste	n (1236)	%
1	599	48.46
2	504	40.78
3	133	10.76

Table 14 Wealth distribution

Wealth quantiles	n (1210)	Overall (%)	2007 (%)	2010 (%)	2012 (%)
1	404	33.39	40.63	36.52	22.11
2	403	33.31	34.06	33.89	31.84
3	403	33.31	25.30	29.59	46.05

Relative to the construction of the wealth index, the first component (roofing material) extracted explained 20% of total variability in the population (Section 4.3.9.1.5). The distribution of the wealth score based on the first component is shown in Figure 16 (n=1236). Scores based on the first component were grouped into tertiles, with the lowest (group 1) representing the poorest and the higher (group 3) representing the richest women in the sample. The share of women falling into each tertiles were: Wealth 1 = 40.63%, 36.52%, 22.11%; Wealth 2 = 34.06%, 33.89%, 31.84%; Wealth 3 = 25.30%, 29.59%, 46.05% in the first, second, and third survey, respectively (Table 14).

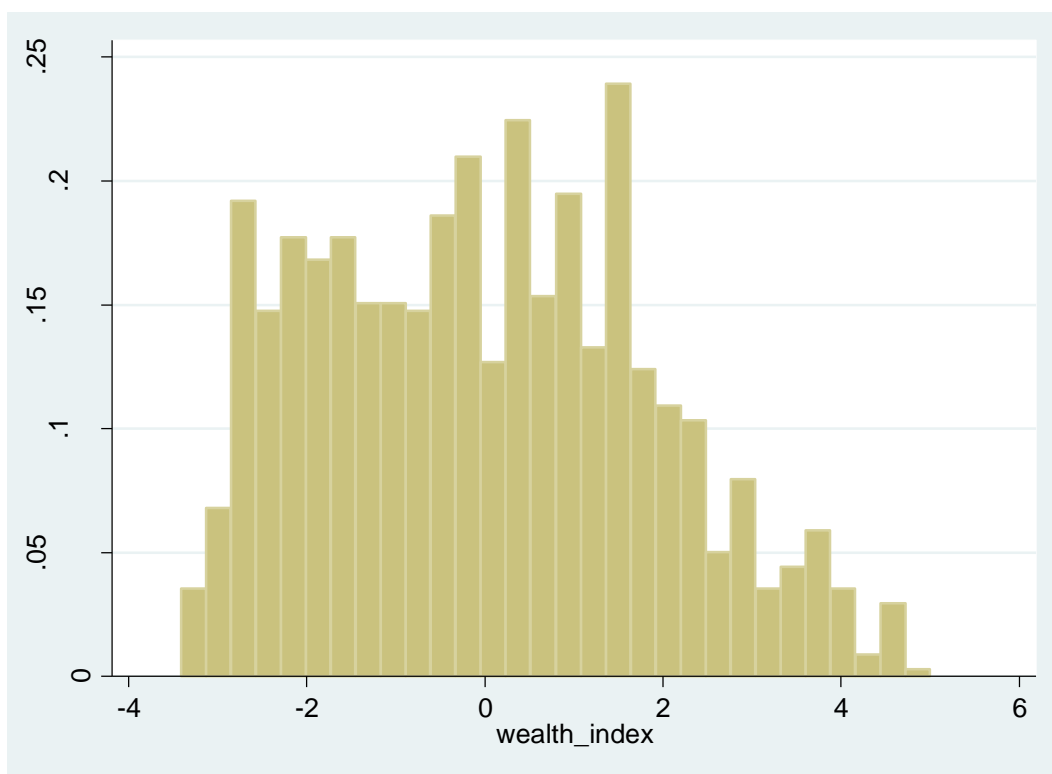


Figure 16 Wealth distribution by caste

The distribution of wealth was also 'split' according to caste (Figure 16) or to high (Figure 17), middle (Figure 18) and low castes (Figure 19), as per the published definition of caste (Ministry of Health and Population 2012; Government of Nepal, National Planning Commission Secretariat 2014b). Distributions per caste are 'high' caste (=1): Brahmin, Chhetri, Newar, 'middle' caste (=2): Tamang middle, or low (=3): Newar Dalit, Balami, Dalit, and others (Christian or Muslim) (Section 4.3.9.1.6). As seen in Figure 17, the wealth is better distributed, the higher the caste.

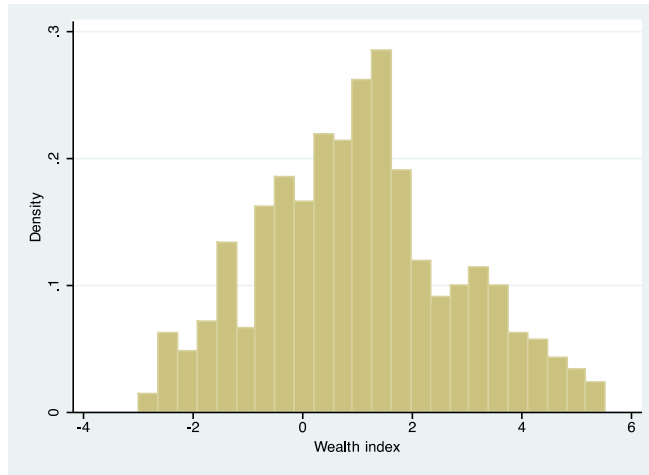


Figure 17 Wealth distribution in high castes

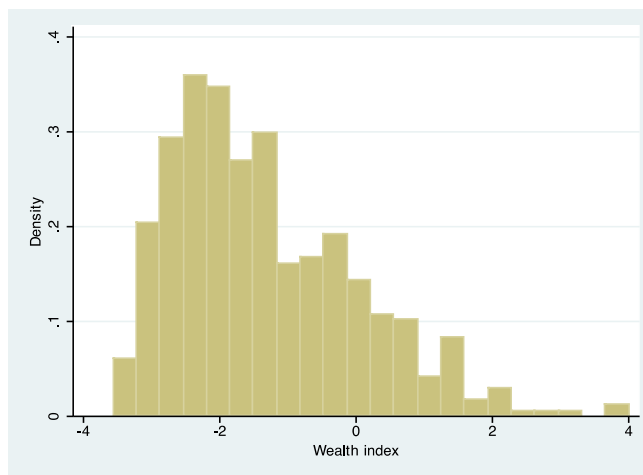


Figure 18 Wealth distribution in middle castes

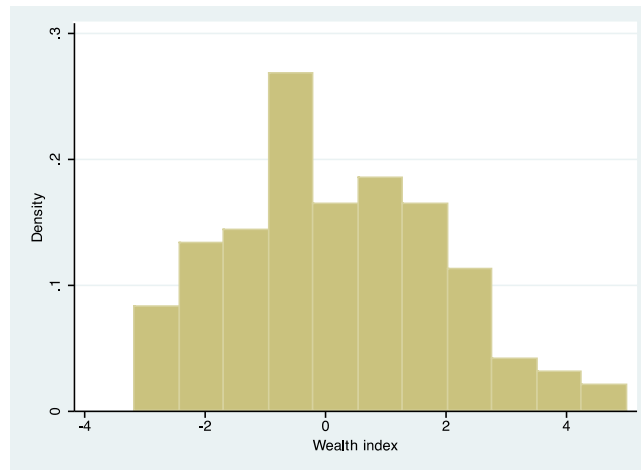


Figure 19 Wealth index distribution among lower castes

5.8.2 Age, education & time

Age was a significant factor in determining whether women sought one antenatal visit and took iron/folic acid both at the midline and final evaluation. In both cases, older age lowered the probability of a positive outcome. Having higher education compared to no education increased the probability of a better attendance of all the outcomes considered. In particular, having secondary school or higher-level education increased the probability of attending ANC at least once at the midline [OR=9.34, 95% CI (3.11; 28.04)] and the overall evaluation [OR=11.02, 95% CI (4.18; 29.04)].

In the intervention area, women were more predisposed to seek an ID [OR=1.52, 95% CI (1.01; 2.31)] and PNC [OR=1.51, 95% CI (1.00; 2.26)] at any time. Women in the intervention area were 2.26 [OR=2.3, 95% CI (1.24; 4.09)] times more likely at midline to take iron/folic and 2.41 [OR=2.41, 95% CI (1.38; 4.18)] by year 5. Over time (variable *afterafter*, see Table 12), women become increasingly more likely to take up SBA at birth [OR=1.34, 95% CI (1.05; 1.72)], ID [OR=1.26, 95% CI (0.99; 1.59)] and PNC [OR=1.75, 95%CI (1.39; 2.21)], reflecting background changes. With increasing parity, the ORs for all indicators remain significantly below 1, when referring to a reduced likelihood of attendance the more children a woman has.

5.9 Continuity of care

The uptake of ANC, ANC in the first trimester, and 4 ANC was significantly related to having a skilled attendant at birth (Table 15).

Table 15 SBA uptake post-ANC

SBA	ANC	ANC in the 1st Trimester	4 ANC
Observations	807	530	689
Percentage of uptake	73.36%	81.79%	78.12%
χ^2	170.55	60.38	165.62
	p<0.05*	p<0.05*	P<0.05*

5.10 Validity, reliability & goodness of fit using predicted probabilities

In the quantitative component of this evaluation, the method of investigation was chosen based on the literature that DiD is suitable for cross-sectional data. Thus ensuring validity and reliability of the DiD regression analysis (Section 4.4).

Secondly, the use of predicted probabilities was used to ensure the ‘goodness of fit’ of the DiD regressions (Section 4.4). The use of predicted probabilities helps us understand the regression model. The beta value probabilities were calculated to ensure that the regressions applied in the DiD analysis were similar to the actual attendance range (Table 16). For example, an example from the table below can be interpreted as: the predicted probabilities model suggests that the probability of seeking ANC once in the control area was 87.19% (with a range of 85% to 88%), while the actual attendance was 88.67%. As stated in Section 4.4, the calculated value for predicted values, with error or the error term (E), above were ‘predicting’ an event and all below that cut-off value as not ‘predicting’ the event (i.e. attendance). This exercise is a measure of how well the modelled probabilities fit, with error as not all confounding factors have been taking into account, as the “actual” proportions of the percentage uptake of health services in 2012 match are similar to the predicted probabilities.

Table 16 Predicted probabilities of DiD analysis of maternal health uptake changes in intervention & control area, final evaluation (%)

	Seeking ANC¹ at least once	Seeking ANC in 1st trimester	Seeking ANC 4 or more times	Taking Iron/Folic Acid during pregnancy	SBA²	ID³	Seeking PNC
Uptake of Health Services Control 2012 (%)	88.67	54.19	72.41	73.82	75.37	71.43	79.31
2012 Control Predicted probability, % of women (with a lower and upper cut off)	87.19 (0.85-0.88) (85-88%)	62.42 (0.61-0.64) (61-64%)	81.28 (0.80-0.82) (80-82%)	79.80 (0.77-0.82) (77-82%)	68.71 (0.66 -0.71) (66-71%)	63.16 (0.61-0.65) (61-65%)	63.25 (0.64-0.68) (64-68%)
Uptake of Health Services Intervention 2012 (%)	98.00	60.50	86.00	95.98	82.00	76.00	85.86
2012 Intervention Predicted probability, % of women (with a lower and upper cut off)	97.36 (0.96-0.97) (96-97%)	61.14 (0.59-0.62) (59-62%)	88.72 (0.88-0.89) (88-89%)	95.20 (0.94-0.95) (94-95%)	75.05 (0.73 – 0.77) (73-77%)	71.17 (0.69-0.73) (69-73%)	81.77 (0.80-0.83) (80-83%)

5.11 The cost of the intervention

This section presents the cost analysis of running women's groups. The intervention lasted 60 months, and nine months were considered the implementation period. Starting with the cost of the surveys, the baseline cost per survey was NRs. 180,000 (GBP 1,379.20). This included enumerator allowance, subsistence transport, salary printing, questionnaires, mobile phones, and the cost of training (U.K.). The second survey was NRs.188, 000 (GBP 1,684.10) and the third survey NRs. 194,000 (GBP 1,412.40) which was the most expensive in Nepali rupees due to the inclusion of this PhD thesis research (Table 18). The disparity in GBP is due to the fluctuation in exchange rate over the years (Section 4.3.9.1.7). The three surveys totalled NRs. 562,000 (GBP 4,091.70). The GTN intervention cost included start-up costs and recurrent costs. The former were for recruiting and office rental. The main recurrent costs were for training, group activities (incentives), and transportation.

The total cost of implementing (and running) the intervention was NRs. 5,210,974 (GBP 42, 950.19) over 60 months (Table 17). The evaluation total was GBP 17,986.48 (Table 18). The total cost of the intervention and the evaluation was GBP 60,936.67. The cost per year was NRs. 1,042,194.80 (GBP 8590.38). Table 17 shows that the cost increased in the fourth and five year, which can partly be explained by the inflation in Nepal and largely by the increased numbers of groups running (Section 4.3.9.1.7).

Table 17 Cost of the implementation of the intervention

Year	Description	Months	Nepali Rupee (NPR)	1 GBP=NPR	GBP
1	1 st January 2007 to 29 th February 2008	14	753410	127.66	5901.69
2	1 st March 2008 to 31 st July 2009	17	764772	128.47	5952.92
3	1 st August 2009 to 28 th February 2010	7	487384	126.24	3860.77
4	1 st March 2010 to 30 th April 2011	14	1776452.00	116.04	15308.96
5	1 st May 2011 to 1 st January 2012	8	1428956	119.82	11925.85
For total of the intervention (60 months)	1 st January 2007 to 31 st December 2012	60	5210974	--	42950.19
Per year (Considering 12 months of the intervention)	Yearly average		1042194.80	--	8590.38
Per month (Considering 60 months of intervention)	Each month (average)		86849.57	--	715.84

Table 18 Cost of the evaluation of the intervention

Items	Details	Nepalese rupees	GBP
Total cost of Surveys 3 rounds questionnaires one month each in both control /intervention (transport, subsistence, photocopy)	Breakdown of surveys cost: enumerator allowance, subsistence Transport, Salary Printing questionnaires, Mobile phone 3*2 months of costs for surveys	180000 (June 2017)	1379.20*
		188000 (June 2010)	1684.10*
		194000 (June 2012)	1412.40*
Total		562000 (June 2012)	4091.70*
Incentives, gifts and assistance	Baby blanket, stretcher, sustenance, transports, stationary, communication, bed and stretcher for clinic 422 blankets * NR300	126600	1023.86**
	Per respondent subsistence NRs. 20*731 people=NPRs.14, 620	24720	199.92**
Cumulative Total		165881.74	1341.54**
Training and flights	External trainers 3 Flights (1000 each) + GBP 1000 per day (5 days)	--	8000.00
	Needs assessment - intervention area Translator, subsistence (NRs. 20,000 converted using June 2017 exchange rate)	--	153.24*
	(2 MSc students, 1 PhD student) Flights (3) @1000	--	3000.00
	Mid-term qualitative evaluation, that inform post-midline HP (S, B &S) 2 qualitative interviewers	--	1400.00
Total		--	12553.24
Evaluation total		--	17986.48

* Exchange Rates: June 2007, GBP 1=NRs. 130.51, June 2010, GBP 1=NRs. 111.63 and June 2012, GBP 1=NRs. 137.3.

** Exchange Rate on date of entry into GTN budget, GBP 1= NRs. 123.65

Considering the total recorded attendees in the groups by year 5 were 731 women, the cost per person (attendee in a women’s group) was GBP 11.75 over the five years (60 months).

Finally, the GTN intervention cost on likelihood of attendance is ascertained by dividing the total cost by a DiD proportion change for a population of 8,569. For example, taking the outcome attending ANC (at least once), the cost per percentage point increase, i.e. to increase ANC uptake by 1% in population from the baseline to the final evaluation, a 13.38% increase was seen in the intervention area (Section 5.6, Table 10) and the cost over 5 years was GBP 5746.73. For the DiD analysis for the cost for a 12.74% likelihood of increase over 5 years, it was GBP 5,471.85 (Table 19).

Table 19 Cost of the likelihood of ANC uptake for the population in the intervention area

Outcome Attending ANC at least once	Over 5 years: Baseline to Final in a population of VDC 8,569	GBP
% Change	13.38	5746.73
% Change due to DiD	12.74	5471.85
Total cost per year	GBP 42950.19	

5.12 Summary

This chapter has discussed the research findings of the quantitative research. There were increases in the attendance indicators for both areas. The use of DiD and PCA on the secondary survey data permitted the approximation of the impact of the intervention on attendance outcomes. They showed that certain ANC outcomes and PNC attendance improved compared to delivery care outcomes as a result of the intervention. The DiD "goodness of fit" test was presented. Finally, this chapter also presented the cost of the intervention. The chapter that follows presents the qualitative findings.

Chapter 6: Qualitative study and findings

6.1 Introduction to the qualitative findings

This chapter presents the qualitative findings of this study. First, the description of the characteristics of the focus groups and interview respondents are detailed. Secondly, the themes of the focus groups, interviews, and key informant interviews are presented. Third, the themes of the focus groups and interviews, as well as the focus group thematic analysis and findings of the study population, are presented with quotations extracted from participants' transcripts to illustrate context and themes. Finally, a reflective section is offered.

6.2 Participants' characteristics

A total of 14 focus groups (FG) were conducted ranging from 3-12 participants. Two sets of qualitative data from the key informants (the two health promoters) and from the participants were separately analysed, as they are separate perspectives of the intervention. They included nine groups of women aged 17 to 62 (separated into groups of recent mothers and mother-in-laws to extract authentic results); two groups of men aged 35 to 66; two groups of female community health volunteers (FCHV) aged 32 to 36 and the other aged 26 to 48; and one group of maternal and child health workers (MCH) (Table 20). All of the men and two-thirds of the women were literate, at least at a primary school level. All participants were married. Additionally, three individual interviews and three joint interviews were conducted with the two health promoters, aged 30 and 40, and seven health workers aged 25 to 52 (Table 20). The total number of participants in the focus groups was 38 individuals, and 9 individuals participated in the interviews (Table 21).

Table 20 Focus Groups

Focus group (FG) number	Group Interviewed	Age	Intervention or Control Area
FG1	Mothers with children ≤ 24 months	25-35	I
FG2	Mothers with children ≤ 24 months	21-28	I
FG3	Mothers with children ≤ 24 months	17- 23	I
FG4	Mother-in-law groups	37-55	I
FG5	Mother-in-law groups	40-62	I
FG6	Mixed type of Mothers having either ≤ 24 months children and non GTN members	26-48	I
FG7	Female Community Health Volunteer (FCHV)	26-48	I
FG8	FCHV	32-36	C
FG9	Mother-in-law groups	55-60	C
FG10	Mothers with children ≤ 24 months	22-28	C
FG11	Mothers with children ≤ 24 months	28-34	C
FG12	Maternal and Child Health workers (MCH)	24 and 31	I
FG13	Extended family groups (Husbands/Father-in-law) Group Interview	29-47	I
FG14	Extended family groups (Husbands/Father-in-law) Group Interview	46-66	C

Table 21 Interviews

Interview number	Group Interviewed	Age	Intervention or Control Area
IDI1	Hospital staff (2)	25 and 28	I
IDI2	Health worker, Sub-Health Post In-charge.	40	I
IDI3	MCH worker (Outreach clinic)		C
IDI4	Health promoters GTN staff (2)	30 and 40	I
IDI5	Health workers, PHN and MCHW (2)	42 and 52	C
IDI6	FCHV	42 and 52	C

From the designed sampling frame (Section 4.3.8.1), six interviews and fourteen focus group discussions were conducted with an independent Nepalese facilitator and interpreter in order to explore (1) changes in the last five years, (2) the reasons underlying the (non)-attendance of women at the Green Tara Nepal (GTN) groups (barriers and facilitators to uptake of services), and (3) users' perceptions regarding the effect of the intervention. The aims of the qualitative study were to document changes starting in 2007 up until 2012 in both the intervention and control areas, and to determine whether such changes are attributable to said intervention (Section 3.6.1).

When discussing changes in the last five years, the author distinguishes between the control or intervention area unless otherwise noted. In this chapter, the Tamang caste (as well as the caste system in general) has been discussed in detail in order to add useful information/'colour' to the quotes. Information provided by the interviewees and group participants in villages where the Tamang dominate, and might be useful for the reader to have/to process before reading the sections.

The findings are presented in two sections (6.2.1 and 6.3), one from health promoters (key informants) and the other from the participants (service users), because participants in each are very different, i.e. it is expected they would

respond very differently and would have very different perspectives on the issues, if only because of expert and lay distinction. A further reflective section considers other possible drivers of the changes observed.

6.2.1 Health promoters' evaluation, key informants

Part of the evaluation involved in-depth discussions with the health promoters (HPs). Below is a summary of the interviews and the observations on the HPs' activities in the field. The first health promoter is 26 years old. She is an auxiliary nurse-midwife (ANM). Her colleague (the second health promoter, 36 years old) reported that she brought 12 years of work experience as a community medical assistant (CMA, the equivalent of a health visitor in the NHS). Both health promoters are *Bahun Brahmin* and live in the same community where they work. They said that GTN wanted to work with health promoters "locally", as a person from the same area would be more likely to be trusted by their own community and were more likely to stay for the duration of the intervention.

During the interview and observations, the HPs mentioned that they were initially uncertain about how to organise the groups for pregnant mothers and new mothers in 2007, as the concept of groups where participants "just talked" was perceived as "foreign/odd". They recalled that the women who were targeted did the majority of the house and fieldwork and did not have the "time" nor the permission from their family, particularly their mothers-in-law, to attend group meetings. They emphasised that the groups were mixed: mothers-in-law with their daughters-in-law. Yet the mothers-in-law were one of the main barriers to access to care. Therefore, they decided to separate the groups once "permission" was obtained from the mothers-in-law. However, even at the midline evaluation in 2010, the pregnant mothers and new mothers reported that sometimes the mothers-in-law did not share the information obtained in the groups with their daughters-in-law. It seems that this notion of "control" still existed.

When interviewed, the staff reported that they started the groups by focusing on the health needs of the community, in other words, by addressing the needs of mothers and informing them of the care of their newborns. This led to behavioural change via the health promotion of women's groups. The staff addressed this health promotion education in areas where it was not demonstrated by the mothers-in-law and with particular emphasis on the pregnant women and mothers.

Since 2007, they sought out and informed all pregnant women and mothers in the intervention area to attend the GTN women's groups. They felt that there was resistance to form and attend groups, as the maternal health promotion group concept was alien to them. Thus, they kept returning to the area, providing tea, biscuits, and blankets as incentives to attend. An interesting approach to engage participants was to "gift" a baby blanket to women who attended four group meetings while pregnant. The reasoning was to prevent hypothermia at birth and to keep the child warm.

The staff commented that the groups were formed and continued only once the community trusted them and due to the incentives. Trust, they said, was gained due to their continuous presence, the fact that they were local, and the fact that they were qualified as ANMs. They recalled that in 2009 (almost two years after the start of the intervention) women in the antenatal period were not always included, so they sought antenatal women and invited them to join the GTN groups. Furthermore, the staff said that they felt they required additional training on intimate partner and sexual violence. The GTN HP staff seemed proactive in their approach, even raising funds for GTN:

"We celebrated "[Teej]", and raised 50/60 thousand rupees." **ID4, GTN staff, Bahun.**

In order to improve attendance, a new strategy was developed by GTN and the HPs. They formed separate groups for mothers-in-law, pregnant women, and first-time mothers with children aged less than 2 years. By year three, 23 new groups were formed, and monthly meetings were held with each of these groups. Mothers with children more than 2 years old were excluded (in order to avoid recall bias, see Sections 1.2 and 4.3.4.2). The health promoters were able to recruit women who met the recruitment criteria but for example 'older' women (i.e. mothers-in-law) and men were hard to recruit:

"Old women and men missed in group activities. We were not interested in them either; they were not our target group." **ID4, GTN staff, Bahun.**

Also hard to reach were those who lived in rental houses and those who were Newari (higher caste). In these cases, GTN got help from FCHVs, who would visit the houses.

“Those who are staying in rental houses, such as wives of policemen and typical Newar in Pharping, were difficult to trap for group discussion. In that situation, we do get help from FCHV. They visit them at home and women listened to them. Anyway, we felt our message reached the target group (laugh)...” ID4, GTN staff, Bahun.

The HPs stated that people do not attend if they are busy. If the target group of women did not listen to the HPs, the health promoters would also ask FCHV to encourage them to attend groups. Similarly, the HPs enlisted help from FCHV for those who rented houses and were mobile.

Each new topic for discussion encouraged the women to participate in the group, for example the importance of iron, folic acid, danger signs during pregnancy, and childbirth and breastfeeding. During the intervention, they did not feel that they had to cancel scheduled meetings because of absent members. Some groups have members coming in and going out and occasionally, only one person may be left at a group session. They conduct meetings at convenient times for members during their hectic days. They do conduct meetings both in the evening and in the morning for the convenience of the participants. Initially, tea was offered but most had had tea at home. After a few months, they gave a small amount of cash or a small gift equivalent to an ear pick, brush, soap, etc., in each group sitting:

“That was very nominal (the gift-giving); the most important things were that they were happy in each meeting and that they learned something new each time...” ID4, GTN staff, Bahun.

Recently, the HPs reported that the groups became difficult to manage:

“In the past, we accepted all people who came to the groups. It was difficult for us later when many people came to the groups... (the groups were) uncontrollable.” ID4, GTN staff, Bahun.

They did state that during the 5 years, they were not able to form many men's groups. They reported that men "ran" away when they approached or stated that they felt this intervention was more suitable for women:

"We generally do not know men (to come) but they recognise us as "GTN ko didiharu" (GTN Staff)." ID4, GTN staff, Bahun.

They felt that the curriculum and this evaluation could be a monitoring tool for future GTN work and future training. The GTN staff kept their own Monitoring and Evaluation (M&E) data. In addition, engaging adolescents would be valuable, and having a Tamang health promoter would be beneficial as they are the dominating group in the area (Table 6). Yet the workload proved to be problematic due to the weather, the volume of meetings, and the unstructured form of some groups:

"Sometime, it was challenging to work in the field. Sometime, we forgot what we discussed in a given meeting as there were lot of meetings." ID4, GTN staff, Bahun.

They discussed progress, problems, planning, implementation, and evaluation and the next women and men's group meeting agenda:

"It (conducting groups, doing the health promotion) became easy as we both have a medical background. We teach new topics in the groups after discussing (between two of us) what to teach, and we created a curriculum with the other GTN staff." ID4, GTN staff, Bahun.

Yet there were challenges such as the weather, the workload, and members missing sessions. The latter was used as an opportunity to have group members discuss the health promotion activities:

"The problem was they do not come on time for meetings. Then we had to repeat the discussions...we (thought to) ask old members to speak and share what we had previously said to late comers to the meetings instead of repeating ourselves." ID4, GTN staff, Bahun.

The HPs reported that almost all new mothers attended GTN. Especially once learning that they are pregnant, women came to ANC clinics and for check-ups.

They found that the women came by their own choice to learn about health; they were eager to obtain information and pregnancy check-ups, too.

“It has been a good trend that new mothers attend the GTN groups. In the past, there were few who participated in the group meetings.” **ID4, GTN staff, Bahun.**

When there were a lot of members in the group, they were sometimes not able to address all members since it became very large. They asked one member from each household:

“Now that so many people come to the group discussions, we have difficulty controlling the groups. Now, we have two separate groups, one being mothers with children under 2 years...they all come to the groups...” **R2, GTN staff, Bahun.**

By June 2012, a total of 58 women’s groups were running. Two groups had stopped as they only had one or two attendees, and home visits were conducted instead. Home visits were also done for those who could not attend, as they did not have permission from the mothers-in-law or could not take time away from the family, household tasks, or fieldwork. Finally, for those women who were housebound or bedbound during their pregnancy (due to anaemia, hypertension, or poor nutritional status) or postpartum (due to anaemia, sepsis or recovery from caesarean section) home visits were also provided.

B.1 Health promoter conducting focus groups

An interesting validity/reliability exercise of the interview schedule was to ask the HPs to conduct using the qualitative questionnaire the same interviews with the groups they ran, to see if the answers would be pleasing for example. The answers on transcription were very didactic and to the point (short or one-word answers). The HP interviewer felt shy about being recorded as she felt she was being observed. The HP for the majority of the FG answered some of the questions herself as she felt she knew the right answers already or knew her group. They kept repeating the questions. It felt forced, directive, and one-sided:

I: “You have attended meetings so you should tell ANC, MH, and PNC about hand-washing, hygiene, (and) sanitation, problems.”

*Participant: nod, no answer. **Balami and Chhetri mothers, I.***

I: "What education have you received (reads list to participant)"

*Participant: nod, no answer. **Balami and Chhetri mothers, I.***

6.3 Focus group findings

According to the FG participants, GTN health promoters (HPs) conduct an average of four meetings per month. During the meetings, the groups were encouraged to interact with their community to identify barriers to accessing health services and then to develop ways of addressing them. Using approaches in the groups (Sections 2.4 and 2.5.2), the HPs presented and discussed the barriers and corresponding strategies to deal with “problems” with support from the community members. The groups then developed plans to address problems with the aid of discussion and a training manual for the duration of an hour. Meetings were limited to an hour because participants had to return to their field or house work. The participants neither commented, argued with, nor gave specific feedback with respect to what was said during the FG; it seemed that they accepted what was discussed in the GTN group discussions. However, all participants irrespective of area did not seem to be open to discussing abortion (results not presented). They were also initially reticent to speak of “traditional practices” for fear of being judged; however, as the interviews and focus groups progressed, they became more talkative. During focus groups and interviews, participants were generally shy and somewhat reticent to share. They may not have felt entirely comfortable during the interviews and FGs.

However, the moderator tried to encourage participation in the discussion during the interview:

“Yes. Now I would like others to speak. Why isn’t anyone else talking?” **FG3, Balami and Chhetri mothers, I.**

6.4 Thematic analysis of the study population

The themes were generated using a thematic approach (Section 4.3.8.2). This approach refers to examining and recording recurrent patterns or "themes" within the transcripts/data by coding. With specific research questions (Section 3.7) – this particular approach permits the elucidation of themes by a rigorous classification process of coding to identify patterns and codes (nodes). In practical terms, previously defined categories or codes from the pilot and initial interviews were used to classify the content into explicative themes. Using inductive thematic analysis meant the interview/FG data were read by two researchers to identify emerging analysis of individual interviews and observations combined were categorised into three themes: 1) changes, 2) changes due to groups, and 3) barriers and limitations (i.e. barriers to attending groups and health services), then into subsequent 15 sub-themes, listed overleaf (Section 4.3.8.2). The transcripts were coded by the software Nvivo™. Figure 20 depicts an example of a transcript demonstrating the process of analysis using the software, first the transcript was read through and each idea/theme was coded/highlighted according the list of codes (nodes) on the following page. As mentioned in Section 4.3.8.2, each theme was identified using this constant comparison process, whereby each highlighted item was checked or compared with the rest of the data (interviews and focus groups) to establish analytical categories or themes coherently and systematically for all the data. In order to have/complete the final set of themes, the field notes, transcripts were used in parallel as textual data for content analysis. The interesting or unfamiliar terms used by the groups/participants were added to the list of refined themes – here they have been defined in parentheses, for example, *Nwaran*, a naming and purification ceremony.

Themes and sub-themes of study population

1. Changes

- a. Changes in the last five years in the area/community
- b. Changes in attitudes with respect to seeking care
- c. Perceived progress of maternal health
- d. Changes in attitudes towards motherhood and female children

2. Changes due to groups

- a. Groups working in the area
- b. Women and workload
- c. Shyness
- d. Men's involvement in maternal health
- e. Effects of the groups
- f. Health workers working with GTN
- g. Empowerment
- h. Changes in decision-making patterns
- i. Decision-making in PNC

3. Barriers and limitations to attending groups and health services

- a. Socio-economic barriers and limitations
- b. Cultural barriers

The screenshot displays the NVivo software interface. On the left, a sidebar lists various project components: SOURCES (Internals, Externals, Memos), NODES (Nodes, Node Matrices), CLASSIFICATIONS, COLLECTIONS, and QUERIES. The main workspace is divided into a top toolbar with functions like Open, Get Info, Edit, Paste, Merge, Format, Paragraph, Styles, and Editing. Below the toolbar is a table listing sources with columns for Name, Sources, Referenc..., Created On, Created By, Modified On, and Modified By.

Name	Sources	Referenc...	Created On	Created By	Modified On	Modified By
▶ Barriers and limitations	1	5	7 Jul 2016 16:22	SS	13 Jul 2016 13:31	SS
▶ Change	1	1	7 Jul 2016 13:25	SS	7 Jul 2016 13:25	SS
▶ Changes due to groups	0	0	7 Jul 2016 13:44	SS	7 Jul 2016 13:44	SS
● Home birth	1	9	8 Jul 2016 11:35	SS	13 Jul 2016 12:30	SS
● Interruptions	1	1	12 Jul 2016 01:18	SS	12 Jul 2016 01:19	SS
● Nutrition	1	9	8 Jul 2016 11:44	SS	13 Jul 2016 13:16	SS
● Suggestions for GTN cu...	1	12	8 Jul 2016 12:13	SS	13 Jul 2016 13:27	SS

Below the table, a text document titled 'FGD_Interview_compiled' is open. The text contains several paragraphs of responses and questions. On the right side of the document, vertical coding bars are visible, indicating the application of codes to specific text segments. The codes include: 'Barriers to attending groups and health services', 'Changes in decision-making patterns', 'Women and workload', 'Suggestions for GTN curriculum', 'Shyness', 'Perceived progress of maternal health', 'Effects of the groups', 'Cultural practices', and 'Coding Density'.

Figure 20 Example of NVivo analyses

6.4.1.1 Changes in the last five years in the area/community

As stated in the methods, Section 4.3.8.1, when asked what changes had occurred since 2007, participants spoke of construction of a water tank, construction of a road, and how road access has improved accessibility to the market in the intervention and the control area.

These changes have led to an increase in housing and roads:

“More houses have been built. There were no houses in this area (He points). Many “gumbas (monasteries)” have been built.” **IDI, Hospital staff, I.**

In the control area, more houses were built and the population subsequently increased:

“The population has increased a lot. We have a lot of new houses, and the village, “Sankhu” has increased in size.” **FG9, Newar mothers-in-law, C.**

Participants also mentioned that they now had fewer children. When discussing population changes in the last 5 years, the respondent stated that there was an increase in population due to migration into the community. Moreover, the community grew from the previously high birth rate, yet it seemed people now were choosing to have fewer children:

“The population has increased a lot in last five years. We have a lot of houses in the village. Now people do not want more children. People in our village have only 2-3 children.” **FG1, Tamang, Older mother, I.**

6.4.1.2 Changes in attitudes with respect to seeking care

Respondents were then asked about any changes in their attitude towards seeking care for their delivery. Some respondents referred to the place of delivery. A mother-in-law respondent mentioned how there was a change in attitude in the place of delivery as the women gave birth at home:

“There are a lot of changes. I did not go to a hospital for delivery - I have four children, all were born at home (laughing)...My mother-in-law and neighbours

helped me during my delivery...Now we all go to the hospital for delivery.” **FG9, Mother-in-law, Newar, C.**

A mother-in-law in the control area responded that while babies were delivered at home in the past, institutional deliveries were now more common due to an increase in awareness and the incentive scheme provided by the government:

“People go to the hospital for delivery (the hospital provides 1000 rupees for hospital delivery). In the past, all gave birth at home. People are conscious and do care of pregnant woman and after delivery.” **FG11, Older mothers, Tamang, C.**

In the intervention area, a health worker mentioned that women seemed to come regularly to the family planning and antenatal maternal health clinics:

“... They’re coming more often for their regular check-up, and they are more aware about their health than before.” **IDI3, MCH health worker, Brahmin, I.**

A female participant responded that while she had given birth to all of her children at home, nowadays mothers went to the hospital as they had the funds to do so:

“I delivered 9 children at home itself. I feel today’s women have more money, that’s why they go to hospital.” **FG4, Bahun/Chhetri, mother-in-law, I.**

However, the MCH worker interviewed stated that Tamang women preferred to deliver at home, due to feeling awkward or shy, and that the decision was made by family members, including the women themselves:

“When a woman is having labour pain in the Tamang community, the woman doesn’t go to hospital immediately... She and her family just wait...they feel awkward going to a hospital. Women feel happy giving birth to children in home. The decision to remain at home is made by family members and even the pregnant woman.” **ID3, MCH worker, Brahmin, I.**

6.4.1.3 Perceived progress of maternal health

6.4.1.3.1 Changes in attitudes towards motherhood and female children

Fertility was reported to have declined as attitudes had changed towards children and the sex of the child. Both family planning changing attitudes towards gender preference in children were mentioned:

“Couples are starting to get operated on for family planning (sterilisation) even if they have only one child. The majority of people in the village now do not continue trying for a son. In the past, people kept trying to conceive a son, and if they did not get son, they did not get family planning services (e.g. contraception).”

ID4, GTN staff, Bahun, I.

A health worker commented on the fact that women were not having fewer children. They referred to past sentiments, when children were considered a “gift”. However, there is now a preference for fewer children.

“But now they give birth to one or two children and visit the health post for family planning, which is now free. In earlier days, people used to give birth to many children thinking that they (children) are a gift from God’s. In some houses, we would see 7 children, but now the scenario has changed.”

ID3, MCH worker, Brahmin, I.

With respect to attitudes towards the sex of the child, women previously felt happy to have become a mother, although they mentioned a preference for male children:

“Khusi lagchha ni” (It feels very good to be a new mother). I am happy to have a son.”

FG2, Young mother, Tamang, I.

Currently, other respondents (men, mothers, and mothers-in-law) mentioned that they felt no preference for either sex. In fact, they considered “preference” to be a form of discrimination:

“Our district is not so backwards as it is closer to Kathmandu, so there is no discrimination between son and daughter. If it is first baby then every member in (the) family is pleased.”

FG13, Men/Father-in-law, I.

In both the control and the intervention areas, the respondents were aware of the fact that the government provided iron and folic acid supplement tablets free of cost to pregnant and postnatal mothers. Also, the respondents knew of the Safe Motherhood incentive programme (*Aama Surakchhya* program, for further details see Chapter 1, Section 1.4.1), which charges 1000 Nepali Rupees for hospital delivery and 400 Nepali Rupees for 4 ANC visits. The VDC healthpost is reportedly registered as an incentivised centre only for the ANC incentives. As the public-private community hospital was not, the respondents had to travel to Kathmandu. A staff member of the community hospital interviewed commented on the incentives available to women:

“Government provides iron/folic acid (tablets) free of cost to pregnant and postnatal mothers. They have to buy calcium. As per the mother incentive programme (Aama Surakchhya program), those women who birth are given 1000 Rupees for hospital delivery and 400 for ANC visits.” **IDI 1, Hospital health worker, Bahun, I.**

In addition, mothers, who were also GTN group members, were able to discuss the incentives that they had received in detail:

“Women get 1000 Rupees for birthing in a hospital and 400 Rupees for 4 ANC check-up from health post. If hospital delivery they get (the money) if not they don’t.” **FG7, FCHV, I.**

Yet one participant, a non-GTN group member, reported that while there was no cost of ANC services, she was not aware of any incentives:

“There was no need to pay for ANC check-up at the health post. They do not give us money, either.” **FG6, Non-GTN group, Mother, I.**

Despite this increase in hospital deliveries, women continued to use traditional healers:

“More are now delivering in hospitals than at home. People go to the health post and the hospital when they get sick. In the past, they solely depend on “Dhami Jhankri” (traditional healer)”. Now, they receive treatments from both the hospital and from “Dhami Jhankri.” **ID1, hospital health worker, Bahun (AHW), I.**

The GTN health promoters interviewed mentioned that services had improved for women, as had bathing practices, and that they were called to provide mobile healthcare on health matters. They also mentioned that they provided antenatal and postnatal services. However, they also reported that certain castes still followed their own practices:

“Services like depovera (contraception), immunization, and family planning are provided from the Out-Reach Clinic (ORC). GTN staff provides antenatal and postnatal services. The numbers of clients are increasing at the ORC clinic. In the past, newly born babies were given a bath within 24 hours of delivery. (But) In the Tamang community, they give baths to baby at any time.” **ID4, GTN staff, Bahun.**

6.4.1.4 Groups working in the area

When asked which NGOs work in the area, the majority of female respondents named GTN. Those in the intervention area also named the community hospital. Male participants seemed aware of the existence of GTN groups:

“...and the Manmohan Community hospital is also a form of government. If you are talking about an NGO, there is only GTN available here; Green Tara is working here (someone talks in between).” **FG13, Husbands/Father-in-law, Tamang, I.**

A mother who attends groups went on to report that meetings were held twice each month:

“Green Tara is working in our village. We have two meetings per month, and we hold meetings here in this cottage, usually on the 24th day of the month... (and) at the end of the month.” **FG1, Mother, Tamang, I.**

Another participant commented that there used to be resistance to attending group meetings. Over time, women’s attendance has increased, and they have learned a lot about personal healthcare as a result. The daughters-in-law no longer argue with their elders regarding their attendance at group activities or health uptake, but listen silently as other women start attending health clinics:

“Old people complain that we do not need to this check-up...now, these people (new mothers) have to get check-ups, immunizations, rest...we just listen and we keep ourselves silent.” **FG1, Mother, Tamang, I.**

The MCH worker interviewed mentioned that she worked with GTN to co-ordinate family planning and ANC clinics. She added that she was aware of their work with women on maternal health, HIV/AIDS, the importance of a skilled attendant at delivery, and neonate hypothermia and she was able to communicate with them:

“I feel free to talk with them, not in the least bit afraid. I was a bit afraid of the male HP...but everything was good (during our interaction with GTN). The changes are really apparent...Due to their space management...I can check on women in a public building close to their village. Many women were unaware of issues related to maternal health, but due to GTN programme, they know much more about that as well as related issues...The majority of women attend GTN in this area.” **ID3, MCH worker, Brahmin, I.**

A member of a mothers' group was also positive about her group participation and mentioned that she could communicate openly:

“I can communicate freely. I really like it. (Laughs).” **FG2, Mother Balami, I.**

Some participants who felt that there were no barriers preventing them from attending the group meetings and that they could openly talk to GTN health promoters:

“Pregnant women and children are not allowed to touch a woman whose baby has died. My child was died due to tetanus when he was one year old. Local pregnant women and children did not touch me. This is not happening now – this practice has disappeared because GTN has taught us.” **FG2, Mother, Tamang, I.**

Another female participant in the women's groups commented on the pre-existing savings group that met after their GTN group meeting, and reported discussing the health of women and children with GTN health promoters:

“One is to collect savings and to discuss the status of savings and credit. Another meeting is for discussing the health of mothers and children, hygiene sanitation, and other health-related issues.” **FG1, Mother, Tamang, I.**

Mothers who were interviewed in the control area (Tamang 28-34), mentioned that the only women’s groups in their village were saving groups; health matters were not discussed:

“We now have women’s groups in the village. I am a member of a women’s group; we collect money, save money and use that for opening shops, for our farms, etc. Hum! We do not talk much about health.” **FG11, Mother, Tamang, C.**

Another mother-in-law also mentioned the savings group where she was a member:

“We have a women’s group for savings and credit... We give a loan (using that money) for a small entrepreneurship like knitting, goat raising, opening shops, etc.” **FG9, Mother-in-law, Newar, C.**

A FG participant mentioned that although there may be women’s groups, she was unsure of their activities:

“Actually, the mothers know more about their health (and how to care for themselves) than us (laughing). They have meetings from time to time for this...there is GTN (somebody came and said, ‘what is this?’ And sitting nearby and talking with participants; mobile ringing and one of the participant is talking).” **FG13, Husband/Father-in-law, Newar, I.**

While a male participant felt that the whole village should take part in the meetings, including men:

“...If, in a given village, everyone gets together, then it would make for a good (GTN) meeting.” **FG13, Husband/Father-in-law, Tamang I.**

6.3.1.4.1 Women and workload

The increase in awareness of maternal health seemed to be attributable either to women's decreased workload at home and in fields or to women and health workers learning and gaining increased awareness from group activities (GTN groups). As seen in the previous section, women gained increased awareness due to maternity incentive groups.

When asked about changes in attitudes, mothers-in-law in the control area mentioned the women's workload:

"In our time, we were given heavy work during pregnancy and after delivery...Now there are a lot of changes." **FG11, Mother, Tamang, C.**

Pregnant women are now allowed to rest more, and they were even encouraged to do so by their mothers-in-law:

"Now, mothers-in-law also say that you should rest during your pregnancy." **FG1, Mother, Tamang, I.**

An interviewed health worker also stated that women were advised to reduce their workload during pregnancy:

"They are not allowed to carry heavy loads." **ID3, MCH worker, Brahmin, I.**

Other respondents who were asked about women and their workloads reported that their hiatus from work varied from only a week to a few months depending on the woman's physical state postpartum:

"Some work 2-3 months, some a month; some may be 5 days. It depends on the time (and her) condition." **FG13, Men/Father-in-law, Tamang, I.**

According to a male respondent, women's workloads were linked to the family norm and the type of delivery they had had. The postpartum resting period ranged from a few days to months based on the time needed to recover:

“Is it simple delivery (vaginal) or is there a delivery involving an operation (e.g. C-section)? In the case of an operational (surgical) delivery, that would make it difficult for a woman to work (post-surgery), but if it is a simple (vaginal) and good delivery, they usually work after 7-8 days...It depends on family type. If it is a ‘good family’, they allow a new mother to rest for 3-4 months both at home and at the parents’ home. Sometimes there is difficulty – it may be so hard to sustain daily life in such a family that the mother will have to work by tomorrow (the next day).”

FG13, Men/Father-in-law, Tamang, FG, I.

However, another male respondent reported that women do have to do strenuous work, and working hard both during pregnancy and after was the norm in their village:

“Actually, we have seen that pregnant women, we say not to lift heavy goods/things, not to do difficult work. But it doesn’t happen in this village, because they have to work here. Here in village, people are not so considerate, so some families don’t care if a woman is pregnant - she still must work.” **FG13, Men/Father-in-law, Tamang, I.**

During one FG, some women stated that they had to work in the field and in the house during their pregnancies:

“In the village, we have to work during and after pregnancy (we) continued cutting grass, fetching water, cutting wood in the jungle...” **FG2, Mother, Tamang, I.**

6.4.1.5 Shyness

An interviewed health worker added that women’s attitudes had changed with respect to their maternal health. Women used to go to traditional healers or give birth at home or in a cowshed or in the “dark” because they were shy. Now, however, women go to the hospital for a delivery or ask a SBA to assist them at home during birth. Additionally, more women came to the health post for a regular check-up or for ANC:

“There are lots of changes in healthcare. People used to feel shy about visiting the health post; they used to go to “Dhami Jhankri” (Traditional Healers) for disease treatments. Women used to give birth in dark places in their houses

thinking people in their community will see them while giving birth to children. Not only this, but they used to give birth to children in cowsheds. This is not the case now. Women feel free to visit the health facility (ANC) whenever they feel they should go. Women go to the hospital to deliver. If they give birth to a child at home, they just (have) SBA over to aid in the delivery.” ID3, MCH worker, Brahmin, I.

A health worker interviewed mentioned that women and men seemed to be more aware of their general health. They were reported to be less shy and more willing to come to the maternal health clinics:

“There are lots of changes in this area. In the past, people from this area were not aware of minor things, and communication was hard. They used to feel shy. But now things have changed. There are changes in the health sector too. Women come to health facilities for their regular check-ups, and they are more aware of their health than before.” ID3, MCH worker, Brahmin, I.

Male participants, and their partners were perhaps too shy to discuss their health with their husbands also mentioned feelings of shyness. Attending GTN groups therefore helped women to be more open and communicative with their husbands:

“There are many GTN groups, some older some are newer. They meet each month (laughs). It is good to share feelings, ideas, and problems. Some are shy about talking with their husbands, and it helps to open (to) them (GTN)...they share the meeting’s discussion with us (smiling).” FG13, Men/Father-in-law, Newar, I.

The maternal child health worker (MCH) reported that there were lots of changes in this area. In the past, people from this area were not aware of small “things” they could do for their health, and communicating which services were available was difficult:

“They used to feel shy. Things have changed; women come to the MCH health facilities.” ID3, MCH worker, Brahmin, I.

6.4.1.6 Men's involvement in maternal health

Most of the men interviewed were somewhat vague when discussing the existence of groups, and they referred to the women who may know more about the programme. They mentioned an existence of women's groups:

"There may be but I forget... yes, there may be women's groups in the village, but I don't know so much about what they are doing." **FG13, Men/Father-in-law, I.**

Whereas a few male participants seemed to be aware of the existence of GTN but not what they did:

"My wife went to GTN a few days ago, but I don't know what she did there." (Laughs) **FG13, Men/Father-in-law, Tamang, I.**

Men commented that they were aware that their wives went to GTN meetings and were somewhat aware of their activities:

"GTN or something, this group is in different places (villages, areas). It works for mothers and babies. The group provides a blanket for the baby after it has been delivered. They come and do health check-ups for women - that's it." **FG13, Men/Father-in-law, Tamang, I.**

Some men also cited the need for programmes like GTN, as they considered the advice obtained as useful:

"We can't do anything by ourselves - there should be projects like GTN, which go from home to home and village to village, to provide more health information to the mothers and care for their children. This would be very good." **FG13, Men/Father-in-law, Tamang, I.**

Males in the control area did not seem aware of any maternity incentive scheme or of any group activities for maternal health:

“There are no programmes here yet ... Related to health, there is no NGO here.” **FG14, Father-in-law/Husband, Dalit/Chhetri, C.**

6.4.1.6.1 Effects of the groups

The participants reported that during the GTN groups, they discussed handwashing, hygiene, and sanitation:

“Babies need to be kept neat and clean.” **FG9, Mother-in-law, Newar, I.**

Also discussed are problems related to ANC, delivery and PNC, infection, exclusive breastfeeding, skin-to-skin methods, using family planning methods (contraception), keeping the baby clean, taking care of the pregnant mother, delivery and after delivery, uterus prolapse, HIV, family planning, danger signs, and when to go in hospital:

“We discuss health related-topics, like pregnancy, exclusive breastfeeding, and danger signs.” **FG1, Mother, Tamang, I.**

They also learned about avoiding preferring one gender to another:

“We talk about not discriminating between having a daughter versus a son.” **FG1, Mother, Tamang, I.**

Some of the participants in the groups discussed certain topics, such as safe sex practices, ANC, and good nutrition only shyly:

“(With small voice) ... (we) talked about safe sex. We need to check for pregnancy at 4, 6, 8 and 9 months - at least four check-ups during pregnancy. Mothers need to eat 180 iron tabs from conception up to 45 days after delivery. Babies should be given mother’s milk only for 6 months and then we should feed them lito (porridge).” **FG1, Mother, Tamang, I.**

The danger signs during pregnancy were also discussed:

“...It is dangerous if our hands and feet swell, if we experience bleeding, vertigo, white discharge, lower abdominal pain...in that case don’t stay at home; go and get a check- up.” **FG1, Mother, Tamang, I.**

Overall a good knowledge of pregnancy, diet, and sanitation were seen. One change observed was that women who had had an institutional delivery were subsequently allowed to rest:

“In the past, pregnant mothers were not taken to the hospital for 2-3 days even though she was in pain. Pregnant mothers should be taken to the hospital for delivery. They need rest and they should be given time for rest after delivery.” **FG1, Mother, Tamang, I.**

A group of GTN attendees mentioned that another change was that women went for antenatal check-ups as a result of participating in the group activities:

“From the time of conception to nine months, women now go for check-ups, but earlier it was not so popular. During pregnancy, women did not go for even a single check-up earlier. In the nine months span, we now go for a minimum of 7 check-ups...Even with the slightest sign we go for check-up... I think even the minimum 4 (ANC) check-up is a big change...” **FG3, Mother, Balami/Chhetri, I.**

A Tamang participant mentioned that they learnt that mothers needed rest during the postnatal period:

“The postnatal mothers have to work very soon, like after a week (postpartum) in the past. Now we all know that mothers need to rest during and after delivery, so usually within a month, mothers have to begin working again.” **FG1, Mother, Tamang, I.**

6.4.1.6.2 Health workers working with GTN

As a result of working with GTN, collaborations formed among the community health workers. As a result, ANC and PNC services became available to women, the FCHV led the mothers’ groups, and contraception became available from these joint clinics. Additionally, the GTN staff provided antenatal and postnatal services:

“FCHVs lead the mother’s group...Services like Depo-Provera (injectable contraception), immunization, family planning, are provided from the outreach clinic (ORC)- GTN staff (alongside) provides antenatal and postnatal services. The numbers of clients have increased in ORC clinic”. **ID4, GTN staff, Bahun, I.**

A few health workers mentioned what they felt could be learnt from GTN. For instance, the MCH worker mentioned how awareness of general health issues and particularly maternal health could be increased. She also went on to mention how they had a good working relationship with GTN:

“I feel free to talk with them. There was no management of the place (clinic) before. Many women were also unaware of issues related to maternal health, but due to GTN programme, they now know much more on the related issues. Almost all the women attend GTN.” **ID3, MCH worker, Brahmin, I.**

6.4.1.7 Empowerment

Changes over the five years included increased notions of empowerment, as women had more autonomy not only with respect to their health but also with respect to driving. Particularly the women who were group members voiced this sentiment:

“Increased number of women driving their scooters in the road.” **ID4, GTN staff, Bahun, I.**

Respondents cited increased feelings of empowerment due to their participation in GTN, including how they were motivated to take up health services, to have no gender preferences for children and the realisation of the importance of immunisation:

“Old village people gossip about pregnancy check-ups, rest during pregnancy, health check-ups, and child vaccinations that (they said) were not needed in their time. We just avoid these types of gossips. We have been here for the GTN group from the beginning and have been teaching in the village that we have to go for check-ups during pregnancy, avoid discriminating in terms of babies’ genders, and bring children immunisation.” **FG1, Mother, Tamang, I**

Similarly, the GTN staff reported that they felt that the GTN group women were more confident in attending groups, that the women themselves took charge of organising the groups, and that they were more involved in discussions:

“Women can keep their voices in front of others...They can share their problems now. They now discuss in groups. In the past, no one came in groups. These days, they are even calling us in groups to share new things...they come themselves to discuss.” **ID4, GTN staff, Bahun, I.**

These women seemed more confident as they were able to attend the GTN group meetings once a month with no restrictions on their attendance by their families:

“We all attend the meeting once a month (loudly). We do not face any (form of) objection from home.” **FG1, Mother, Tamang, I.**

During a FG of mothers-in-law, participants noted that they felt women were more in charge or made more decisions with regards to their own health, particularly as they had savings groups:

“Women are empowered. We have saving/credit, and we feel women are empowered.” **FG4, Mother-in-law, Bahun/Chhetri, I.**

6.4.1.8 Changes in decision-making patterns

When participants were asked who made the decision to seek care (for instance, ANC) the responses varied. It seemed that women did make the decision solely for themselves, especially if they were group members, and that sometimes their husbands played a role:

“Women themselves make their own decision for ANC, and sometimes their husbands also played a role in the decision-making...Basically, family members make decisions.” **ID3, MCH worker, Brahmin, I.**

While in other instances, the mother-in-law played a role during the pregnancy and birth:

“Women themselves...We have to tell (her)...but the grandparents make decisions regarding care after delivery.” **FG5, Mother-in-law, I.**

One of the men interviewed stated that making the decision together arose when problems occurred during labour. Reflecting a general change of no longer delivering at home, the woman went to the hospital, sometimes accompanied by a female relative:

“If there is delivery in the hospital, then health workers take over care at that time, and usually mothers make the decision regarding their care, and after they come home, all (members) cares (for her) in the family.” **FG14, Men/Father-in-law, Chhetri/Dalit, C.**

Whereas a few male participants mentioned that it is more of a consultation among all the family, rather than making a decision to deliver at home:

“For this decision, we all consult as a family”. **FG13, Men/Father-in-law, Tamang, I.**

For example, if a woman feels unwell, the family will come together, discuss the matter, and then make a decision to take her to hospital:

“Husband and wife make the decision...where to get treatment.” **FG14, Father-in-law/Husband, Chhetri/Dalit, C.**

At the time of delivery, a male respondent in the control area also mentioned that the head of the house made the decision with the family:

“Mainly household health, but all makes decision together in the family.” **FG14, Father-in-law/Husband, Chhetri/Dalit, C.**

While a few mothers (Tamang, Balami and Chhetri) said that that they themselves decide, here is an example of a quote:

“Myself, ourselves, we discuss with the family and go”. **FG3, Mother, I.**

Mothers-in-law in the control area mentioned that the decision was left to the couple:

“Sons and daughters-in-law knew about it, and they can decide themselves now.” **FG9, Mother-in-law, C.**

Others reported that they consulted with their husbands and the husband’s family - one example is provided below:

“We decide ourselves to go in for check-ups and deliveries. Most of us are staying with our husbands. We share our thoughts with husbands and they also agree. Some of us are staying with our mother-in-law and father-in-law. They share (the decision-making responsibility) in the family.” **FG2, Mother, Tamang, I.**

When asked who made the decision during delivery care, mothers reported that the entire family makes the decision:

“Mother-in-law, father-in-law, entire family, husband”. **FG3, Mother Balami/Chhetri, I.**

Three respondents mentioned that the reason a joint decision is taken with the family is that they live as a nuclear (joint) family. They share that decision with the family with agreement from their husband:

“We ourselves decide for us. Then we share with our husbands. We are living as a nuclear family. So it is easy for decision-making. The husband agrees on it.” **FG11, Mother, Tamang, C.**

6.4.1.8.1 Decision-making in PNC

When asked who made the decision to attend PNC, participants in a GTN group stated they make the decision themselves to attend:

“(If) we have (health) problem in PNC, we decide on our own”. **FG3, Mother, Balami/Chhetri, I.**

They reported that if women feel well in the postnatal period, they do not attend PNC, but are instead primarily concerned with labour and birth. This might indicate a gap in awareness.

“Most of them do not go for PNC check-up. If they have any problem, then only then do they go in for a check-up, otherwise, they do not come out from home. They say that ‘there is nothing wrong with me, why should I go to the clinic?’... They go for PNC every? 45 days for family planning. They do not go out if everything is normal. They need to walk, have to take bus, which they don’t want to do during this period.” **ID4, GTN staff, Bahun.**

It seems that decision-making during PNC is a mix of the women themselves and family and husband:

“We ourselves decide to go for pregnancy check-up. We are living in homes separately from our mothers-in-law. We share our beds with our husbands.” **FG1, Mother, Tamang, I.**

Men who were asked the question regarding PNC attendance felt that women were physically weak and needed help to make a decision:

“At that time in the postnatal period, she can’t do anything, we have to care (look after her). First of all, the family members, like mother-in-law, father-in-law, and husband, who also make decisions for them (on their behalf).” **FG14, Men/Father-in-law FG, C.**

Whereas others stated that they did decide themselves:

“No way, if we do not decide ourselves, who will do for us?” **FG1, Mother, Tamang, I.**

6.4.1.9 Barriers and limitations to attending groups and health services

6.4.1.9.1 Socio-economic barriers and limitations

The respondents reported that there were few women with children under 2 years old in the area who did not come to the group meetings. Those who reported not attending were either new mothers or those with too much housework.

When asked why some people might not attend, men cited household work – women do most of the house and fieldwork, which makes it difficult to manage their time, as they are busy:

“Main reason is household work (his baby cries) household works makes it difficult to manage time.” **FG13, Men/Father-in-law I.**

On non-attenders, the attenders mentioned that they were told that there are few who did not attend groups, stating they do not have time:

“They scold us ‘timiharu just kaam napakeyo ho ra hami kaam ma janu parch’, which means, ‘we are not like to you who do not have work, we have to go for work’.” **FG2, Mother, Tamang, I.**

The GTN staff also reported that they organised home visits for those women who could not attend groups:

“There are some who cannot come to the group. For them we talk to them during home visits ...there is one lady - I told her family where to go for delivery and what to do when I met her family (at home).” **ID4, GTN staff, Bahun.**

The other GTN staff said:

“One who is extremely busy does not come to group discussion, like one who has to go in office, who has to send children to school, who has to cook lunch, who has to raise goats, animals in home etc...For them, we visit them their homes.” **ID4, GTN staff, Bahun.**

Participants were asked about the barriers preventing them from attending PNC, which included lack of awareness on the need for PNC:

“Women rarely come for a PNC visit. Maybe there is lack of counselling for PNC. I think we should go on home visits and inform them about PNC. We should counsel them very nicely. Even if we tell them to come for PNC and they don’t, they’ll visit health facilities during vaccination times. Until and unless postnatal mothers get sick or suffer, they won’t go for check-ups.” **ID3, MCH worker, Brahmin, I.**

In several of the interviews, the respondents cited time, having to work in the field or house, permission from family, and housework as barriers to attendance:

“There are many who don’t. Let’s look at the community as a whole and think...due to work at home, baby, time constraints...We are asked during our duty time after we leave work, where do we (really) need to go?” **FG3, Mother, Balami/Chhetri, I.**

For some women, non-attendance was the result of not having the money to attend health services:

“Money is the biggest problem...we if we go to the hospital, we won’t have money to even pay the fee.” **FG3, Mother, Balami/Chhetri, I.**

Other women reported that non-attendance was due to being physically weak or mistreated by the family:

“Mothers are weak. They can’t even get nutritious food. They are usually engaged in work, so they don’t have time to care their children and their health. There are some cases where mothers-in-laws don’t give food to their daughter-in-laws and order them to engage in work. Financial problems are also a major problem; as a result, women don’t go to health facilities for treatment. So, there are things that should be changed.” **MCH health worker, Brahmin, I.**

One of the GTN health workers mentioned that women did not attend health services due to fear or shyness about being scolded for having married and gotten pregnant at such a young age (teenager):

“Many married young and do not go for antenatal check-up when they are pregnant because of shyness and because they are afraid that they will be scolded by the health providers for being pregnant at such an early age... Teenage mothers do not attend ANC clinic because they thought that they would be scolded.” **ID4, GTN staff Bahun, I.**

6.4.1.9.2 Cultural barriers

Seemingly, there are seemingly several cultural practices that include isolation, which may have resulted in women not attending PNC. This may mean that such cultural practices also act as a barrier to uptake of the intervention. Another barrier seemed to be the lack of awareness of health promotion activities and services that exist.

Other dates of significance in Nepal include the date when the new mother can leave her in-laws' home (30 days after birth) to go to her parents' home for a period that lasts from a few days to up to a month dedicated to rest:

“The postnatal mother goes to her mother’s house within a month of delivery and stays there around one month.” **ID1, Hospital staff, AHW, Bahun, I.**

Another respondent reported that women travelled to their parents' homes and stayed for a full month; this may mean they did not attend PNC.

“The postnatal mother is taken to her mother’s home within a month following delivery and kept there for a month. It depends on the condition of the house. If nobody’s in the home, they are taken to their mother’s home early, like within 10-15 days, and they stay more days in their mother’s home.” **FG9, Mother, Newar, C.**

Respondents were asked about their cultural practices that exist around pregnancy to see whether, if asked in a different way, certain potentially harmful traditions were practiced despite evidence-based health promotion training.

Interestingly, the practice of isolating women (in a shed, typically a cowshed – “Chhaupadi”) was mentioned in a men’s focus group during the men’s FG:

“In this matter, there is not so large an influence or effect in this village, but in some places, there is still system of isolating women during menstruation/pregnancy (Chhaupadi). Sometimes women have to stay in the stable, also. In my thinking, in these parts (cough), these are not bad practices. Everyone is doing equity/equal behaviour.” **FG13 Men/Father-in-law, Tamang, I.**

Respondents were asked about cultural practices after birth and stated that they followed religious practices and were not permitted to go to the temple. They said similarly when women menstruated they were isolated and were not in physical proximity to anyone:

“Those cultural practices (are done) in (a) religious way. After 2-3 or 4 months of pregnancy, they shouldn’t go to (Hindu) temple. Other practices are during that menstruation no one ‘touches’ (her) but there is the practice of isolation (Chuwachut/Chhaupadi).” **FG13 Men/Father-in-law, Tamang, I.**

Another male respondent stated that although there was no isolation during menstruation or pregnancy, isolation does occur in the postnatal period:

“There is no system of isolating women during menstruation/pregnancy here...yet after delivery there is 3 days and sometimes 5 days (of isolation) to name the baby.” **FG13 Men/Father-in-law, Tamang, I.**

Isolation can also be a positive phenomenon where women are allowed to rest after giving birth:

“The postnatal mothers had to go for work very soon, like after a week, in the past. Now, we all know that mothers need rest after delivery (birth), so usually within a month, mothers have to go for work.” **FG1, Mother, Tamang, I.**

The mothers group who attend GTN seemed reluctant to mention cultural practices as they felt that the interviews might be shared with GTN and they did not want to be judged. Women reported nothing negative about GTN, which may be a reflection of pleasing/imbalanced views they wanted to give on GTN.

Most women reported that, unlike in the past, they were now allowed to rest after birth in their in-laws' home. In the days, before "nwaran" (naming ceremony), however, the new mother cannot leave the room or the house, and no one will touch her or take the child directly from her, as a vaginal birth is deemed "dirty". The mother-in-law will use her old sari or old clothes to pick up the child. After nwaran, the new mother is re-introduced to household activities once again. Until that time, women have other restrictions imposed on them.

Not attending due to the naming ceremony, *nwaran*:

"It is good, in relation to health, in our culture that after the delivery (up to 7 days post-delivery), the mother doesn't come out from home. When we offer the baby a name, only then can she come out and go here and there. And this is good."

FG13 Men/Father-in-law, Tamang I.

6.4.1.10 Reflexive section

Overall, when comparing the interviews of the intervention versus the control sites, participants in intervention sites seemed more knowledgeable, confident, outspoken, and expressive than those in the control area, as well as more autonomous in their decision-making ability. Specifically, they seemed more knowledgeable in general health, and maternal and child health issues. For instance, some participants in intervention sites were able to comment in detail on the danger signs of pregnancy, on the amount of iron tablets that ought to be taken during pregnancy, which months and times they should attend ANC to 'achieve' 4 visits, and so on during focus groups. Overall, the responses were more forthcoming and fluid than those from participants in the control sites.

During the initial GTN group meetings held in 2007 and 2009, the participants were shy and reluctant to engage, particularly with respect to cultural practices. The intervention started when the civil war had just ended, and the notion of outsiders involving themselves in "private home" affairs were initially strongly disliked. Over the years and with time, women seemingly became more confident. By June 2012, they seemed more open to communicate. The training sessions the HPs used were based on the curriculum and their own experiences (marriage and childbirth) to encourage the group to participate. They shared that they too were also mothers

and thus encouraged exclusive breastfeeding and a balanced diet for weaning children so that they would do well at school. Finally, the health promoters and the health post and hospital health workers felt that the interviews were an evaluation of their job performance. In the analysis of the key informants, they also referred to enablers and barriers, yet they are from a different perspective.

Respondents were asked about cultural practices existing around pregnancy in order to find out, if asked in a different way, if certain traditions, perhaps harmful, were practiced. This highlighted a need to address ineffective practices in the future with evidence-based health promotion training.

On reflection, the use of a Tamang-speaking researcher may have facilitated the group discussions in villages where the Tamang dominate, particularly in three FG. The language barrier required a two-stage interpretation to extract opinions from participants in the groups. There appeared to be interplay between a moderator of a different caste and the participants both when comparing the caste responses and in the manner in which the interviewees expressed themselves. It seemed that the female Tamang respondents were more empowered or self-assured. The Newari moderator/translator used for the focus groups stated in a surprised tone: *“they [the Tamang women] decide for themselves and hold more power in the household than one would expect and when compared to other (upper) castes”*.

Chapter 7 Discussion

7.1 Introduction

The quantitative (Chapter 5) and qualitative (Chapter 6) results from the study show changes: i.e. a) improvements in socio-demographic factors (some of which were confounders), and b) attendance outcomes that occurred over time in both intervention and control areas. This evaluation took a pragmatic approach, with elements of realism, and so was only concerned with the changes that were likely to be attributable to the GTN intervention. Therefore, in this chapter, only the evaluation's main findings, their measurement, and the study's strengths and limitations are discussed. This chapter consists of these three interrelated parts, starting with a discussion on the contribution to new knowledge in the field and the substantive findings of the PhD research followed by ways of evaluating interventions in LMICs settings. The final section highlights the limitations and strengths of the research conducted for this thesis and reflections on the evaluation research process.

7.2 Difference-in-Difference

This is the first mixed-methods evaluation in maternal health promotion in Nepal, possibly in any LMICs that used a setting-appropriate methodology difference-in-difference (DiD) with three time points. Here, the value of the DiD analysis was one of effectiveness and attribution; it isolated the effect of the programme from other external and internal factors, and potential confounders (Sharma et al. 2016a). In other words, DiD permitted a closer approximation of the causal effect of the programme, the "treatment" on the outcomes of interest (Alderman et al. 2009a; Liu et al. 2010; Ensor et al. 2014). The DiD analysis provided a more useful method in the impact evaluation of this quasi-experimental study design than a standard before-after analysis. A before-after analysis would be concerned with looking at percentage change and thus would have shown greater uptake than should be attributed to the intervention. For example, taking the outcome of attending ANC (at least once) from the baseline to the final evaluation, a 13.38% increase was seen in the intervention area (Section 5.6, Table 10). Whilst the DiD analysis for the same indicator showed that the change was

only 12.74% (Section 5.10, Table 16). This method prevents the over-estimation of the intervention.

Another key highlight of using DiD is the precision it offered. An increased uptake was seen across the study for the outcomes SBA at birth and institutional delivery (ID) (Section 5.7, Table 12). It is likely, as mentioned in the qualitative findings, that this percentage increase may be due to the maternity incentive rather than the intervention (Section 6.4.1.3). The maternity-voucher-incentive scheme aimed to address cost barriers to the uptake of maternal health services in Nepal (Section 1.4.1). The DiD analysis, however, showed no statistically significant difference between the intervention and control groups (*treatafter*) as the possible confounders, including the maternity voucher incentive scheme (Section 1.7), were deemed to have been controlled for by virtue of the fact that it was available in both areas since both the control and intervention area received the intervention. In addition, as seen in Sections 2.3 and 6.4.1.6.1, the intervention offered ANC and selected aspects of PNC - it only provided knowledge on the importance of having a SBA at birth or an ID and no additional resources (Sharma et al. 2017). Therefore, it is not surprising that no impact was seen for the intervention group in terms of seeking a SBA or having an ID. This finding is similar to a previous study on women's groups, which was designed to improve birth preparedness (McPherson et al. 2006). The study resulted in an increase in the knowledge of obstetric "danger" signs and little change in the proportion of deliveries involving SBA. The authors hypothesised that this was due to the fact that barriers, such as the cost of getting to a facility, persisted (McPherson et al. 2006; WHO 2014c).

DiD was also valuable in understanding sometimes contrary findings within the study. Two such examples are given below. First, there is evidence that ANC utilisation is strongly correlated with the utilisation of a SBA (WHO and UNICEF 2003; WHO 2009a). This could explain the finding that the less sophisticated before-after analysis (Pearson's Chi-square test) demonstrated a correlation between attending ANC once and having a SBA at birth, in both areas, among the whole population (Section 5.6). These findings are similar to those in a study on the continuum of skilled care (Christian et al. 2003). Based on the assumptions and given the data, the best causal estimation is that implementing an ANC service has the potential

to serve as a strategy for increasing the utilisation of SBA (Section 5.9). Women receive advice to seek skilled birth care (Section 2.5.4). Yet, this association would need to be explored whilst controlling for potential confounders when looking at the association between SBA and ANC; and if facility costs are addressed as they represent a significant barrier to attending services (Witter et al. 2011).

Secondly, as mentioned in Sections 1.1, 3.2.3.2, and 7.2.1, it is important to account for counterfactuals/temporal trend comparisons, i.e. changes that happen over time; for instance, in order to provide a comparative trend by linking to national data (Section 1.1). At a national level, births occurring in the presence of a SBA rose by 17.3% from 2006 to 2011 (MOHP et al. 2007; MOHP et al. 2012). Whilst in the similar period to the GTN intervention, it rose by 21.40%, and in the control group by 19.98% (2007-2012). One possible explanation for the rise in SBA at birth is the above-mentioned maternity voucher incentive scheme (AAMA) that was rolled out in 2009 (Section 1.4.1). Or the increase in women's education, a factor linked to increased maternal services use (Section 1.3 and 1.4.4). It is noted that the control area demonstrated a comparable increase to the intervention area for this indicator. More research is needed to ascertain if there was any correlation between the GTN intervention and the AAMA programme.

The DiD analysis also provided details on covariates and barriers to attendance. This study (Section 5.7) saw that a low educational level and low household income were risk factors for non-attendance (Baral et al. 2010). Multiparous women were more likely to attend; unlike other studies multiparity was not a barrier in attending maternal health services. Furthermore, well-documented socio-demographic data indicate that women from relatively poor backgrounds who live in rural areas and/or have low levels of education are less likely to access antenatal services (Abouzahr 2003; Houweling et al. 2007; Simkhada et al. 2008). Other factors, including having a husband with a low level of education, living a long distance from a clinic, and having high parity, have also been identified as barriers to accessing care (Kabir et al. 2005; Trinh et al. 2007; Brown et al. 2008; Bassani et al. 2009). Similar factors emerge in the reviews of barriers to ANC in high-income countries (Rowe and Garcia 2003; Lewis 2011; Downe et al. 2009; Thomson et al. 2013) which suggest that the issues for women

who remain marginalised at local, national, and global levels are much the same (Finlayson and Downe 2013; Sharma et al. 2016a; Sharma et al. 2016b).

On the whole, the barriers to seeking a SBA, including socio-economic, financial and geographical, are more difficult to overcome than the barriers to ANC and PNC (Borghi et al. 2006; Furuta and Salway 2006; Choulagai et al. 2013). In Nepal, the shortage of SBAs and perhaps the quality of care provided in institutions is a considerable barrier to this continuum of care (Section 1.4.3) as Nepal does not have midwives (Bogren et al. 2013; John 2015). Furthermore, these factors may explain why the intervention did not have an impact on delivery care. Moreover, the qualitative study suggested that the weight or influence of the family's decision is greater in attending delivery care than it is regarding ANC (Section 6.4.1.8). The explanation behind this may be that the family controls finances and is likely to make decisions regarding place of birth based on cultural preferences of childbirth and that birth is more expensive than ANC (Kwambai et al. 2013).

The qualitative findings also suggested that in certain castes, such as the Tamangs, there seemed to be a preference to give birth at home (Section 6.4.1.2). This highlights an area that needs to be addressed, that of preferences - women in Nepal prefer to have reproductive health services and give birth within their communities. Pitchforth et al. (2008) discussed the concept of "choice" and place of birth in (rural) Scotland. Women engaged differently in the choice process, and health professionals, pregnancy complications, geographical accessibility, and the implications of alternative place of birth all played a role in terms of demands in their social networks (family/community) (Pitchforth et al. 2009). Yet, the provision of different models of maternity services may not be sufficient to convince women that they have "choice" and therefore they may prefer to birth at home, such as in rural Nepal. It would be of interest to know the proportion of Nepalese women who would birth with a SBA if they had transport to the hospital. It may be that they choose to birth at another facility/hospital, thus disputably exercise freedom of choice.

It is important to choose an appropriate research approach for health promotion evaluations. DiD is suitable for the GTN intervention, as the

evaluation was not a clinical trial, it was a complex community intervention (Sections 2.1 and 2.2). Moreover, many researchers have conducted either process only or outcome evaluations of community-based interventions in LMICs (Section 1.2), but these lack a control or comparison group, typically used in social experiments to gauge impact (Rauniar et al. 2012; Sharma et al. 2016a). Others have done significant work with RCTs (Manandhar et al. 2004; Shrestha et al. 2011), but these study designs are often inappropriate for the local setting as they are difficult to organise. For example, the randomisation of clusters/villages due to socio-economic mobility, and the local politics on the ground is challenging and may involve having to re-negotiate access to the community at various stages of the trial, which can prove expensive and time-consuming (Rosen et al. 2006; Scriven 2008; Dixon et al. 2013). In addition, for ethical reasons, some interventions cannot be measured using a RCT. For example, a study on home birth is likely to be considered unethical, if the place of birth is randomly allocated in a setting where women are used to having choice. Moreover, there are sample size issues and potential difficulties include getting villages to buy-in to be the “control” (tested but “no reward”). Hence, there may be little incentive to stay in the control community. In the field of maternity care this might mean paying for unintended consequences of an RCT (highest in the hierarchy of evidence). An unintended consequence is defined as the unforeseen or unanticipated consequences of purposive action (Merton 1936). Unintended consequences are not necessarily undesirable. They may be highly beneficial or neutral (Sections 1.2, 3.2 and 3.2.3.2). However, an unintended consequence of an RCT is such that the cost exceeds the intervention (Thompson & Schoenfeld 2007; Bothwell et al. 2016). The DiD helps keep the costs of the evaluation down whilst achieving relatively high precision as a randomised study (WHO 1998; Duflo 2004). This would help to reduce the 10/90 gap burden, where only 10 per cent of health research is devoted to conditions that account for 90 per cent of the global disease burden (Stevens 2004).

In summary, the DiD permitted a more precise evaluation of the programme by adjusting for covariates in order to determine the intervention’s effectiveness. A further strength of the method was the examination of the wider confounding factors and highlighting unintended consequences within the mixed-method study design.

7.2.1 Mixed-measurement evaluation

As mentioned, one of the key strengths of the evaluation was the use of the DiD analysis in a community-based LMICs intervention and the alongside qualitative study. As was seen in Section 3.2.2, an evaluation should be context specific. The results are mixed with the qualitative findings to yield richer data on changes over time in maternal health and in decision-making. Few programmes evaluate a five-year project in such detail, and the strength of the research in this thesis is the mix of statistical analysis, qualitative and expenditure data that enabled an evaluation of the cost, time, effect and impact on health uptake/attitude behaviour of the study population, and programme's staff time (Section 3.2.3).

It is estimated that approximately 50% of women in LMICs receive inadequate antenatal care (Finlayson and Downe 2013b). The DiD analysis showed that there was some improvement in the intervention group regarding maternal healthcare uptake, specifically an improvement in antenatal care utilisation for the rural women attending once over the five years and for those who received the WHO recommended four ANC visits only in the first two and half years. The qualitative research also suggested a possible explanation for this increase; women over time: a) were more aware of the importance of attending ANC, b) perceived that there were fewer barriers to attending ANC, and c) seemed to have more autonomy in making a decision to attend ANC (Section 6.4.1.8).

Iron/folic acid uptake significantly increased over both time periods for women living in the intervention area. A possible explanation for this increase could be that women in the intervention group were made more aware of the iron and folic acid supplementation that is provided at government health facilities throughout the country at no cost (MOHP, New ERA & ICF International 2012; Sharma et al. 2016a). However, in this study improvements were not seen for women in their first trimester of pregnancy (i.e. ANC attendance in early pregnancy). The qualitative study did not highlight any particular reasons for this; however women mentioned general notions of shyness/awkwardness (Section 6.4.1.5). The literature reports that women might not know that they are pregnant in the first few weeks and

that there are cultural reasons in Nepal behind why pregnancy is kept a “secret” in the first trimester (Simkhada et al. 2008, 2009; Finlayson and Downe 2013). Perhaps a “first-time” mother might feel unable to attend an ANC in the first trimester if she needs to (a) ask permission or monies from her family (typically her mother-in-law) to attend; (b) find time to travel to the clinic, in Nepal daughters-in-law are responsible for the household and farm tasks and therefore delay the first ANC visit; and (c) where early “disclosure” of pregnancy could lead to unwanted religious or spiritual complications (Simkhada et al. 2010; Puri et al. 2011a; Finlayson and Downe 2013a). The literature (Pell et al. 2013; Sharma et al. 2016a) suggests that pregnant women and mothers are often influenced by the experiences of their immediate social circle (family and friends), and in Nepal, the mother-in-law and husband tend to be the most influential (Simkhada et al. 2006; Lewis et al. 2015; Sharma et al. 2016a).

In addition, the qualitative study revealed that some women missed ANC sessions or health promotion groups due to the demands of daily family life and work (Section 6.4.1.9). Although not all women attended all sessions, this intervention improved ANC attendance. Yet, not all four ANC indicators improved over the five years. If women do not attend complete antenatal care, they are less likely to be prepared for birth and less likely to choose a SBA at the forthcoming birth (Morrison, Thapa et al. 2014). This poses an alarming problem; population groups in LMICs receiving few antenatal visits have been shown to have an increased risk of perinatal mortality and stillbirth (Dowswell et al. 2010). There was evidence that health promotion can make a difference in empowering these women to seek care (Section 7.2.5). The two sets of data suggested that as a result of the intervention, women were more empowered to make their own decisions to attend care, particularly in the antenatal period (Section 6.4.1.8). Empowerment will be explored further in Section 7.2.5. The importance of decision-making by women is highlighted in the literature. Women should be provided with information based on the available evidence and supported to make informed decisions about their care (Sharma et al. 2016a; Sharma et al. 2016b, Sharma et al. 2017). This issue of not being provided with information also seemed to apply to this low-income setting in Nepal and for women in high-income countries (Pitchforth et al. 2009; Watkins and Weeks 2009).

7.2.1.1 DiD & confounding factors

The DiD analysis also permitted the “unpacking” of the effect of each confounding factor independently. This was important as they have varying degrees of effect on the intervention outcomes, but they are frequently reported together in the literature. In the DiD analysis multiparous, more educated and wealthier women were more likely to attend maternal health services. The literature confirms this finding as older age, higher parity, and higher levels of education, and household economic status of the women were predictors of both attendance at four or more visits and receipt of ‘good quality’ ANC including iron supplementation (Joshi et al. 2014). This is also similar to the findings reported in this thesis, which showed that older women were more likely to attend ANC once or take iron and folic acid. However, the literature is not clear on the direction of the effect. Simkhada et al. (2008) found that in LMICs, women in their 30s attended ANC early and more frequently than teenagers and older women. The expectation might have been younger women in Nepal, with more education, and older women with more “maternal experience” attend services (Khanal et al. 2014; MOHP, New Era & ICF International 2012).

Years of research have suggested that many socio-cultural factors influence maternal healthcare uptake behaviour (Sections 1.4, 1.4.3 and 2.6.1), as was detailed in the maternal health conceptual framework (Section 4.3.2), and therefore these factors were justifiably included in the regression analysis. The results of the evaluation in this thesis confirmed that the combination of factors were as important but the general trend was that wealth, education, and parity have an independent impact on the likelihood of uptake of maternal health services. The fact that they work independently is important, and it suggests that there is a chance of impacting inequalities, for instance through education without increasing wealth (Section 5.7; Sharma et al. 2016b). This was noted in particular with delivery care outcomes of SBA at birth and ID (Section 7.2.1). For instance, the uptake of ID statistically increased, as did SBA over the five-year time, however, as a result of other factors rather than as a direct result of the intervention, wealthier and more educated women were likely to have an SBA at birth or an ID (Section 5.7; Tables 11 and 12). A future intervention may consider

this complexity and investigate whether increasing education and increasing wealth, either together or independently, can improve delivery care outcomes (Section 5.7). In addition to socio-economic indicators, time was also a confounder on the outcomes of the intervention, and this is discussed below.

Time points

Previous studies, conducted by e.g. Ensor et al. (2014), and Liu et al. (2010) referred to in the literature review (Section 2.6.1), only use two time points in their DiD analyses. This is the first study of a community-based intervention to use DiD analysis at three time points (Section 4.3.9.1.4). The inclusion of the third time point enables longer-term effects to become apparent. For example, the intervention had no impact on PNC attendance in the first two and half years when analysed with DiD, but there was evidence of an effect when considered over the five years, at the third time point. This may be due to the lower baseline in the intervention area - it rose from 52.20% (baseline) to 76.85% (midline), and to 85.86% (final). It may also be due to delay and decay effects that occur over time, i.e. it takes time to change and sustain health services attendance behaviour (Clore, & Schnall 2005; Higgins 2014; Sharma et al. 2016a).

Furthermore, the use of three time points enables a more realistic interpretation of the impact of the intervention in the longer term; women were seven times more likely by the midline and three times more likely by the final survey to attend ANC once (Section 5.7). While seeking ANC four or more times was significant from the baseline to midline, yet not in the final survey. This may suggest that the intervention was less effective or that it was difficult to sustain that effect (to change the way the message is delivered as communities get used to hearing the same thing and it becomes part of the “background noise”) in promoting antenatal uptake after 5 years than after two and a half years. Thus, health promotion can change certain behaviours within 2.5 years to increase uptake of services in the community. First, the literature suggests that achieving the “last mile” can be difficult. For example, it is easier to achieve an increase from 50% to 55% than from 90% to 95% (Dhaliwal et al. 2011). The challenges for programmes in completing the last mile include the need for extra resources,

the distances (time and transport) that would need to be covered, and a lack of available information in a particular village. It seems health promotion was more effective by year 2.5 than by year 5, particularly for ANC outcomes. This may mean an intervention can be run over a shorter time period in the future. There may be a challenge in sustaining a behaviour-change intervention as initially achieved gains often diminish over time due to lack of resources or motivation (Ory et al. 2010). Moreover, there is a body of literature that shows that the early adoption plateaux of interventions are maintained while the later adopters and laggards are more resistant to change (Rogers 2002). The qualitative study suggests that women were more confident, or empowered, as they participated in the group (Sections 6.4.1.6.1 and 6.4.1.7). Despite this, however, it is not possible to say whether the participants were early or late adopters.

In the next section, the qualitative interpretation of the mixed-methods study is discussed. There is an added value of mixed-methods studies; not only does this study have a sophisticated analysis that provides attribution, as was discussed in this section. It is further complimented by a process evaluation (qualitative) that helped explain some of the key findings or lack thereof (Section 4.3) as will be explored in the next section.

7.2.2 Qualitative

Based on the voices in Chapter 4 from the women, their families, and the health workers, the qualitative study highlighted why the intervention worked and how. Several barriers were highlighted to their roles in preventing access to health services. The qualitative component of the thesis looked at the changes over time, the knowledge of reproductive health, antenatal, delivery, and postnatal care and if there were barriers to uptake of the intervention or health services. The findings were that there was an improved capacity of the community to identify, negotiate, and solve health related problems of maternal and child health and a better understanding of the need for a skilled attendant present at the birth or birth in a hospital (Section 6.4.1.6.1). Despite the rollout of the intervention, there still existed a range of barriers to accessing care (Section 6.4.1.9). As previously seen, there were several issues that come with attending ANC, institutional care, and PNC; these include knowledge, time, cost, distance, workload, and

familial relationships (Sharma et al. 2016b). There is potential for continuity of care during pregnancy, childbirth, and the postnatal period – this may ensure positive maternal health and reduce morbidities and mortalities (Section 1.3).

The qualitative data also offered insights into changes between the time points and the areas. As seen, there were improvements in infrastructure and health practices (Section 6.4.1.1), maternal health awareness (Section 6.4.1.3), and women in the intervention area were more expressive/forthcoming in the interviews. There were also differences in responses between GTN group members, and non-members (Section 6.4.1.10). Overall, it appeared as though participants were more aware of their health and maternal health practices in the intervention area than in the control (Section 6.4.1.7). It was highlighted during the interviews that GTN worked with health workers in the area to improve maternal health and contraception practices (Sections 6.4.1.4 and 6.4.1.6.1).

In the qualitative findings, it came across that the process of diffusion of behavioural change within the population was through group members and health workers in the area. For example, both seemed to recall additional maternal health practices for the area. The added value of qualitative work was that it explained that the changes occurred via the positive spillover effect (Section 2.2), as GTN's groups worked with the whole community and not only the women in need of maternal health (Sections 6.4.1.1, 6.4.1.6 and 6.3.1.6.1). These community-based health promotion trials are more comprehensive as they are more holistic, i.e. not only concerned with health outcomes, as health promotion is concerned with salutogenesis (Section 2.2). Previous studies have found that a programme for improving birth preparedness in Nepal through women's groups increased their knowledge of obstetric danger signs but there was almost no change seen in the proportion of births involving an SBA (McPherson et al. 2006). As in the GTN intervention, despite an increase in awareness, other barriers to healthcare such as the cost of getting to a facility persisted. In health promotion, changing awareness versus changing behaviour is a common challenge in health promotion programmes; a mass media campaign may be beneficial in yielding positive changes in health uptake behaviour (Angus et al. 2013; Wakefield et al. 2010). The paper by Liu and colleagues (2010) using DiD on

evaluating a Safe Motherhood health system strengthening intervention found that despite an improvement in ANC uptake, there was no impact on delivery care. This is contrary to Ensor and colleagues' (2013) DiD evaluation of mothers' groups to improve both understanding of maternal health and of providing access (transport) to maternal healthcare services. They found improvements in delivery care due to provision of transport; yet not in the proportion of women who received antenatal and postnatal care.

In addition, there seem to exist sociocultural barriers to care. In the qualitative evaluation, shyness/timidity was referred to when considering accessing health services, although this changed in the last five years as women mentioned feeling empowered (Sections 6.4.1.7 and 6.4.1.8). Studies have found that women felt shy to be seen by an "unfamiliar" person i.e. not a relative or a male practitioner (Milne et al. 2014; Morrison, Thapa, et al. 2014). The interviews in the evaluation in this thesis also highlighted a number of key barriers to the first phase of delay of the *Three Delays* framework (Section 1.3.2), and they are common to both sample sites despite their different geographical locations and their capacities (equipment). The findings resonate with the literature predominantly collated from women's perspectives (Acharya et al. 2010a; Bowser and Hill 2010; Milne et al. 2014; Morrison, Thapa, et al. 2014).

By the final survey, women were one and a half times more likely to attend PNC by year 5 (Section 5.7). The qualitative findings suggested that in the postpartum period, women did not attend due to social constraints imposed on them, for example, being isolated or needing to rest (Section 6.4.1.9). Other literature had found similar reasons for PNC uptake being globally low for similar reasons to not attending ANC (Warren et al. 2006; Khanal et al. 2014; Sharma et al. 2016b). Yet in those studies where women went to their mothers' home, they were likely to receive a higher level of psychosocial care (Sections 1.3.1 and 2.3).

Finally, unintended consequences can occur during the delivery of intervention as highlighted by the mixed-methods evaluation (Sections 1.2 and 3.2.3.2). For instance, the qualitative study pointed to women's husbands being more supportive during pregnancy and childbirth (Section 6.4.1.6); this may mean they can play a supportive role in birth preparations

and PNC if they become a part of or involved in a health promotion intervention as discussed by Mullany and colleagues (2007) and Sharma and colleagues (2016b), and in Section 2.6.1. For maternal health, men (generally) have yet to be seen as part of the “solution” (Sternberg & Hubley 2004).

In the qualitative study it was suggested that disrespectful maternity care affects the enthusiasm of women to attend institutional deliveries. First, women are often treated as second-class citizen or are marginalised in LMICs, and as a result are prevented from attending health services (Sections 1.4.1, 2.3, and Section 6.4.1.9). Secondly, studies have ascertained that poor quality of care at health facilities may act as a barrier to pregnant women and their families accessing skilled care; as in LMICs the care women receive can be rude, disrespectful, and/or abusive. This leads to a violation of trust and poor quality care in the long-term (Rosen et al. 2015; Millar et al. 2016). The WHO (2015), among others such as the seven domains of disrespect and abuse (D&A) outlined in Bowser and Hill's *Analysis and The White Ribbon Alliance Respectful Maternity Care Charter: The Universal Rights of Childbearing Women*, stated that health systems must be responsible for the treatment of women during childbirth (Bowser & Hill 2010; WRA 2011). Health workers being overworked and underpaid (due to intractable health system problems) can lead to poor morale, compassion fatigue, and as an unintended consequence of disrespectful treatment of clients, and fellow providers. Therefore, there is a continued need for programmes designed to improve the quality of maternal healthcare, with a strong focus on respectful care. The latter should be an essential component of quality care for healthcare providers at all levels. Staff, therefore, require support and training to ensure that childbearing women are treated with compassion and dignity promoting evidence-based practices, and client-centred and respectful maternity care services. Especially since educational interventions are an effective method of changing how providers communicate (Davis et al. 1995). Moreover, in the community, there should be an inclusive process that promotes the participation of women (Sharma et al. 2016b). Finally, strategies to track and continuously improve respectful care need to be measured and analysed - where disrespect and abuse is consistently identified and reported, and that locally appropriate preventative and therapeutic measures are implemented.

7.2.3 Groups

Community mobilisation through participatory women's groups to improve maternal and newborn health in rural settings have focused on health outcomes, such as neonatal mortality, stillbirth rate, pregnancy-related mortality ratio, and maternal mortality ratio (Houweling et al. 2007; Manandhar et al. 2004; Azad et al. 2010; Tripathy et al. 2010; More et al. 2012; Lewycka et al. 2013; Colbourn et al. 2013; Fottrell et al. 2013). Yet their effectiveness is debated on maternal mortality (WHO 2014b). However, one study found that community mobilisation and groups led to a reduction in neonatal mortality (Fottrell et al. 2013). Brody et al. (2016) did not find evidence for statistically significant effects of groups on women's psychological empowerment; however they found that women's groups (with a focus on economics) have positive effects on economic and political empowerment, women's mobility, and women's control over family planning.

Women's groups in Nepal have run the intervention over a shorter time period (<5 years): the MIRA trials the groups were run for 2.5 years (Manandhar 2004). As a result, the current recommendation is that groups should be run for no shorter than 3 years (WHO 2015). Furthermore, Prost and colleagues 2013 suggests that groups' studies ought to be placed into 'low coverage' (i.e. cut-off at <30% of pregnant women in the intervention area reached by the intervention) and 'high coverage'. Prost and colleagues' (2013) study, contrary to this evaluation, found no effect on use of antenatal care (receiving any/receiving recommended number of visits). Finally, similar to GTN, a study in Bangladesh found men rarely attend groups (Houweling et al. 2011).

7.2.4 Cost

For any intervention to improve maternal healthcare, it is important to know whether it is cost-effective, sustainable, and scalable (Ensor et al. 2009; Prost et al. 2013b). Although, a full cost-effectiveness analysis was outside the scope of this study as a far more sophisticated (health) outcome set was needed (Section 4.3.9.1.7). Key costs involved have been examined. As

seen in Section 3.4, if this type of community interventions is introduced into the health system, they need to take into account the importance of time and cost in delivering and evaluating health promotion. The costs of implementing and running intervention were described in Section 5.11. This latter analysis also included per percentage point increase, i.e. to increase ANC uptake by 1% in a population of VDC 8,569 (Table 19). The main start-up costs were for training and group activities. The main recurrent costs were for salaries and transportation to the field. Here, the evaluation cost was close to 10% of the programme cost. The cost of evaluations has been debated (Section 3.4). If kept low as here, and in a study in Kenya with an evaluation cost of 17% of the programme cost, the majority of funds may be effectively used on programme activities; and be cheaper than when compared to the cost of an RCT (Dhaliwal et al. 2011; Larson and Wambua 2011). In the future, costs such as incremental cost per health promotion group, and impact on uptake outcomes would be of benefit to interventions like these. The economic case for investing in Safe Motherhood/maternal health promotion interventions is needed as little detailed evidence exists regarding the relative cost effectiveness of antenatal care, post-abortion care, and essential obstetric care (Jowett 2000).

7.2.5 Empowerment & decision-making

The DiD and qualitative analysis (Sections 7.2.1 and 7.2.2) revealed that there were other reasons for empowerment in addition to GTN (Sections 6.4.1.3 and 6.4.1.7). All the maternal indicators improved in time, but some of them were not directly caused by the intervention. For instance, women increased their level of empowerment in terms of autonomous decision-making within the family (Section 6.4.1.8), and may have potentially had an impact on maternal attendance outcomes. In this section, the nature of the intervention and its impact on empowerment is discussed. There was evidence that empowerment increased as seen by women deciding for themselves or with their family members when seeking ANC and delivery care (Table 7 and Section 6.4.1.8). However, decision-making/empowerment was not included in the estimated models as the trend was captured both by time and education (education, age, and parity were strongly correlated to the intervention). As highlighted in Section 1.4.4, both

'education level' and 'time' are associated/linked with empowerment. In other words, it was not straightforward to identify the impact of the intervention on empowerment in a context of general improvement in both women's conditions (e.g. education) and in healthcare attendance possibly caused by other factors, such as local literacy programmes and so on. During 2007-2010, the ANC increase appeared to not be caused by GTN intervention but was largely due to other determinant as witnessed by the significance of the variable time in both midline and overall regressions (Section 5.7). Either the progressive improvement in women's level of education (Section 5.3, Table 6) or the empowerment (Section 6.4.1.7) within the household may have played a role.

Although there are overarching reasons for non-attendance during pregnancy due to the patriarchal family structure in Nepal (Section 1.4), women have reduced decision-making power with regard to their reproductive health (Sections 6.4.1.7 and 6.4.1.8). Similarly, findings were identified by Puri et al. (2011). However, the qualitative findings indicated that patterns for decision-making had changed, with women deciding themselves or with their family members both when seeking ANC and delivery care (Section 6.4.1.8).

Therefore, complex relationships are likely to exist among education, empowerment, maternal outcomes, and the health promotion intervention as seen in studies looking at empowerment and health indicators (Varkey et al. 2010). As studies have found in maternal health programmes, women's participation in decision-making is essential whether they make decisions alone or jointly with their husbands or family (Acharya et al. 2010).

To summarise, this evaluation has largely achieved its aim, which was to compare the effectiveness of health promotion in a LMICs and to measure the uptake of ANC, DC, and PNC over the five years of the intervention. The objectives of the research are addressed by using DiD to assess the impact of the intervention on maternal health attendance, conducting a costing exercise, and detailing the cost of the evaluation as compared to the intervention. The research was also concerned with perceptions of change due to increased knowledge of maternal health, and any facilitators or barriers to uptake in relation to decision-making to attend care (Section

3.6.1). If more time had been available, further qualitative research could have been conducted at the same time of the midline survey. Although, the broad qualitative study design has helped to delve into areas that may not have been had it been narrower. The cost exercise in this thesis had limitations, as there are missing data for some of months. These were extrapolated from the data available; this estimation reduces reliability. In addition, the trainers may have underestimated some of the training costs. There are several aspects that may have been overlooked, such as controlling for group members or caste. In the former's case, it is argued that this study was concerned with the public health, and moreover the health promotion argument, and that a wider population benefits from interventions like these, not only those women in the groups in the evaluation. Finally, wealth as a potential confounding factor was more precise than caste. The study limitations and strengths are presented in further detail in the next sections.

7.3 Research limitations & strengths

In this section, the study limitations and strengths are presented. They include reflections on study design, sampling frame (total population), secondary analysis, reflections on social context, reflections on analytical approaches, validity (DiD, themes/pilot), and theoretical and researcher influence. As with all public health studies, the study has weaknesses. This section ends with the strengths of the research.

7.3.1 Limitations

The limitations of the evaluation include issues with regards to the methods and the time available to conduct the research. The principal limitation was time and money involved in conducting the interviews. This was a particular issue as the interviewing took place during June 2012 in Nepal, which is the monsoon season. This therefore posed further difficulties for the researcher in terms of reaching certain villages. Moreover, it proved arduous to speak to women: as they were busy prior to and during the start of the monsoon season, as this is the typical time to plant crops. Hence conducting fieldwork

was more time-consuming due to “finding/gathering” participants as they might not attend groups/health-post clinics due to the heavy rains.

The aim of the evaluation was to capture a broader (spillover) effect of the intervention on the local population in that women surveyed were not necessarily the ones who received the intervention. The DiD method did not provide an analysis of those who were in the groups, although the qualitative analysis did.

Also, it was not a follow-up study with a control, which would have been more precise in determining effects over the five years on individual women. There is also a positive way of looking at this; there might have been positive/beneficial spillover effect occurring for those living in the intervention area, where those not part of the intervention still benefitted from the health promotion activities by word of mouth or simply communicating the information received (Section 2.2).

Another limitation is that some women interviewed might have been the same women during the baseline, midline, or final evaluation, which raises the issue of recall bias (Section 1.2).

Furthermore, the data are limited. The secondary data do not yield any financial data on healthcare uptake, nor did the survey query distance from home to health post/birth facility. Also, no questions were asked about the quality of care including: 1) the presence of male health workers at the facility; 2) other factors that might account for the changes found; and 3) lack thereof between the data collection points.

Another limitation is that it is difficult to ascertain what impact on longer-term maternal health the intervention had, as maternal mortality was not a primary outcome of the programme. As seen in Section 1.3, there exists the problem of linking long-term and relatively rare health outcomes to “real-world” community-based interventions (Gruber 1994; Bhutta et al. 2005; Reynolds et al. 2006; Waldinger 2010; Bouvier-Colle et al. 2012).

Language was also an issue, as the author did not speak Nepali. The research protocol detailed that the research translator briefed the

participants prior to the interview, and where possible, expanded on any terms and expressions particular to the Nepali, Newari, and Tamang language that could not be directly translated to English in order to be as comprehensive as possible (Sharma et al. 2015). In Section 5.3, 40.67% of the respondents were Tamang - a Tamang speaking moderator would have been beneficial. Also, during the process of the focus groups, there were three moderators and two transcribers/translators for this study from different ethnic backgrounds, each with their own range of experiences. The latter may mean that there are certain variances in the translation of the data despite the consensus aimed for.

As mentioned in Section 3.6, it is difficult to reconcile the stakeholders' diverse expectations of the purpose of an evaluation. For instance, during the interviews, the participants from the intervention area, the mothers-in-law groups and the GTN health promoters felt that this was an evaluation of the project, and thus they may have given "pleasing" (which is a type of bias) answers. This forms a threat to the study's validity. They felt a need to justify the continuation of the groups whereas the health promoters felt it was an evaluation of their job; some of their responses seemed to be a justification of their actions (van Teijlingen et al. 2013).

Issues in qualitative research also include the duration, interruptions, and audio-quality of the focus groups and interviews. Elevated background noise was often captured, as the interviews took place in the "open" field and near the road. These background noises were noticeable in the recordings and were noted during the transcription.

7.3.2 Strengths

One of the main strengths of this evaluation is the use of DiD analysis, as very few studies have used it in maternal health and LMICs. Furthermore, no other study has applied it in maternal health in Nepal. In addition, DiD is relatively low-cost (Section 7.2). However it is stressed that DiD could not capture all pre-existing differences in the control area compared to the intervention area. For example, there may have been interventions that the researcher was not aware of taking place in the control area (locality). Therefore, a qualitative study was needed to identify the "why and how"

behind what worked. This also helped determine what barriers existed, and if the intervention did address these, why and what the additional measures to improve the use of birth facilities and skilled birth attendants were. Thus using mixed methods is a strong point, as the combination of both quantitative and qualitative provides a deeper insight into the rationale/motivation underpinning the statistics/numbers (Section 4.2).

There is also strength in the outcomes selection - in this study there are counterfactual outcomes and a positive spillover effect, that is outcomes for participants who were not exposed to the programme and yet who benefit (Section 3.2.3.2). This thesis used proxy outcomes for health (Sections 1.3.1 and 4.3.9). In addition, these helped to look at improving maternal uptake, towards eventually reducing maternal morbidities and mortalities as they are linked.

Conducting a process, and impact, evaluation provides a strong way to address the complexity and flexibility of the GTN intervention (Section 2.5.4). For instance, as stated in Section 1.2 and in the limitations section (Section 7.3.1), there are challenges to measuring long-term health outcomes in health promotion interventions. Nonetheless, in an evaluation an intervention is “judged” beneficial if we see an increase in a timely and effective use of services and improved psychosocial state and outcomes. Furthermore, this evaluation shows that maternal health access is the vehicle for women in making their own decisions (empowerment) for reproductive health. Therefore, health promotion empowers women in the long-term to help them gain access to services they did not know about or could not attend due to power relations in the family.

Moreover, it requires knowledge and experience to conduct this type of evaluation, as was highlighted in the introduction (Section 1.2). The researcher knew a lot of key issues beforehand so could probe into maternal health and cultural issues, when the need arose in the qualitative study. In addition, the student has published a peer-reviewed article on Nepal (van Teijlingen et al. 2012; Joshi et al. 2013; Sharma et al. 2015; Sharma et al. 2016a; Sharma et al. 2016b and Sharma et al. 2017) and was able to ask questions on maternal health, cultural practices - being Hindu and general female issues.

This study used primary data in addition to secondary data. Using secondary analysis was firstly a plus point, as a study of this scale of work as a primary study would not have been feasible due to the time and funding constraints of a PhD. Second, the secondary analysis data - frames were cleaned by the researcher prior to the analysis to obtain a fuller understanding in addition to the primary data. The third plus point was the high response rate of the survey that provided the secondary data, i.e. the near total coverage of the population (Section 4.3.4.2). An additional strength was that in the primary qualitative study, women, mothers-in-law, and men were also interviewed separately, which allowed them to speak about any issues anonymously.

The main translator had a health background and was trained prior to the research, as the interviewer spoke Hindi and a few Nepali words. This helped ensure the quality of the data. Also, the researcher was prepared for every eventuality: noise and interruptions and checked the recording for the transcription. In addition, the same translator was used throughout, thus providing consistency. A Newari-speaking translator had an added benefit (Sections 4.3.8 and 6.4.1.10). Two Nepalese translators who transcribed four of the interviews, independently of each other, ensured the accuracy of translation. The transcripts were then verified. Using a translator enabled access to the wider staff body, all of which have a role to play in providing childbirth services and thus influencing women's perceptions. One of the strengths of this study was the concurrent use of observations and semi-structured interviews (Section 4.3.8.2).

Richer data were provided by the frequent group members (women) who were more "open", i.e. willing to answer questions after the participants felt comfortable, as they were freely (and in confidence) able to express their views in the group discussions and in particular those mothers' groups with young children (<2 years old) (Section 6.4.1.10).

Finally, this thesis benefitted from a large and broad supervisory team with expertise in statistics, economics, qualitative evaluation, maternal health, LMICs experience, and mixed-methods research.

The chapters that follow outline the conclusion from the thesis and the recommendations from the research findings.

Chapter 8 Thesis conclusion

The quantitative research in this thesis leads to the conclusion that the GTN health promotion intervention appeared to have had a beneficial effect on selected maternal health-seeking behaviours. It improved in the maternal health services attendance outcomes in the intervention area relative to the control area for three of the six measured non-health (proxy) outcomes. Time is a factor in responding to the intervention. The improvement in PNC appeared to be subject to a “delay effect” (Section 7.2.1.1). This thesis also concludes that the GTN intervention had a greater spillover effect influence on the uptake of community-based ANC and PNC than on facility-based birth. ANC alone does not improve facility-based care in a health promotion intervention.

It can be concluded from the qualitative research that the intervention area's increase in awareness and empowerment is at least partly due to the GTN intervention. A more tentative conclusion is that the role and place of women in society probably has much more of a negative effect on postnatal women (Section 7.2.2).

The research contribution to new knowledge is that DiD is a suitable method to evaluate a complex community intervention in comparison to using expensive and cumbersome trials (Section 7.2). An analysis such as DiD provided a level of precision not available in simpler analysis, such as a before-after analysis of percentage change or Chi-square.

More generally, a mixed-method evaluation enables a more rounded understanding of potential causes of care-seeking behaviour in maternal health. Furthermore, one should not just do a quantitative analysis without a qualitative part, the statistics obtained may not imply anything if the context ‘why’ is not given, as solely percentages are inference without context (Section 7.2.2).

A control (area) is useful for comparison. The reader is drawn to the fact that health promotion interventions and their evaluations are complex yet a control provides the answer to the “what if” question, or what would happen if participants had not been exposed to the intervention.

8.1 Evaluation context

Evaluation is a key part of health promotion (Chapter 3) and the methods used in this thesis enable programmes or NGOs to add to their toolkit of evaluation design to provide accountability to the various stakeholders, assess if they have effectively met their programme aims, adapt their activities for future undertakings, and contribute to evidence in research (Sections 1.2, 2.2, and 3.2). As the main aim of the PhD was to evaluate what works in order to inform future implementations or upscaling (Sections 1.5 and 3.2), the key finding is that GTN was evidence-based and other projects aiming to be effective should be evidence-based too.

The apparent conclusion from the study results is that health promotion groups are effective in improving access to health. First, the increase in ANC uptake might lead to more women seeking delivery by SBA, and to the potential for postnatal care and rounded maternal care. Second, groups played a role in ensuring the continuation of care by increasing ANC and PNC, which are effective to target maternal and neonatal morbidity as well as infant mortality (Section 1.3).

There is a continuing need for conducting evaluations, as a review of quantitative methods and models of impact evaluation estimates how measured changes in wellbeing are attributable to a particular project or policy intervention (Sections 3.2.3.2 and 4.3.9.1.4). While this expanded range of methods for evaluation offers practical solutions to many of the problems facing health promotion evaluation, they are not a rapid, complete or easy answer. Scientific outcome methods for evaluating health promotion programmes have limits (Sections 3.2.3 and 3.6). Furthermore, the intervention was complex (several activities in the community) and unintended effects occurred. It is not completely possible to separate out the effect of the individual components, yet the qualitative analysis helped to a certain extent. As shown in this study, an effective evaluation should therefore be able to assess precisely the mechanisms by which beneficiaries are responding to the intervention (Manandhar et al., 2004; Osrin et al.,

2009). Evaluation, as seen in Section 1.2, is concerned with evidence and effectiveness for accountability and replicability/scalability. However, social science experiments are hard to replicate as often they are tailored to the existing population (Sections 1.2 and 3.2.3). Maternal access might be an issue in one area whilst in another the main issue might be sexual violence. The other query is whether there has been enough evidence/trials to warrant upscaling or to stop testing each new application of a development idea (Kremer 2003; Duflo 2004; Hobbes 2014). If an intervention is scaled, a rigorous evaluation of programmes' impacts can be a shared or public good and therefore scaled up (generalisable); the future application is that it offers reliable guidance to international organisations, governments, donors, and non-governmental organisations (NGOs) in their continual search for effective programmes (Section 1.2).

Therefore, it is beneficial to conduct integrated evaluations alongside complex community-based interventions in a transparent, measurable fashion (Judd et al. 2001; Duflo 2012; Datta and Petticrew 2013). Such rigorous scientific tests and controlled trials for social policy are needed to take the guesswork out of policy-making by knowing what works, what does not work, and why (Duflo 2012). In the hierarchy of evidence for effectiveness (Sections 1.2, 3.1, and 3.2.3), RCTs are ideal even in health promotion interventions, as seen in Section 2.6.1, where other costlier trials have used them. Yet as health promotion does emphasise working with the resources available, it lends to the idea/belief that appropriate less costly and more setting appropriate methods ought to be used, such as DiD.

One of the fallacies/misconceptions is that maternal health is (only) a "woman's issue". This evaluation has shown that in order to sustainably empower women to access health services, health promotion is needed and there is also the need to involve those who either make decisions for the women or with them: men, mothers-in-laws, their families or community 'leaders' (traditional healers, see Section 6.4.1.3.1).

To continue to improve awareness of maternal health and access, an investment can be made in health promotion. However, a concomitant investment must be made to strengthen the health system in general. It lends to that health promotion should be provided within the health system

and whichever model of care it suits whether primary, secondary or tertiary levels. This can be achieved by strengthening the health promotion capacity of health workers, skilled maternal, and newborn health workers (Section 1.4.1). If they are in short supply, community-based mobilisation may be a solution to empower individuals by improving access to knowledge and services (such as ANC and PNC), as seen in Section 2.4. It is cautioned that a similar point has been made with respect to conditional cash transfers, which increase demand for schooling but may not necessarily improve learning outcomes or even enrolments if there are supply-side constraints (White 2009). A programme such as this can improve uptake but not necessarily health outcomes over the long-term if the health system has constraints in providing quality care (Sections 2.4 and 2.6.1).

In summary, measuring the effects of a community-based intervention is not straightforward because of confounding factors in the wider social, ecological, environmental, and political arena. For instance, a large percentage of women may still prefer to be cared for at home by family members or other unskilled birth attendants. As mentioned in Chapter 1, this evaluation is important to the researcher. It was discussed that she wished to understand what works best for whom and to contribute to the body of accountability in programmes and inequities in health, in particular to the marginalised populations in LMICs. Ireland et al. (2015) have discussed that research in the field, such as Nepal, changes one's personal and professional knowledge. The researcher wished to understand the process of change or empowerment in marginalised women, and in that process, she herself changed and gained confidence in her own skills. As Chapter 1 detailed, health promotion is complex and intricate relationships exist. Thus the value of using mixed methods is that they address these issues. They measure and detail the complexity in order to interpret the findings. While Chapter 2 explored health promotion and behaviour change, here it is concluded that positive maternal health cannot be achieved solely through empowerment and women's groups. The effectiveness of women's groups has been discussed. These indeed are "means to an (public health) end" and can contribute significantly as seen here, particularly in community maternal health (Sections 2.5 and 2.6.1). However, public health needs to go the extra mile and improve the health system infrastructure and transport for these women to access delivery care. For instance, the SDGs call for

continued improvements in maternal health. If these evaluation results were to be placed in context, policy and planners now would need to address and strengthen the referral between the community and the facility using health promotion. Therefore various levels need to be included, such as grassroots, civil societies, and other social movements in health promotion activities. At a policy level, the next steps should be to build the capacities of grassroots organisations to work directly with communities. As this may yield progress towards capturing social indicators of change in attitudes, of empowerment, of support, and of those attributes of societies and relationships to strengthen (as GTN did) rather than to victimise. Towards these, the SDGs will also focus on countries that need to ensure that continued progress outcomes are recorded and analysed to ensure continuing progress to gender and development and women's rights with an additional need to focus not only on the economic but also on the social situation of women.

Chapter 9 Recommendations from the thesis

9.1 Overview

This thesis offers a set of different recommendations for Green Tara Nepal (GTN), other practitioners/implementers, policymakers, educators (health promoters), funders, researchers and those interested in implementing and evaluating community-based maternal health promotion interventions using groups.

9.2 Recommendations for GTN

As discussed in Chapter 1, GTN worked in is a particular social and geographical setting hence recommendations need to be seen in this light.

For (future) interventions' implementation:

- a) The two health promoters showed that it was possible to reach over two thousand individuals by being mobile (walking and scooter use). It is recommended that future programmes aiming to improve health access in poor, rural communities, particularly for those women who do not/cannot leave the home, consider using similar community mobilisation strategies complimented by the use of mobile clinics.
- b) The future design of the groups should be adapted to the level in question for example to account for preference for learning, such as oral versus visual methods, language, ethnic group mix or caste, etc.
- c) It is recommended to include a health promoter who can speak local languages while working with marginalised women (Sections 6.2 and 6.4.1.10).
- d) GTN had to deal with the (high) expectation(s) from the community, and often expectations from stakeholders are overwhelming. Therefore, health promoters should always explain what the direct benefits are (Sharma et al. 2017).
- e) Health promoters should limit the size of groups to deal with participation particularly if they feel overwhelmed, e.g. due to the large size of the groups; or if there is a loss of interest during meetings of the group and/or the time they have on offer to the groups.
- f) In the future GTN should grow "leaders of change", e.g. women who have been coming to the groups for 1-2 years as they may help to ensure health

promotion activities are continued. These leaders of change can perform a number of activities within the groups, such as training community members in safe birthing techniques, generation of community funds for maternal and infant care, stretcher provision schemes, distribution of clean delivery kits, home visits by women's group members to newly pregnant mothers, awareness raising with the help of video films in GTN's possession, social and psychological support, support for early initiation and maintenance of breastfeeding, etc.

- g) In the qualitative study, it was highlighted that men would like to join the GTN groups (Section 6.4.1.6). GTN should make further efforts to have male groups; perhaps this can be achieved with the appointment of a male health promoter.
- h) The qualitative study also showed that cultural beliefs and traditional/cultural practices around pregnancy were harmful, e.g. isolation or abuse of women in the postnatal period. GTN should address these ineffective practices in the future with evidence-based health promotion training to circumvent their continued practice. On the referral side, the GTN health promoters may consider exploring local institutions interested to collaborate with GTN, particularly in the areas of violence, often domestic and/or sexual. This latter exercise may also help manage the health promoter's time (and group size), as it will delegate certain tasks to these organisations.
- i) Health programmes and their evaluation need to be tailored for the needs of the community since a one-size-fits-all approach is not suitable. From the start, the local stakeholders should be involved in the needs assessment, this process improves the chances of empowerment occurring, of programme ownership and ensures sustainability in the long-term.

For the research and evaluation process:

- j) Continue to conduct research and evaluation around a humanitarian setting; and use methods such as DiD, qualitative, and costing methods where appropriate.
- k) GTN should consider continuing their endeavour of collecting and storing these rich data as it was at a relative low-cost (Section 5.11). Furthermore, it is recommended to consider the use of paperless technology (i.e. mobile phones) to collect field data.
- l) Health promotion interventions like GTN's often take place at a community level. The expected proportional benefits to individuals can be small, and

beneficial outcomes are delayed, particularly with regards to the health outcomes in these from health promotion exercises. Organisations, like GTN, who wish to continue or upscale their activities, will need to plan a rollout along a longer timeline and negotiate at the regional and national level for support.

- m) As in public health when there are changes in diseases patterns, for instance the growing burden of non-communicable diseases, GTN should seize the opportunity to test 'new' concepts on prevention/management of health promotion activities in these topic areas.
- n) There are growing numbers of open access journals, and interest from various organisations to set up a similar intervention. GTN participatory research activities ought to be published (better disseminated) so that others aiming to do this important work of improving health uptake via community mobilisation may also learn/benefit.

9.3 Recommendations for researchers

- a) In the first instance, DiD is recommended for evaluating quasi-experimental study designs to assess an NGO's or health promotion intervention's activities in LMICs.
- b) DiD can also help provide details of confounding factors, such as education.
- c) In addition, mixed methods are recommended as they use both qualitative and quantitative methods to answer what impact a complex evaluation has had in a community. The use of these methods also helps determine if a programme has had any unintended consequences.
- d) Costing an evaluation is difficult and should form part of evaluation. A rough costing of DiD would be useful in the future.
- e) As a result of being part of the intervention, women's empowerment may have increased. Complex relationships between education, empowerment, maternal outcomes, and health promotion may exist and further research will be devoted to shed a light on this.
- f) For the academic research community, the continuing way forward should ensure that more research is undertaken into social science in LMICs interventions. It is imperative that this research is applied to improve health services for Nepal's largely rural communities and that social policy can be shaped to be 'inclusive' of those marginalised.

9.4 Recommendations for practitioners

- a) Recommendations for practitioners include training/education in health promotion and community mobilisation. For example, health promotion officers employed in rural areas need to be trained in evidence-based health promotion to help them fulfil their role better in the community and thus assist them to determine the best way to improve maternal wellbeing and/via women empowerment.
- b) Since health promotion offers 'something for everyone', the groups may provide an impact into the wider community due to a spillover effect as health promoters may play a promising role in providing pregnancy and childbirth care, mobilising communities, and improving uptake outcomes in LMICs.
- c) In terms of service delivery in maternal health, other interventions, not just ANC, are needed to improve delivery care. Of all the outcomes, ANC improved, yet in the intervention area did not lead to an increase in uptake of SBA as suggested by a simpler analysis and the literature (Section 7.2). This means that ANC should not be targeted with the intended aim to increase institutional deliveries. Thus, additional measures are needed to improve the use of birth facilities and skilled birth attendants.
- d) In the future, the health promotion sessions may have to differ from those currently offered by GTN, for example specific training sessions for seeking a SBA at birth.
- e) In addition, one should not only do ANC. There are several components that are required to improve delivery care and PNC.
- f) In order to improve access to these services, an intervention in the health system should address both the supply of health workers and the transport to maternal health services.
- g) Also, it is not enough to 'get' women to care. The quality of care should be of importance.

- h) Part of addressing this lack of empowerment should involve training health workers in community mobilisation to include mothers-in-law and the men.

9.5 Recommendations for policy-makers

People who design interventions addressing the role and place of women in society and their access to health probably should take into account it is difficult to do so, especially over a short-term. This should also be taken into account if said interventions wish to consider evaluating their activities over the short-, medium- and long-term. Women's or mother-in-law groups may form part of a strategy, as they may be empowered to change or be part of a change with the information received during the groups. As seen in Chapter 1, government commitment was also a key ingredient in the success of mortality and fertility (Sections 1.3 and 1.4.4). This is similar to Bangladesh, (World Bank 2006); see Section 1.4.4 - Table 1. For policy-makers, recommendations from this evaluation include that maternal care interventions in Nepal and other LMICs should provide focused programmes for rural, uneducated, poor women so that they may delay childbearing; attend antenatal clinics and delivery care in case of pregnancy and postnatal care. These behavioural change health promotion programmes ought to include the accommodation of socio-cultural barriers; in order to achieve long-term change, with a slow build-up and not expect to see change overnight.

Appendix

Appendix I - Ethics Letter



Nepal Health Research Council



NHRC

Ref. No. 182

Executive Committee

Executive Chairman
Prof. Dr. Chop Lal Bhusal

Vice - Chairman
Dr. Rishi Ram Koirala

Member-Secretary
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Members
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Dr. Samjhana Dhakal
Dr. Devi Gurung

Representative
Ministry of Finance
National Planning Commission
Ministry of Health & Population
Chief, Research Committee, IOM
Chairman, Nepal Medical Council

1 September 2011

Mr. Ram Chandra Silwal
Principal Investigator
Green Tara Nepal
GPO Box 8974,
CPC 158

Ref: Approval of Research Proposal entitled **Evaluation of Comprehensive Health Promotion Programme in Four VDCs in Nepal**

Dear Mr. Silwal,

It is my pleasure to inform you that the above-mentioned proposal submitted on 10 April 2011 (Reg. no. 37/2011 please use this Reg. No. during further correspondence) has been approved by NHRC Ethical Review Board on 14 Aug 2011 (2068-04-29).

As per NHRC rules and regulations, the investigator has to strictly follow the protocol stipulated in the proposal. Any change in objective(s), problem statement, research question or hypothesis, methodology, implementation procedure, data management and budget that may be necessary in course of the implementation of the research proposal can only be made so and implemented after prior approval from this council. Thus, it is compulsory to submit the detail of such changes intended or desired with justification prior to actual change in the protocol.

If the researcher requires transfer of the bio samples to other countries, the investigator should apply to the NHRC for the permission.


Further, the researchers are directed to strictly abide by the National Ethical Guidelines published by NHRC during the implementation of their research proposal and submit progress report and full or summary report upon completion.

As per your research proposal, your total research amount is US\$ 9,600.00 and NHRC processing fee is US\$ 100.00.

If you have any questions, please contact the research section of NHRC

Thanking you,

Sincerely Yours,


Dr. Shanker Pratap Singh
Member Secretary

Appendix II - Table 2, Definitions & Sources

1. Population millions (2013) rounded off to closest million

Population, total: Total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship--except for refugees not permanently settled in the country of asylum, who are generally considered part of the population of their country of origin. The values shown are midyear estimates.

(1) United Nations Population Division. World Population Prospects, (2) United Nations Statistical Division. Population and Vital Statistics Report (various years), (3) Census reports and other statistical publications from national statistical offices, (4) Eurostat: Demographic Statistics, (5) Secretariat of the Pacific Community: Statistics and Demography Programme, and (6) U.S. Census Bureau: International Database.

Catalog Sources World Development Indicators

<http://data.worldbank.org/indicator/SP.POP.TOTL>

2. Literacy rate, adult total (% of people ages 15 and above)

Adult (15+) literacy rate (%). Total is the percentage of the population age 15 and above who can, with understanding, read and write a short, simple statement on their everyday life. Generally, 'literacy' also encompasses 'numeracy', the ability to make simple arithmetic calculations. This indicator is calculated by dividing the number of literates aged 15 years and over by the corresponding age group population and multiplying the result by 100.

UNESCO Institute for Statistics

Catalog Sources World Development Indicators

<http://data.worldbank.org/indicator/SE.ADT.LITR.ZS>

3. Life expectancy at birth, total (years)

Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.

Derived from male and female life expectancy at birth from sources such as: (1) United Nations Population Division. World Population Prospects, (2) United Nations Statistical Division. Population and Vital Statistics Report (various years), (3) Census reports and other statistical publications from national statistical offices, (4) Eurostat: Demographic Statistics, (5) Secretariat of the Pacific Community: Statistics and Demography Programme, and (6) U.S. Census Bureau: International Database.

Catalog Sources World Development Indicators

<http://data.worldbank.org/indicator/SP.DYN.LE00.IN>

4. Maternal mortality ratio (modelled estimate, per 100,000 live births)

Maternal mortality ratio is the number of women who die from pregnancy-related causes while pregnant or within 42 days of pregnancy termination per 100,000 live births. The data are estimated with a regression model using information on the proportion of maternal deaths among non-AIDS deaths in women ages 15-49, fertility, birth attendants, and GDP. WHO, UNICEF, UNFPA, The World Bank, and the United Nations Population Division.

Trends in Maternal Mortality: 1990 to 2013. Geneva, World Health Organization, 2014

Catalog Sources World Development Indicators

<http://data.worldbank.org/indicator/SH.STA.MMRT>

5. Neonatal Mortality Ratio/1000 live births (2013)

Mortality rate, neonatal (per 1,000 live births)

Neonatal mortality rate is the number of neonates dying before reaching 28 days of age, per 1,000 live births in a given year.

Estimates developed by the UN Inter-Agency Group for Child Mortality Estimation (UNICEF, WHO, World Bank, UN DESA Population Division) at www.childmortality.org.

Catalog Sources World Development Indicators

<http://data.worldbank.org/indicator/SH.DYN.NMRT>

6. Births attended by skilled health staff (% of total)

Births attended by skilled health staff are the percentage of deliveries attended by personnel trained to give the necessary supervision, care, and advice to women during pregnancy, labor, and the postpartum period; to conduct deliveries on their own; and to care for

newborns.

UNICEF, State of the World's Children, Childinfo, and Demographic and Health Surveys by ICF International.

Catalog Sources World Development Indicators

2011-2013

<http://data.worldbank.org/indicator/SH.STA.BRTC.ZS>

7. Birth rate, crude (per 1,000 people), 2011

Crude birth rate indicates the number of live births occurring during the year, per 1,000 population estimated at midyear. Subtracting the crude death rate from the crude birth rate provides the rate of natural increase, which is equal to the rate of population change in the absence of migration.

(1) United Nations Population Division. World Population Prospects, (2) United Nations Statistical Division. Population and Vital Statistics Report (various years), (3) Census reports and other statistical publications from national statistical offices, (4) Eurostat: Demographic Statistics, (5) Secretariat of the Pacific Community: Statistics and Demography Programme, and (6) U.S. Census Bureau: International Database.

Catalog Sources World Development Indicators 2013

<http://data.worldbank.org/indicator/SP.DYN.CBRT.IN>

8. Death rate, crude (per 1,000 people) (2013)

Crude death rate indicates the number of deaths occurring during the year, per 1,000 population estimated at midyear. Subtracting the crude death rate from the crude birth rate provides the rate of natural increase, which is equal to the rate of population change in the absence of migration.

(1) United Nations Population Division. World Population Prospects, (2) United Nations Statistical Division. Population and Vital Statistics Report (various years), (3) Census reports and other statistical publications from national statistical offices, (4) Eurostat: Demographic Statistics, (5) Secretariat of the Pacific Community: Statistics and Demography Programme, and (6) U.S. Census Bureau: International Database.

Catalog Sources World Development Indicators

<http://data.worldbank.org/indicator/SP.DYN.CDRT.IN/countries>

9. Fertility rate, total (births per woman)

Total fertility rate represents the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with current age-specific fertility rates.

(1) United Nations Population Division. World Population Prospects, (2) United Nations Statistical Division. Population and Vital Statistics Report (various years), (3) Census reports and other statistical publications from national statistical offices, (4) Eurostat: Demographic Statistics, (5) Secretariat of the Pacific Community: Statistics and Demography Programme, and (6) U.S. Census Bureau: International Database

Catalog Sources World Development Indicators 2011

<http://data.worldbank.org/indicator/SP.DYN.TFRT.IN>

10. Contraceptive prevalence (% of women ages 15-49)

Contraceptive prevalence rate is the percentage of women who are practicing, or whose sexual partners are practicing, any form of contraception. It is usually measured for married women ages 15-49 only.

Household surveys, including Demographic and Health Surveys by Macro International and Multiple Indicator Cluster Surveys by UNICEF.

Catalog Sources World Development Indicators

<http://data.worldbank.org/indicator/SP.DYN.CONU.ZS>

11. Pregnant women receiving prenatal care (%)

Pregnant women receiving prenatal care are the percentage of women attended at least once during pregnancy by skilled health personnel for reasons related to pregnancy.

UNICEF, State of the World's Children, Childinfo, and Demographic and Health Surveys by ICF International.

Catalog Sources World Development Indicators 2011

<http://data.worldbank.org/indicator/SH.STA.ANVC.ZS>

12. Health expenditure per capita, PPP (constant 2011 international \$)

Total health expenditure is the sum of public and private health expenditures as a ratio of total population. It covers the provision of health services (preventive and curative), family planning activities, nutrition activities, and emergency aid designated for health but does not include provision of water and sanitation. Data are in international dollars converted using 2011 purchasing power parity (PPP) rates.

World Health Organization Global Health Expenditure database (see <http://apps.who.int/nha/database> for the most recent updates).

Catalog Sources World Development Indicators
<http://data.worldbank.org/indicator/SH.XPD.PCAP>

World Health Organization Global Health Expenditure database (see <http://apps.who.int/nha/database> for the most recent updates).

World Health Organization Global Health Expenditure database (see <http://apps.who.int/nha/database> for the most recent updates).

Catalog Sources World Development Indicators

Source: <http://data.worldbank.org/indicator/SH.XPD.OOPC.TO.ZS>

13. Out-of-pocket health expenditure (% of total expenditure on health)

Out of pocket expenditure is any direct outlay by households, including gratuities and in-kind payments, to health practitioners and suppliers of pharmaceuticals, therapeutic appliances, and other goods and services whose primary intent is to contribute to the restoration or enhancement of the health status of individuals or population groups. It is a part of private health expenditure. World Health Organization National Health Account database (see <http://apps.who.int/nha/database/DataExplorerRegime.aspx> for the most recent updates).
Catalog Sources World Development Indicators 2011

14. GNI per capita, PPP (current international \$)

GNI per capita based on purchasing power parity (PPP). PPP GNI is gross national income (GNI) converted to international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GNI as a U.S. dollar has in the United States. GNI is the sum of value added by all resident producers plus any product taxes (less subsidies) not included in the valuation of output plus net receipts of primary income (compensation of employees and property income) from abroad. Data are in current international dollars based on the 2011 ICP round.

World Bank, International Comparison Program database.

Catalog Sources World Development Indicators

<http://data.worldbank.org/indicator/NY.GNP.PCAP.PP.CD>

15. GDP (purchasing power parity) rank/229 [1] 2014

GDP (purchasing power parity)

<https://www.cia.gov/library/publications/the-world-factbook/rankorder/2001rank.html>

Country Comparison: GDP (Purchasing Power Parity)

GDP (purchasing power parity) compares the gross domestic product (GDP) or value of all final goods and services produced within a nation in a given year. A nation's GDP at purchasing power parity (PPP) exchange rates is the sum value of all goods and services produced in the country valued at prices prevailing in the United States.

<http://data.worldbank.org/indicator/NY.GNP.PCAP.PP.CD> and Source: The World Bank:

World Development Indicators: Size of the economy (2013) The World Bank Group.

<http://wdi.worldbank.org/table/1.1>

Appendix III - Questionnaire for Women in English and Nepali

Questionnaire for Women SN.:

VDC:

Ward no.:

Name of village:

Day:

Date: 2010/04/.....

SCREENING Q: DO YOU HAVE A CHILD UNDER 24 MONTHS (Not Completed)

1. Yes 2.No (if no, do not continue questionnaire)

1.0 If yes, how old is your youngest child?Months

1.0 A How many child(ren) do you have under 24 months?

Section 1: Household and Socio-demographic information

SN	Questions	Coding categories	Skip
1.1	In what month and year were you born?	Month: Don't Know month Year: Don't Know year	
1.2	What is your age? (Compare and correct 1.1 and/or 1.2 if inconsistent)	.....Years	
1.3	What is your caste /ethnicity?	1. Brahman 2. Chhetri 3. Tamang 4. Newar non Dalit 5. Newar Dalit 6. Balami 7. Dalit 8. Other (specify).....	
1.6	What is your religion?	1. Buddhist 2. Hindu 3. Christian 4. Other (specify).....	
1.7	Can you read and write?	1. Yes 2. No →	Go to 1.10
1.8	Have you ever attended school?	1. Yes 2. No →	Go to 1.10
1.9	If yes, what is the highest grade you completed?	1. Primary education 2. Secondary education (SLC) 3. Intermediate (PCL)	

		4. Bachelor and above	
1.10	What is your current main occupation?	1. House wife 2. Farmer 3. Service 4. Business 5. Other (Specify).....	
1.11	What is your husband's level of education?	1. Illiterate 2. Primary education 3. Secondary education (S.L.C) 4. Intermediate (PCL) 5. Bachelor and above	
1.12	What is your husband's main occupation?	1. Farmer 2. Teacher 3. Business 4. Skilled labour 5. Unskilled labour 6. Other (Specify).....	
1.13	How many people live in your house?	1. Total 2. Young People & Adults (age 10 or above) 3. Children (below 10 yrs)	
1.14	How many rooms in your household are used for sleeping?	.....Rooms	
1.15##	Do you and your family (household) have any property?	1. Land in Ropani- 2. Number of Houses 3. Balance in cash (bank/ in hand) 4. Yes, but do not know amount 5. Cattle (Specify) A. Cow..... B. Buffalo..... C. Goat..... D. Chicken..... E. Pig..... F. Others (Specify).....	

1.16	Do you own any land or property?	1. Yes 2. No 3. Don't Know	
1.16B	Do you have own Mobile Phone?	1. Yes 2. No	
1.17	Where are you currently living?	1. In own home 2. In rented property 3. Living with relative 4. Other (specify)..... <div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: right;"> } } } </div> <div style="text-align: left;"> → → → </div> <div style="text-align: left;"> Go to 1.19 </div> </div>	
1.18	If it is your own home, What type of roof in your house? (Observation)	1. Cemented 2. Tin 3. Tile 4. Hay 5. Other (specify):	
1.19 ##	What is the main source of drinking water for members of your household? (Max. 2 Answers)	1. Piped water to own home 2. Common/public piped water 3. Tube well or borehole 4. Surface water (river/dam/ lake/ pond/stream/canal/ irrigation canal 5. Stone tap/dhara 6. Jar/Bottled water 7. Others (specify).....	
1.20	Do you have your own toilet?	1. Yes 2. No	Go to 1.23
1.21	If yes, how many people use the toilet?	..... members	
1.22 ##	If Yes, what kind of toilet facility do members of your household usually use? (max 2 answers)	1. Flush to piped sewer system 2. Flush to septic tank 3. Flush to somewhere else 4. Pit latrine with slab 5. Pit latrine without slab 6. Composting toilet	
1.23 ##	Does your household have:	1. YES 2.No 1. Electricity <input type="checkbox"/> <input type="checkbox"/>	


		2. Radio <input type="checkbox"/> <input type="checkbox"/> 3. Television <input type="checkbox"/> <input type="checkbox"/> 4. Telephone <input type="checkbox"/> <input type="checkbox"/> 5. Refrigerator <input type="checkbox"/> <input type="checkbox"/> 6. Computer <input type="checkbox"/> <input type="checkbox"/> 7. Wall clock <input type="checkbox"/> <input type="checkbox"/> 8. Gas Geezer <input type="checkbox"/> <input type="checkbox"/> 9. Solar panel <input type="checkbox"/> <input type="checkbox"/>	
1.24 ##	What type of fuel does your household mainly use for cooking? (max 2 answers)	1. Electricity 2. LPG (Gas) 3. Biogas 4. Kerosene 5. Wood 6. Animal dung 7. Other (specify):	
1.26	Do you have access to a motorable road? (within five minutes walk)	1. Yes <input type="checkbox"/> → 2. No <input type="checkbox"/>	Go to 1.28
1.27	If no, how long does it take to reach to motorable road? (TIME TAKEN TO REACH ROAD BY NORMAL WALKING)	..... Hours Minutes	
1.28 ##	Does any member of your household own:	1. Yes <input type="checkbox"/> 2. No <input type="checkbox"/> 1. Bicycle /Rickshaw <input type="checkbox"/> <input type="checkbox"/> 2. Motorcycle/scooter <input type="checkbox"/> <input type="checkbox"/> 3. Tempo: <input type="checkbox"/> <input type="checkbox"/> 4. Car/Truck: <input type="checkbox"/> <input type="checkbox"/> 5. Other transport (specify).....	

1.30	How old were you when you got married?	..... yrs.	
1.31	How old were you when you had first pregnancy?	.....yrs	
1.32	How many times have you been pregnant?	.....times	
	How many live children do you have?	.....
1.33	Have you had any miscarriages/abortion/stillbirth?	1. Yes 2. No	
1.34	Is abortion legal in Nepal?	1. Yes 2. No 3. Don't know	

Section 2: Antenatal Care and seeking care – FOR ALL RESPONDENTS

Note: these questions relate to the woman's LAST pregnancy

2.12	How many dose of TT vaccine did you have in your lifetime?	1. Dose(s)	
2.1	Did you take iron/folic acid (vitamin tabs) during pregnancy?	1. Yes 2. No → 3. 3. Don't know →	Go to 2.5
2.2	If yes, for how long did you take them?	From .....Weeks to weeks of pregnancy For .....weeks after delivery	
2.3 ##	Where did you get these tablets?	1. HP/SHP 2. NGO/Manmohan Hospital 3. Private doctor or clinic 4. Pharmacy 5. Local health worker/FCHV 6. Outreach clinic 7. Hospital in Kathmandu 8. Others (Specify)	
2.4	Did you/anyone in your family pay for the tablets?	1. Yes 2. No 3. Don't know	

2.5	Did you see anyone for antenatal care this/ most recent pregnancy?	1. Yes 2. No 	Go to 2.22
2.6 ##	If yes: Whom did you see for your last visit/check-up?	1. Doctor 2. Nurse 3. HA/CMA/MCHW 4. Health Worker (General) 5. Other, (Specify)..... 6. Don't know	
2.7 ##	Where were the antenatal visits? (circle all that apply)	1. Hospital 2. PHC/Manmohan Hospital 3. HP/SHP 4. Out Reach Clinic 5. Private Clinic 6. Other (specify).....	
2.8	After how many months of pregnancy did you first have your antenatal visit with above person?	1. Month..... 2. Don't know	
2.9	How many antenatal visits did you have during your last pregnancy?	1. No. of visit..... 2. Don't know	
2.10 ##	How did you know about ANC check-ups?	1. From Family members 2. From Radio/TV 3. Health workers 4. Friends/relatives /Neighbour/community people 5. School/college/teacher 6. Female community health volunteer 7. Green Tara Nepal's staff 8. Green Tara Nepal's Group Member 9. Other (specify).....	

2.11 ##	During antenatal visit, was any of following done at least once during your pregnancy? A. Did you have weight checked? B. Was your height measured? C. Was blood pressure measured? D. Did you give urine sample? E. Did you give blood sample? F. They checked your ankles for swelling?	A. 1.Yes 2. No 3. Don't know B. 1.Yes 2. No 3. Don't know C. 1.Yes 2. No 3. Don't know D. 1.Yes 2. No 3. Don't know E. 1.Yes 2. No 3. Don't know F. 1.Yes 2. No 3. Don't know	
2.13	During pregnancy were you given an injection in the arm to prevent baby from getting tetanus?	1. Yes 2. No → 3. Don't know →	Go to Q 2.15
2.14	If yes, how many times?	..... times	
2.15	During the antenatal visit did you get any advice from health worker?	1. Yes 2. No 3. Don't know	
2.17	How long did it take to travel from your home to place where you usually went for antenatal check- up?	..... Hours.....Minutes	
2.18	How did you get there?	1. Walking 2. Bus 3. Other (specify).....	
2.19	Who decided that you would go for your antenatal check-up?	1. Myself 2. Husband 3. Mother-in-law 4. Other (specify).....	
2.20 ##	How much did you pay (including cash & kind)	1. Total cost Rs..... 2. Kind: Labour.....hrs 3. Kind, other (specify).....	

	for each antenatal visit during last pregnancy?		
2.21	How satisfied are you with the antenatal care you received from service providers during pregnancy?	<ol style="list-style-type: none"> 1. Not at all 2. Somewhat 3. Very Much 	Go to 2.23
2.22 ##	<p>If you did not have any antenatal care visits, why not? (More than one answer possible) Do not read out answers!</p>	<ol style="list-style-type: none"> 1. Shyness 2. Health worker is a man 3. Don't know about health services 4. Too far to health facility 5. No money to pay for visit 6. No time to go for visit 7. Family don't allow to go 8. No transportation 9. Other (specify) 	
2.23	Did you have any health problems during your most recent pregnancy?	<ol style="list-style-type: none"> 1. Yes 2. No → 3. Don't know → 	<p>Go Sec. 3</p>
2.24 ##	If yes, what problems did you have?	<ol style="list-style-type: none"> 1. Vaginal Bleeding 2. Swelling body/ legs 3. High blood pressure 4. Dizziness 5. Abdomen pain 6. Vomiting in early pregnancy 7. Weakness 8. White discharge 9. Other (specify)..... 	
2.25 ##	Where did you go to solve these problems?	<ol style="list-style-type: none"> 1. Hospital 2. PHC/Manmohan Hospital 3. HP/SHP 4. Out Reach Clinic 5. Private Clinic 6. Traditional Healers 7. Other (specify)..... 8. Nowhere 	<p>Skip 2.26 except 8. Nowhere</p>
2.26 ##	If you did not seek care from any one, why not? (Max. 3 Answers)	<ol style="list-style-type: none"> 1. No need perceived by woman 2. No need perceived by family 3. Not part of local tradition 4. HW not in health facility 	<p>Ask this Q if 2.25 is Nowhere</p>

		5. HW is a man 6. Not aware of services 7. Too far to health facility 8. No money to pay for visit 9. No time to go for visit 10. The service is poor 11. Family don't allow to go 12. Any problem cured itself 13. Other (specify):	
--	--	--	--

FOR ALL RESPONDENTS, ASK ABOUT LAST DELIVERY:

Section 3: Delivery Care

3.1	When was your last antenatal visit before you gave birth?	.....month of pregnancy Don't know	Only for ANC Check up
3.2 ##	Where did you deliver the baby?	1. Home 2. Hospital 3. PHC/Manmohan Hospital 4. HP/SHP 5. Private clinic 6. Other (specify).....	
3.3	Who decided where to deliver your baby?	1. Myself 2. Husband 3. Mother-in-law/grandmother 4. Other (specify).....	
3.4 ##	Who assisted with the birth of baby?	1. Doctor 2. Nurse 3. Student Nurse/medical student 4. HA/CMA/MCHW 5. VHW 6. TBA 7. Family member/Relatives 8. Health worker (general) 9. Other (specify)..... 10. No one	

3.5	Is there any local/ national financial help available for your delivery?	1. Yes 2. No → Go to Q. 3. Don't know → 3.8	
3.6	If yes, who are they?	1. Government 2. Private lender 3. Local savings group 4. Other:	
3.7	How much money did you receive?	1. ....Rs 2. Don't know	
3.8	How much did you have to pay drugs, registration procedures, travel, food etc.?	1. Total cost .....rupees 2. Don't Know	
3.9 ##	What problems, if any, occurred during the labour or delivery? Specify?	1. Long labour (more than 18hrs) 2. Retained placenta 3. Excessive Vaginal Bleeding 4. Convulsion/fits 5. Other (specify)..... 6. None	If none, go to Q 3.13
3.10 ##	Who or Where did you visit to solve these problems?	1. Hospital 2. PHC/Manmohan Hospital 3. HP/SHP 4. Out Reach Clinic 5. Private Clinic 6. Traditional Healers 7. Other (specify)..... 8. Nowhere → 3.12	Go to 3.12
3.11	How soon did you seek help after the problem started?	1. Immediately 2. In less than 2 hours 3. Between 3-6 hours 4. More than 6 hours	Go to 3.13
3.12##	If you did not seek help anywhere, why not?	1. No need perceived by woman 2. No need perceived by family 3. HW not in health facility 4. HW is a man 5. Not aware of services 6. Too far to health facility 7. No money to pay for visit	

		8. No time to go for visit 9. The service is poor 10. Family don't allow to go 11. Too weak/sick to travel 12. Other (specify).....	
3.13	How satisfied are you with the care received during labour and delivery? (Ask only to whom receive health services)	1. Not at all 2. Somewhat 3. Very 4. Not applicable	
3.14##	In your opinion, what are the main 3 problems with delivery care in your community?	1. No trained health worker 2. No transportation 3. Too far health facility 4. No health workers available at the time 5. No money 6. Not usual practice 7. 7.Don't know where to get help 8. Family do not perceive need 9. Family refused to access care 10. 10. Other (specify).....	
3.15##	What 3 things could improve delivery care for women in your community?	1. Health facilities in village 2. Better trained staff in Health facility 3. More medicines 4. More staff 5. Inform women about available health services 6. Increased awareness about delivery care 7. More support from friends/family 8. Other (specify).....	

Section 4: Postnatal Care of Woman

4.1	After baby was born, did a health professional check your own health?	1. Yes 2. No → 3. Don't know →	Go to 4.5
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4.2	How many days or weeks after the delivery did the first check take place?	<ol style="list-style-type: none"> 1. Same day 2. After 1 day 3. After 2 days 4. Between 3-7 day 5. Between 8- 14 day 6. More than 14 days 7. No Check 	
4.5	Did you have any health problems within the first 42 days after delivery?	<ol style="list-style-type: none"> 1. Yes 2. No → 3. Don't know → 	Go to Q4.9
4.6 ##	If yes, what problems did you have?	<ol style="list-style-type: none"> 1. Vaginal Bleeding 2. Fever 3. Weakness 4. Convulsions/fits 5. Breast infection 6. Baby feeding problem 7. Low mood/depression 8. Offensive vaginal discharge 9. Vaginal pain 10. Faecal discharge from vagina 11. Other (specify)..... 	
4.7 ##	Where did you visit to solve these problems?	<ol style="list-style-type: none"> 1. Hospital 2. PHC/Manmohan Memorial Hospital 3. HP/SHP 4. Out Reach Clinic 5. Traditional Healers 6. Private Clinic 7. Other (specify)..... 8. Nowhere → 	Skip 4.8 except 8. Nowhere
4.8 ##	If you did not seek help from anywhere, why not? (Max. 3 Answers)	<ol style="list-style-type: none"> 1. No need perceived by women 2. No need perceived by family 3. HW not in health facility 4. HW is a man 5. Not aware of services 6. Too far to health facility 7. No money to pay for visit 8. No time to go for visit 	Ask this Q if 4.7 is Nowhere

		9. The service is poor 10. Family don't allow to go 11. Too weak/sick to travel 12. Other (specify).....	
4.9 ##	In your opinion, what are 3 main reasons that women do not check their health after delivery? <p style="text-align: center;">(Max. 3 Answers)</p>	1. No transportation facility 2. Health facility too far 3. No health personnel in health centre 4. No money 5. No usual practice 6. No need perceived 7. Not allowed by family 8. Don't Know 9. Other (specify).....	
4.10 ##	In your opinion, what 3 things could help women access postnatal care more easily in your area? <p style="text-align: center;">(Max. 3 Answers)</p>	1. Health facility in village 2. Better trained staff in health facility 3. More medicines facility 4. More staffs in health centre 5. Inform bout available health services 6. Increase awareness on PNC 7. More support from friends/family 8. Don't Know 9. Other (specify).....	

Section 5: Neonatal care:

TELL WOMAN THIS RELATES TO HER MOST RECENTLY BORN CHILD

5.1	If you had your baby at home, was a Home Delivery Kit box (safe delivery kit box) used?	1. Yes 2. No 3. Don't know	ONLY for HOME Delivery
5.2	With what was the cord-cut?	1. Clean blade 2. Unclean blade 3. Other (specify) 4. Don't know	ONLY for HOME

			Delive ry
5.3	How far from the baby's body was the cord cut?	1. ...(No. Of fingers) 2. Don't know	Ask Home Delive ry
5.4	What was put on the cut cord?	1. Nothing 2. Antiseptic 3. Oil 4. Ghee/Butter 5. Other (specify).....	ONLY for HOM E Delive ry
5.5	When was first time the baby was washed?	1. Immediately after birth 2. After.....hrs 3. After.....days 4. Don't know	ONLY for HOM E Delive ry
5.6	How soon was the baby wrapped up after birth?	1. Immediately 2. Within one hour 3. More than one hour 4. Don't know	ONLY for HOM E Delive ry
5.7	How old was the baby the first time they had anything other than breast milk? (E.g. animal milk, horlicks, medicine except vaccines, Jeevan jal, any foods)	1. 1 month 2. 2 to 4 months 3. 5 to 6 months 4. Over 7 months	
5.8	Was breast milk the first feed your baby was given?	1. Yes 2. No	
5.9	Did you give your baby the colostrum, the first yellow milk from the breast?	1. Yes 2. No	
5.1 0	Did you breastfeed within the first hour after birth?	1. Yes 2. No	
5.1 1	When did the baby have a first health check after delivery?	..... Hrs after delivery ----- Days after delivery	

5.1 2	Did the healthcare worker check your baby again in the first month after delivery?	1. Yes 2. No 3. Don't know	
5.1 3	Did your baby have any healthcare problems within the first month after delivery?	1. Yes 2. No	Go to Q 5.17
5.1 4	At what age did the baby have health problems?	-----days -----weeks	
5.1 5	What problems occurred with the baby after delivery	1. Difficulty in breathing 2. Cold 3. Not feeding 4. Too sleepy 5. Diarrhoea 6. Other (specify)	
5.1 6	Where did you visit to solve these problems? Who or where did u go to solve these problems?	1. Hospital 2. PHC/Manmohan Memorial Hospital 3. HP/SHP 4. Out Reach Clinic 5. Private Clinic 6. Traditional Healers 7. Other (specify)..... ... 8. Nowhere	
5.1 7	Did you or anyone else register the birth of your	1. Yes 2. No 3. Don't know	

5.1 9	What was the baby wrapped in after delivery?	1. Blanket 2. Towel 3. Sari 4. Thin cloth 5. Other (state).....	
----------	--	---	--

Section 6: Contraception and others FOR ALL RESPONDENTS

6.4	Was your last pregnancy planned?	1. Yes 2. No	
6.5	Were you using any kind of contraception, when you got pregnant?	1. Yes 2. No	
6.6	Are you a member or ex member of any elected local body? (E.g. VDC, ward etc.)	1. Yes (Your Post) 2. No	
6.7	Are you member of any voluntary organisation (e.g. NGO, User groups Cooperative etc.)	1. Yes 2. No	
6.8	Who makes the decisions mainly about healthcare in the household?	1. Myself 2. My Husband 3. Mother-in-Law 4. Father-in-Law 5. Other (Specify)	
6.9	Sometimes a husband is annoyed or angered by things that his wife does. In your opinion, is a husband justified in hitting or beating his wife in the following situations: A. If she goes out without telling him? B. If she neglects the children? C. If she argues with him? D. If she refuses to have sex with him? E. If she burns the food?	A. 1. YES 2. NO 3. Don't Know B. 1. YES 2. NO 3. Don't Know C. 1. YES 2. NO 3. Don't Know D. 1. YES 2. NO 3. Don't Know	

		E. 1. YES 2. NO 3. Don't Know	
1.4	Are you from Dalit Caste?	1. Yes 2. No 3. Don't Know	

Section 7: EXTRA PAGE FOR INTERVENTION COMMUNITY ONLY

7.1	Have you heard of Green Tara Nepal?	1. Yes 2. No	
7.2	Have you met any of the Green Tara Nepal staff?	1. Yes 2. No	
7.3 ##	If you know GTN, how?	1. Been to Group 2. GTN Staff visited at home 3. Been to antenatal/postnatal gathering 4. Been to festival 5. Relative goes to group 6. Heard from others in community. 7. Other (Specify).....	If Don't know about Green Tara Don't ask this Q.
7.4	Do you go to a GTN group?	1. Yes 2. No	Go to 7.7
7.5	If Yes, how many months ago was your 1 st meeting?	1. 0-3 months 2. 4-6 months 3. 7-12 months 4. More than 12 months	
7.6	How many meetings have you been to?	..... meetings	
7.7	Does anyone else in your household go to a GTN group?	1. Yes 2. No	Go to 7.10
7.8	If yes, who goes?	1. Mother-in-law 2. Sister-in-law 3. Husband 4. Father in law, 5. Brother-in-law	

		6. Other (Specify)	
7.9	Did they share anything about health with you from their group meetings?	1. Yes 2. No	
7.10	Did you get given a blanket especially for the baby?	1. Yes 2. No	

THANK YOU for taking part in this study

Please take this Nail-Clipper as our gift

SN.:

Household Survey Questionnaire for Women- 2012

VDC:

Ward no.:.....

Name of village:

Day:

Date:2012/06/.....

SCREENING Q: DO YOU HAVE A CHILD UNDER 24 MONTHS (Not Completed) तपाइको २४ महिना भन्दा कम उमेरको बच्चा छ? **1. Yes. 2. No (if no, do not continue questionnaire)** (यदि छैन भने प्रश्न नसोध्ने)

1.0 If yes, how old is your youngest child? (यदि भएमा सबभन्दा सानो बच्चा कति उमेरको भयो?)monthsDays

1.0a How many child(ren) do you have under 24 months? (तपाइको २४ महिना भन्दा कम उमेरको कतिजना बच्चा छन्?).....

Section 1: Household and Socio-demographic information

SN	Questions	Coding categories	Skip
1.1	In what month and year were you born? Write in B.S. तपाइको जन्म कुन महिना र सालमा भएको थियो? वि. सं. मा लेख्नुहोस् ।	Month: Don't Know month Year: Don't Know year	
1.2	What is your age? (Write completed yrs) तपाइको उमेर कति भयो? पुरा भएको उमेर लेख्नुहोस् । (compare and correct 1.1 and/or 1.2 if inconsistent) प्रश्न 1.1 र 1.2 को बीचमा एकरूपता छ वा छैन हेर्नुहोस्	.....Years	
1.3	What is your ethnicity? तपाइको घर के हो ? सबैको घर लेख्ने ।	1. Yadav 2. Tharu 3. Muslim 4. Gurung 5. Other (specify.....)	
1.4	What is your caste /ethnicity? तपाइ कुन जातमा पर्नुहुन्छ?	1. Janjati 2. Tharu 3. Muslim 4. Terai Dalit 5. Pahadi Dalit 6. Brahmin 7. Chhetri 8. Other (specify.....)	
1.5	What is your religion? तपाइ कुन धर्म मान्नुहुन्छ?	1. Buddhist 2. Muslim 3. Hindu 4. Christian 5. Other (specify).....	
1.6	Can you read and write? तपाइ पढ्न लेख्न सक्नुहुन्छ ?	1. Yes 2. No →	Go to 1.9
1.7	Have you ever attended school? तपाइले स्कुल गएर पढ्नुभएको हो?	1. Yes 2. No →	Go to 1.9
1.8	If yes, what is the highest grade you completed? तपाइले कति कक्षा सम्म पढ्नुभएको छ?	1. Primary (completed class 5) 2. Secondary (completed class 10) 3. Intermediate (PCL)-completed class 12 4. Bachelor and above	
1.9	What is your current main occupation? तपाइको अहिलेको मुख्य पेशा (काम) के हो ?	1. Student 2. House wife 3. Farmer 4. Service 5. Business 6. Other (Specify).....	

1

Multiple Answers (यस्तो चिन्ह ## भएमा एक भन्दा धेरै उत्तर हुन सक्छ ।)

1.10	What is your husband's level of education? तपाइको श्रीमानले कतिसम्म पढ्नु भएको छ?	1. Illiterate 2. Primary education 3. Secondary education (S.L.C) 4. Intermediate (PCL) 5. Bachelor and above																																		
1.11	What is your husband's main occupation? तपाइको श्रीमानको मुख्य पेशा के हो ?	1. Farmer 2. Teacher 3. Business 4. Skilled labour 5. Unskilled labour 6. Other (Specify).....																																		
1.12	How many people live in your house? तपाइको घरमा कति जना हुनुहुन्छ ?	1. Total 2. Young People & Adults (age 10 or above) 3. Children (below 10 yrs)																																		
1.13 ##	Do you and your family(household) have any property? तपाइको आफ्नै वा परिवारको कति सम्पत्ती छ?	1. Land in Bigha/kaththa-																																		
1.14	Do you have any property in your name? के तपाइको आफ्नै नाममा जमिन वा सम्पत्ती छ?	1. Yes 2. No 3. Don't Know																																		
1.15	Do you have own Mobile Phone? तपाइको आफ्नै मोबाइल फोन छ?	1. Yes 2. No																																		
1.16	Where are you currently living? तपाईं अहिले कहाँ बसि रहनु भएको छ ?	1. In own home 2. In rented property 3. Living with relative 4. Other (specify).....																																		
1.17	What type of roof in your house? (Observation) छाना कस्तो प्रकारको छानो भएको घरमा वस्नुभएको छ? (श्रवलोकन)	1. Cemented 2. Tin 3. Tile 4. Hay 5. Other (specify):																																		
1.18 ##	Does your household have: तपाइको घरमा निम्न सुविधाहरू छन् ?	<table border="0"> <tr> <td></td> <td>1. YES</td> <td>2.No</td> </tr> <tr> <td>1. Electricity</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>2. Radio</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>3. Television</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>4. Telephone (landline)</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>5. Refrigerator</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>6. Computer</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>7. Wall clock</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>8. Gas geyser</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>9. Solar panel</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>10. Fan</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table>		1. YES	2.No	1. Electricity	<input type="checkbox"/>	<input type="checkbox"/>	2. Radio	<input type="checkbox"/>	<input type="checkbox"/>	3. Television	<input type="checkbox"/>	<input type="checkbox"/>	4. Telephone (landline)	<input type="checkbox"/>	<input type="checkbox"/>	5. Refrigerator	<input type="checkbox"/>	<input type="checkbox"/>	6. Computer	<input type="checkbox"/>	<input type="checkbox"/>	7. Wall clock	<input type="checkbox"/>	<input type="checkbox"/>	8. Gas geyser	<input type="checkbox"/>	<input type="checkbox"/>	9. Solar panel	<input type="checkbox"/>	<input type="checkbox"/>	10. Fan	<input type="checkbox"/>	<input type="checkbox"/>	
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10. Fan	<input type="checkbox"/>	<input type="checkbox"/>																																		
1.19 ##	What type of fuel does your household mainly use for cooking?(max 2 answers) तपाइको घरमा खाना पकाउन कुन इन्धन प्रयोग गर्नुहुन्छ? (बढीमा २ वटा उत्तरहरू) (max 2 answers)	1. Electricity 2. LPG (Gas) 3. Biogas 4. Kerosene 5. Wood 6. Animal dung 7. Other (specify):																																		
1.20 ##	Does any member of your household own: तपाइको परिवार सदस्यहरूको तलका मध्ये केनै सवारी साधन छ?	<table border="0"> <tr> <td></td> <td>1. Yes</td> <td>2.No</td> </tr> <tr> <td>1. Bicycle /Rickshaw</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>2. Motorcycle/scooter</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>3. Tempo:</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>4. Car/Truck:</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>5. Cart (bull cart)</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>6. Other transport (specify)</td> <td></td> <td></td> </tr> </table>		1. Yes	2.No	1. Bicycle /Rickshaw	<input type="checkbox"/>	<input type="checkbox"/>	2. Motorcycle/scooter	<input type="checkbox"/>	<input type="checkbox"/>	3. Tempo:	<input type="checkbox"/>	<input type="checkbox"/>	4. Car/Truck:	<input type="checkbox"/>	<input type="checkbox"/>	5. Cart (bull cart)	<input type="checkbox"/>	<input type="checkbox"/>	6. Other transport (specify)															
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6. Other transport (specify)																																				
1.21	Is anyone in your family currently working abroad? के तपाइको परिवार सदस्यहरूमध्ये कोहि विदेशमा काम गरि रहनु भएको छ?	1. Yes 2. No—skip to section 2 3.																																		

2

Multiple Answers (यस्तो चिन्ह ## भएमा एक भन्दा धेरै उत्तर हुन सक्छ ।)

1.22	If yes, in which country/countries are they working? यदि हो भने कुन देशमा काम गरिरहनु भएको छ, देशको नाम लेख्नुहोस्? यदि दुईजना भएमा दुवै लेख्ने । worth giving option of more than 1?	1 2.....	
1.23	Are they sending money to your household? के बहाले नियमित रूपमा घरमा पैसा पठाउने गर्नु भएको छ?	1. Yes 2. No	

Section 2: Water and sanitation

2.1 ##	What is the main source of drinking water for members of your household? (Max. 2 Answers) तपाईंको घरमा खानेपानी कहाँबाट ल्याइन्छ? (बढीमा २ वटा उत्तरहरू)	1. Piped water to own home 2. Common/public piped water 3. Tube well or borehole 4. Surface water (river/dam/ lake/ pond/stream/canal/ irrigation canal) 5. Stone tap/dhara 6. Jar/Bottled water 7. Other (specify)	
2.2	Do you have toilet in your house? तपाईंकोमा आफ्नै चर्पी छ?	1. Yes 2. No →	Go to 2.4
2.3 ##	If Yes, What kind of toilet facility do members of your household usually use? (max 2 answers) यदि भएमा, कस्तो प्रकारको छ? (बढीमा २ वटा उत्तरहरू)	1. Flush to piped sewer system 2. Flush to septic tank 3. Flush to somewhere else 4. Pit latrine with slab 5. Pit latrine without slab 6. Composting toilet	
2.4 ##	If you have no toilet at your house, what is the reason? तपाईंको घरमा चर्पी नभएको भए चर्पी नबनाउनुको कारण के हो?	1. Lack of financial resources 2. Lack of time 3. No land 4. Do not like defecating in toilet 5. Do not know importance of toilet 6. New house/still to make toilet 7. Other (specify)	
2.5	Where do you defecate if you have no toilet at your home? तपाईंको घरमा चर्पी नभएको भए कहाँ दिशा गर्ने गर्नुभएको छ?	1. Use neighbours' toilet 2. Use public toilet 3. Open defecation (bush, field) 4. Other (specify)	
2.6	Is there enough water in the toilet, where do you go for defecation? के तपाईंले प्रयोग गर्ने चर्पीमा प्रशस्त पानीको व्यवस्था छ?	1. Yes 2. No	
2.7	Have you ever heard about open defecation free campaign in your VDC? के तपाईंले यस गा. वि. स. लाई खुल्ला दिशामुक्त क्षेत्र बनाउन लागेको सुन्नु भएको छ?	1. Yes 2. No	
2.8	Is there toilet facility in the following places within your VDC? के यस गा. वि. स. का निम्न स्थानहरूमा चर्पी छ?	1. YES 2.No 3. Don't know 1. School <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 2. VDC Office <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 3. HP/SHP <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 4. Temple/religious place <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 5. Other (specify) -----	
2.9 ##	When is it necessary, if at all, to wash your hands? हात कतिवेला धुनुपर्छ?	1. After defecation 2. Before eating meal 3. After cleaning faces of the child 4. After working at the dust/ field/animal sheds 5. Other (specify.....).	
2.10	In the last one month, has your child had diarrhoea? (Loose stool more than 3 times in 24 hours) के गत १ महिनाभित्रमा तपाईंको बच्चालाई पखाला लागेको थियो? (२४ घण्टामा तीन पटकभन्दा बढि पातलो दिशा लागेको)	1. Yes 2. No →	Go to next sec

3

Multiple Answers (यस्तो चिन्ह ## भएमा एक भन्दा धेरै उत्तर हुन सक्छ ।)

2.11	During the time (your child had diarrhea), how much food was he given to eat? तपाईंको बच्चालाई पखाला लागेको बेलामा साविक भन्दा कति मात्रामा खान दिईएको थियो?	1. Less than usual 2. More than usual 3. About same 4. Other (.....)	
2.12	Was anything given to treat diarrhoea? पखालाको उपचार गर्न केहि दिईएको थियो?	1. Yes 2. No 3. Don't know/ don't remember	
2.13 ##	What was given to treat diarrhoea? पखालाको उपचार गर्न केहि दिईएको थियो?	1. Pills/ syrup antibiotic 2. Oral rehydration solution 3. Zink tablets 4. Injection 5. Intra-venous fluid 6. Home remedy/ herbal medicine 7. Other (specify.....)	

Section 3: Antenatal Care and seeking care – FOR ALL RESPONDENTS

Note: these questions relate to the woman's LAST pregnancy

3.1	Did you take iron/folic acid (vitamin tabs) during pregnancy? तपाइले पछिल्लो पटक गर्भवती हुँदा आइरन र भिटामिनका चक्की खानुभएको थियो?	1. Yes 2. No 3. Don't know	Go to 3.4
3.2	Did you take all of the tables OR did you complete the course? के तपाईंले सबै चक्की खानुभयो वा सबै औषधि खानुभयो? Complete course means 4 th month of pregnancy to birth	1. Yes 2.No	
3.3 ##	Where did you get these tablets? तपाइले यि चक्की कहाँबाट लिनुभयो?	1. HP/SHP 2. NGO clinic 3. Private doctor or clinic/ Pharmacy 4. local health worker/FCHV/Out reach clinic 5. Hospital in Kathmandu 6. Other (Specify)	
3.4	Did you see anyone for antenatal care during your most recent pregnancy? तपाइले पछिल्लो पटक गर्भवती हुँदा कसैसँग जाँच गराउनु भएको थियो?	1. Yes 2. No	Go to 3.16
3.5 ##	If yes: Whom did you see for your last visit/check-up? यदि जाँचाउनुभएको भए को सँग जाँचाउनु भयो?	1. Doctor 2. Nurse (SN, ANM) 3. HA/CMA/MCHW 4. Other (Specify.....) 5. Don't know	
3.6 ##	Where were the antenatal visits? (circle all that apply) तपाइले पछिल्लो पटक गर्भवती हुँदा गर्भवती जाँच कहाँ गराउनुभयो?	1. Hospital 2. PHC 3. HP/SHP 4. Out Reach Clinic 5. Private Clinic 6. Other (Specify.....)	
3.7	After how many months of pregnancy did you have your first antenatal visit with above person? तपाइ गर्भवती भएको कती महिनामा पहिलो जाँच गराउनु भयो?	1. Month..... 2. Don't know	
3.8	How many antenatal visits did you have during your last pregnancy? तपाइले पछिल्लो पटक गर्भवती हुँदा जम्मा कति पटक जाँचाउनु भयो?	1. No. of visit..... 2. Don't know	
3.9 ##	How did you know about ANC checkups? तपाइले गर्भवती जाँचबारे कसबाट थाहापाउनु भयो ?	1. From Family members 2. From Radio/TV 3. Health workers 4. Friends/relatives /Neighbour/community people 5. School/college/teacher 6. Female community health volunteer 7. Other (specify).....	

4

Multiple Answers (यस्तो चिन्ह ## भएमा एक भन्दा धेरै उत्तर हुन सक्छ ।)

3.10 ##	During antenatal visit, was any of following done at least once during your pregnancy? गर्भवती जाँचको बेला कस्तोमा एक पटक तलका प्रक्रियाहरू गरीयो? A. Did you have weight checked? तौल लिइयो? B. Was your height measured? उचाइ लिइयो? C. Was blood pressure measured? रक्तचाप जाँचियो? D. Did you give urine sample? पिसाब जाँचियो? E. Did you give blood sample? रगत जाँचियो? F. Did they check your ankles for swelling? सुनिएको छ छैन पिडौलामा औला गाडेर जाँचियो?	A. 1.Yes 2.No 3.Don't know B. 1.Yes 2.No 3.Don't know C. 1.Yes 2.No 3.Don't know D. 1.Yes 2.No 3.Don't know E. 1.Yes 2.No 3.Don't know F. 1.Yes 2.No 3.Don't know	
3.11	During pregnancy were you given an injection in the arm to prevent the baby from getting tetanus? तपाइ गर्भवती हुँदा टि.टि.खोप लगाउनुभयो?	1. Yes (if yes, times) 2. No 3. Don't know	
3.12	During the antenatal visit did you get any advice from health worker regarding ANC, use of iron, deliver at HF and PNC? गर्भवती जाँचको समयमा तपाइले स्वास्थ्यकर्मीबाट गर्भवती जाँच, आइरन चककी खाने, स्वास्थ्य संस्थामा प्रसूती गर्नेबारे कुनै सल्लाह पाउनुभयो?	1. Yes 2. No 3. Don't know	
3.13	How long did it take to travel from your home to place where you usually went for antenatal check-up? तपाइको घरबाट प्रायः गर्भवती जाँच गराएको स्थानमा पुग्न कति समय लाग्यो?	..... Hours Minutes	
3.14	Who decided that you would go for your antenatal check-up? गर्भवती जाँच गराउने निर्णय कसले गर्‍यो?	1. Myself 2. Husband 3. Mother-in-law 4. Other (specify).....	
3.15	How satisfied are you with the antenatal care you received from service providers during pregnancy? स्वास्थ्यकर्मीको व्यवहार र जाँचबाट कसिको सन्तुष्ट हुनुहुन्छ?	1. Not at all 2. Somewhat 3. Very Much	Go to 3.17
3.16 ##	If you did not have any antenatal care visits, why not? यदि तपाइले गर्भवती जाँच नगराउनु भएको भए, किन जाँच गराउनुभएन? (more than one answer possible) Do not read out answers!	1. Shyness 2. Health worker is a man 3. Don't know about health services 4. Too far to health facility 5. No money to pay for visit 6. No time to go for visit 7. Family don't allow to go 8. No transportation 9. Other (specify)	
3.17	Did you have any health problems during your most recent pregnancy? के तपाइलाई गर्भवती अवस्थामा कुनै समस्या भयो?	1. Yes 2. No 3. Don't know	Go to next Section 4
3.18 ##	If yes, what problems did you have? यदि समस्या आएको भए के के भयो?	1. Vaginal Bleeding 2. Swelling body/ legs 3. High blood pressure 4. Dizziness 5. Abdominal pain 6. Vomiting in early pregnancy 7. Weakness 8. White discharge 9. Other (specify.....)	
3.19 ##	Where did you go to solve these problems? यि समस्या समाधानको लागि कहा जानुभयो ?	1. Hospital 2. PHC 3. HP/SHP 4. Out Reach Clinic 5. Traditional Birth Attendants 6. FCHV 7. Private Clinic 8. Traditional Healers 9. Other (specify.....) 10. Nowhere	

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Multiple Answers (यस्तो चिन्ह ## भएमा एक भन्दा धेरै उत्तर हुन सक्छ ।)

3.20 ##	If you did not seek care from any one, why not? (Max. 3 Answers) Only if nowhere to previous question. यदि सहयोग लिनु नभएको भए, किन लिनु भएन ? (बढीमा ३ वटा उत्तरहरू) अधिल्लो प्रश्नमा कहिपनि तगएको बताएमा मात्र)	<ol style="list-style-type: none"> 1. No need perceived by woman 2. No need perceived by family 3. Not part of local tradition 4. HW not in health facility 5. HW is a man 6. Not aware of services 7. Too far to health facility 8. No money to pay for visit 9. No time to go for visit 10. The service is poor 11. Family don't allow to go 12. The problem cured itself 13. Other (specify.....) 	
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Section 4: Delivery Care

FOR ALL RESPONDENTS, ASK ABOUT LAST DELIVERY:

4.1	Where did you deliver the baby? तपाइले बच्चा कहाँ जन्माउनुभयो?	<ol style="list-style-type: none"> 1. Home 2. Hospital 3. PHC 4. HP/SHP 5. Private clinic 6. Other(specify)..... 	
4.2 ##	Who decided where to deliver your baby? बच्चा कहाँ जन्माउनेबारे कसले निर्णय लियो?	<ol style="list-style-type: none"> 1. Myself 2. Husband 3. Mother-in-law/grandmother 4. Other (specify.....) 	
4.3 ##	Who assisted with the birth of baby? बच्चा जन्माउन कसले मद्दत गर्‍यो?	<ol style="list-style-type: none"> 1. Doctor 2. Nurse 3. Student Nurse/medical student 4. HA/CMA/MCHW 5. VHW 6. TBA 7. Family member/Relatives 8. Health worker (general) 9. Other (specify.....) 10. No one 	
4.4	Did you receive money from GON as transportation allowance for delivering at health facility? तपाइ सुत्केरी हुँदा कतैवाट (सरकारी वा नैसरकारी) आर्थिक सहयोग पाउनुभयो?	<ol style="list-style-type: none"> 1. Yes 2. No → Go to 4.6 3. Don't know → Go to 4.6 	
4.5	How much money did you receive? तपाइले सुत्केरी हुँदा कति रकम सहयोग स्वरुप पाउनुभयो?	<ol style="list-style-type: none"> 1. Did not get any 2. rupees 3. Don't know 	
4.6	How much did you have to pay drugs, registration procedures, for staff, for delivery, travel, food etc? तपाइ सुत्केरी हुँदा कति खर्च लाग्यो? (दर्ता शुल्क, औषधि उपचार, कर्मचारी, यातायात, खाना, आदि सबैमा)	<ol style="list-style-type: none"> 1. Total cost .....rupees 2. Don't Know 	
4.7	How satisfied are you with the care received during labour and delivery? तपाइ प्रसव सेवावाट कतिको सन्तुष्ट हुनुहुन्छ?	<ol style="list-style-type: none"> 1. Not at all 2. Somewhat 3. Very 4. Not applicable 	

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Multiple Answers (यस्तो चिन्ह ## भएमा एक भन्दा धेरै उत्तर हुन सक्छ ।)

Section 5: Postnatal Care of Woman

5.1	After baby was born, did a health professional check your own health? बच्चा जन्मेपछि, स्वास्थ्यकर्मीले तपाईंलाई जाँच गर्‍यो?	1. Yes 2. No 3. Don't know	Go to 5.3
5.2	How many days or weeks after the delivery did the first check take place? बच्चा जन्मेको कति समयपछि जाँच गरियो?	1. Same day 2. next day 3. After 2 days 4. No Check	
5.3	Did you have any health problems within the first 42 days after delivery? तपाईंलाई प्रसव भएको पहिलो ४२ दिन भित्रमा कुनै स्वास्थ्य समस्या आयो?	1. Yes 2. No 3. Don't know	

Section 6: Neonatal Care : TELL WOMAN THIS RELATES TO HER MOST RECENTLY BORN CHILD

6.1	If you had your baby at home, was a Home Delivery Kit box (safe delivery kit box) used? यदि तपाइले घरमै बच्चा जन्माउनु भएको भए, सुक्केरी सामग्रीको बट्टा प्रयोग गर्नुभयो?	1. Yes 2. No 3. Don't know	ONLY for HOME Delivery
6.2	With what was the cord-cut? साल के ले काटियो वा काटनुभयो ?	1. Clean blade 2. Unclean blade 3. Other(specify) 4. Don't know	ONLY for HOME Delivery
6.3	How far from the baby's body was the cord cut? कति लामो नाभि छाडेर साल काटनुभयो?	1. ....(no. of fingers) अंगुली 2. Don't know	
6.4	What was put on the cut cord? साल काटेपछि, नाभिमा के राख्नुभयो?	1. Nothing 2. Antiseptic 3. Oil 4. Ghee/Butter 5. Sindur 6. Turmeric (Besar) 7. Other (specify)	
6.5	When was first time the baby was washed? बच्चालाई कति समय पछि, नुहाइदिनु भयो?	1. Immediately after birth 2. After .....hrs 3. After .....days 4. Don't know	
6.6	How soon was the baby wrapped up after birth? बच्चालाई कति समय पछि न्यानो कपडाले वेर्नुभयो?	1. Immediately 2. Within one hour 3. More than one hour 4. Don't know	
6.7	What was the baby wrapped in after delivery? बच्चा जन्मेपछि, बच्चालाई के ले वेर्नुभयो?	1. Blanket 2. Towel 3. Sari 4. Thin cloth 5. Nothing 6. Don't know 7. Other (state).....	
6.7	How old was the baby the first time they had anything other than breast milk? (eg animal milk, horlicks, medicine except vaccines, Jeevan jal, any foods, alcohol or holy water from priest/ trad healer) तपाइको बच्चा कति महिनाको हुँदा आफ्नो दूध बाहेकका खानेकुरा खाउन शुरू गर्नुभयो ?	1. 1 month 2. 2 to 4 months 3. 5 to 6 months 4. Over 7 months 5. Still breast feeding	
6.8	Was breast milk the first feed your baby was given? तपाइले बच्चालाई पहिलो पटक तपाइको आफ्नै दूध खुवाउनुभयो?	1. Yes 2. No	
6.9	Did you give your baby the colostrum, the first yellow milk from the breast? तपाइको बच्चालाई तपाइले पहिलोपल्ट आउने बाक्लो पहेंलो (विघीती) दूध खुवाउनुभयो?	1. Yes 2. No	
6.10	Did you breast feed within the first hour after birth? तपाइको बच्चालाई जन्मेको एक घण्टा भित्रमा दूध खुवाउनुभयो?	1. Yes 2. No	
6.11	Was your baby weighed soon after delivery? के तपाइको बच्चालाई जन्मने वित्तिकै तौलिएको थियो?	1. Yes 2. No 3. Don't know	Go to Q 6.13

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Multiple Answers (यस्तो चिन्ह ## भएमा एक भन्दा धेरै उत्तर हुन सक्छ ।)

6.12	If yes, what was his/her weight? यदि थियो भने उसको तौल कति थियो?	1. gram 2. Don't remember	
6.13	When did the baby have a first health check after delivery? बच्चा जन्मेको कति समयपछि पहिलो पटक स्वास्थ्य जाँच गराउनुभयो?	..... Hrs after delivery ----- Days after delivery Had none	
6.14	Did the healthcare worker check your baby a second time in the first month after delivery? तपाइको बच्चालाई स्वास्थ्यकर्मीले एक महिनाभित्र फेरी जाँच गराउन लाग्नुभयो?	1. Yes 2. No 3. Don't know	
6.15	Did your baby have any healthcare problems within the first month after delivery? तपाइको बच्चालाई जन्मेको एक महिना भित्र कुनै स्वास्थ्य समस्या आयो?	1. Yes 2. No	Go to Q 6.19
6.16	At what age did the baby have health problems? तपाइको बच्चा कति दिन वा हप्ताको हँदा स्वास्थ्य समस्या आयो?	-----days -----weeks	
6.17	What problems occurred with the baby after delivery यदि स्वास्थ्य समस्या आएको भए के के भयो?	1. Difficulty in breathing 2. Cold/ hypothermia 3. Fever 4. Not feeding 5. Too sleepy 6. Diarrhoea 7. Other (specify)	
6.18	Where did you visit to solve these problems? Who or where did you go to solve these problems? यी समस्याहरू समाधान गर्न कहाँ जानुभयो?	1. Hospital 2. PHC/ Hospital 3. HP/SHP 4. Out Reach Clinic 5. Private Clinic 6. Traditional Healers 7. Family members 8. Other (specify) 9. Nowhere	
6.19	Did you or anyone else register the birth of your baby? तपाइको बच्चाको जन्म दर्ता भयो?	1. Yes 2. No 3. Don't know	

Section7: Women empowerment

7.1	Are you a member or ex member of elected local body? (eg VDC, ward etc) तपाइ कुनै संस्थाको निर्वाचित सदस्य हुनुहुन्छ? वा हुनुहुन्थ्यो? (गा.वि.स., बडा)	1. Yes (your post) 2. No	
7.2	Are you member of any voluntary organisation (NGO, User groups etc) तपाइ कुनै समूह वा गैरसरकारी संस्थाको सदस्य हुनुहुन्छ?	1. Yes 2. No	
7.3	Who makes the decisions mainly about health care in the household? तपाइको घरमा स्वास्थ्य सेवा लिनमा कसले निर्णय गर्छ?	1. Myself 2. My husband 3. Mother in law 4. Other (specify who).....	
7.4	Sometimes a husband is annoyed or angered by things that his wife does. In your opinion, is a husband justified in hitting or beating his wife in the following situations: कहिलेकाहि श्रीमान् श्रीमतीसँग केहि कुरा पढा रिसाउछन् । तपाइका विचारमा निम्न अवस्थामा श्रीमतीलाई गालि गर्नु वा कुटपिट गर्नु जायज हो ? A. If she goes out without telling him? यदि श्रीमान्लाई नसोधि बाहिर गएमा B. If she neglects the children? यदि उनले बच्चाहरूलाई बेवास्ता गरेमा C. If she argues with him? यदि उनले श्रीमान्सँग वादविवाद वा बहस गरेमा D. If she refuses to have sex with him? यदि उनले यौन सम्पर्क गर्न नमानेमा E. If she burns the food? यदि उनले खाना डढाएमा	A. 1. YES 2. NO 3. Don't Know B. 1. YES 2. NO 3. Don't Know C. 1. YES 2. NO 3. Don't Know D. 1. YES 2. NO 3. Don't Know E. 1. YES 2. NO 3. Don't Know	

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Multiple Answers (यस्तो चिन्ह ## भएमा एक भन्दा धेरै उत्तर हुन सक्छ ।)

7.5	How old were you when you (Ask only for married woman) तपाईं कतिवर्षको हुनुहुन्थ्यो? (विवाहितमहिलालाई मात्र सोध्ने) 1. promised to marry विवाह गर्न निर्णय हुदाको उमेर 2. got married विवाह गर्दाको उमेर 3. Living with husband श्रीमानसित सगै बस्दाको उमेर	1. yrs. Promise marriage 2. yrs- age at marriage 3. yrs –started to live with husband or husband house	
7.6	Who selected your husband? (Ask only for married woman) तपाईंको श्रीमानकसले छनौट गर्नुभएको थियो? (विवाहित महिलालाई मात्र सोध्ने)	1. Myself 2. My family 3. Myself and my family jointly 4. Other (specify.....)	
7.7	In your opinion, who should have right to choose the husband/partner? तपाईंको विचारमा श्रीमान छनौट गर्नमा कसको अधिकार हुन्छ होला? सबैलाई सोध्ने ।	1. Own 2. Family member (parents, own brother and sisters) 3. Relatives 4. Jointly 5. Other (Specify	
7.8	How old were you when you had first pregnancy? तपाईं पहिलो पटक गर्भवती हुँदा कति वर्षकी हुनुहुन्थ्यो?	.....yrs	
7.9	How many times have you been pregnant? तपाईं अहिले सम्म कति पटक गर्भवती हुनुभयो?	.....times	
7.10	How many live children do you have? तपाईंको कति जना जीवित बच्चा छन्?	.....
7.11	Have you had any miscarriages/abortion/stillbirth? तपाईंको बच्चा खेर गएको वा गर्भपतनभएको वा मरेको बच्चाजन्मेको छ ?	1. Yes 2. No	
7.12	If yes, what has happen? यदि थियो भने के भएको थियो?	1. Miscarriages (28 wks before) 2. Abortion (after 28 weeks) 3. Stillbirth (मरेको बच्चा जन्मेको)	
7.13	Have you ever discussed, with your partner, his attitudes towards family planning? परिवार नियोजनका साधनको प्रयोगबारे आफ्नो श्रीमान वा साथीसित कहिल्यै सल्लाह गर्नुभएको छ?	1. Yes 2. No 3. No partner/unmarried	
7.14	Is abortion legal in Nepal? के नेपालमा गर्भपतनले कानुनीमाय्यतापाएको छ ?	1. Yes 2. No 3. Don't know	
7.15	Where do women go to have abortion in this village? यदि गर्भपतन गराउन परेमा सो सेवा कहा पाईन्छ?	1. India 2. Butwal 3. Parasi 4. Bhairahawa 5. Others (specify	

Section 8: Contraception and others FOR ALL RESPONDENTS

8.1	Were you using contraception when you became pregnant before your recent/last pregnancy? तपाइले अहिले वा गत गर्भावस्था भन्दा पहिले कुनै परिवार नियोजनको साधन प्रयोग गर्नुभएको थियो?	1. Yes 2. No →	Go to 8.5
8.2 ##	If yes, what did you use? यदि गर्नु भएको भए के प्रयोग गर्नुभएको थियो?	1. Oral pills 2. IUD(Copper T)/ IUI (Mirena) 3. Injections (DEPO) 4. Implants (Norplant) 5. Condom 6. Diaphragm/cap 7. Foam/jelly 8. female sterilization (minilap) 9. male sterilization (vasectomy) 8. Other (specify).....	
8.3	How long had you been using that method of contraception? ती साधनहरु कति समयदेखि प्रयोग गरि रहनु भएको छ?	1. Less than one week 2. Less than 1 month 3. Between 1-6 months\ 4. Less than one year 5. More than one year	
8.4 ##	Where did you obtain this contraception last time? यि साधनहरु कहाँबाट प्राप्त गर्नुभयो?	1. Gov hospital/clinic 2. PHC 3. Health post/sub health post 4. mobile clinic 5. FCHV	

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Multiple Answers (यस्तो चिन्ह ## भएमा एक भन्दा धेरै उत्तर हुन सक्छ ।)

		6. FPAN 7. Marie Stopes 8. Private hospital/clinic 9. pharmacy 10. Others (specify.....)	
8.5	Was your last pregnancy planned? तपाइको गत गर्भ योजनाअनुसार भएको हो?	1. Yes 2. No	
8.6	Have you ever discussed, with your partner, his attitudes towards family planning? परिवार नियोजनका साधनको प्रयोगबारे आफ्नो श्रीमान वा साथीसित कहिल्यै सल्लाह गर्नुभएको छ?	1. Yes 2. No	
8.7	Who makes the decisions about family planning for you? परिवार नियोजनका साधनको प्रयोगबारे कसले निर्णय गर्छ? परिवार नियोजनका साधन प्रयोग गर्नेलाई मात्र सोध्ने?	1. No partner/unmarried 2. Don't use FP 3. You 4. Partner 5. Mutual (you & partner) 6. Relatives 7. Health workers 8. Other (specify)	
8.8	Have you ever used emergency contraceptives? के तपाईंले कहिल्यै आकस्मिक गर्भ निरोधकको साधनहरू प्रयोग गर्नुभएको छ?	1. Yes 2. No 3. Never heard of it	

Section 9: Knowledge on HIV and its prevention

9.1	<ul style="list-style-type: none"> Can people reduce their chance of getting the AIDS virus by having just one uninfected sex partner who has sexual intercourse with no other partners? के मानिसले एकजना विश्वासिलो व्यक्तिसग मात्र यौन सम्पर्क गरेमा (जसले अन्यसग यौन सम्पर्क गरेको छैन) एड्स लाग्ने संभावना घट्छ? Can people get the AIDS virus from mosquito bites? के लामखुट्टेको टोकाइबाट एड्स सक्छ? Can people reduce their chance of getting the AIDS virus by using a condom every time they have sex? हरेक पटकको यौन सम्पर्कमा कण्डम प्रयोग गरेमा एड्स लाग्ने संभावना घट्छ? Can people get the AIDS virus by sharing food with a person who has AIDS? एड्स लागेको व्यक्तिको जुठो खादा एचआइभ सक्छ? Is it possible for a healthy-looking person to have the AIDS virus? हेदा स्वस्थ देखिने व्यक्तिलाइ पनि एड्स लागेको हुन सक्छ? If a member of your family became sick with AIDS, would you be willing to care for her or him in your own household? तपाइको परिवारको कोहि सदस्यलाई एड्स भयो भने तपाइ उसलाई घरमै स्याहार गर्नुहुन्छ कि हुन्न? 	1. YES 2. NO 3. Don't Know <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
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THANK YOU for taking part in this study (धन्यवाद !)
Please accept this small gift

Appendix IV - Variables Description

Table S1: Variables description and codification, overall evaluation.

Variable	Description	Values
Regressions		
Intervention	Dichotomical variable	0=control group; 1= intervention group
After (midline regression)	Dichotomical variables	0= time at baseline; 1= time at midline
After*intervention (midline regression)	Dichotomical variables	0= control group at midline; 1= intervention group at midline
Afterafter (final regression)	Categorical variables	0= time at baseline; 1= time at midline 2= time at final
Afterafter*intervention (final regression)	Dichotomical variables	0=control group at final; 1= intervention groups at final 2= intervention group at final
Age	Continuous variable	15 - 49
Education	Categorical variables	0= none; 1= primary; 2= Secondary and higher/tertiary
Components for wealth index construction		
1. Materials used for roofing	Dichotomical variables	0= roof made of tin, hay, stone; 1= roof made of cement, tile,
2. Area of land owned	Dichotomical variables	0= own land less than 3 Ropani (0.38 acres in the hills); 1= own land greater than 3 Ropani (0.38 acres in the hills)
3. Goat	Dichotomical variables	0=none; 1= owns goats
4. Motorised vehicle	Dichotomical variables	0=none; 1= owns a motorcycle
5. Car	Dichotomical variables	0=none;

		1= owns a car
6. Source of drinking water	Dichotomical variables	0= non-piped source of water to the home (common or public piped water, well, borehole, rain water, surface water such as rain, dam, lake, pond, stream, stone tap or <i>dhara</i>); 1= piped source of water to the home
7. Type of toilet	Dichotomical variables	0= pit latrine (with or without slab) or composting toilet; 1= owns a flush toilet (flush to piped sewer system, septic tank or pit latrine)
8. Number of rooms in dwelling	Ratio of room: person	Total household member/rooms in dwelling
9. Type of energy used to cook (natural)	Dichotomous variables	0=none; 1= uses natural source directly (kerosene, wood, animal dung, coal, straw, shrubs, grass)
10. Type of energy used to cook (biogas)	Dichotomous variables	0=none; 1= uses biogas (made from raw materials converted to gas: agricultural waste, manure, municipal waste, plant material, sewage, green waste or food waste)
11. Type of energy used to cook (LP gas)	Dichotomous variables	0=none; 1= uses liquid petroleum gas (LP gas)
12. Type of energy used to cook (electricity)	Dichotomous variables	0=none; 1= uses electricity to cook
13. Bicycle	Dichotomical variables	0=none; 1= owns a bicycle
14. Mobile phone	Dichotomical variables	0=none; 1= owns a mobile phone
15. Fridge	Dichotomical variables	0=none; 1= owns a fridge
16. Computer	Dichotomical variables	0=none; 1= owns a computer

**Appendix V - Annex-1: Qualitative topic guide, Intervention Area
Intervention area: Very young, young, and older mothers**

1. What has changed in this area since 2007?
2. How has the population changed distribution of the communities in the last 5 years?
3. What government programmes (financial schemes or interventions) for health have been introduced since 2007?
4. In your opinion, what has changed in healthcare in the last five years?
5. Tell me how you use mobile phones to enquire about healthcare and advice in the community? How?
6. What would you like to change in the community to help improve the health of babies?
7. What would you like to change in the community to help improve the health of babies?
8. What NGO's work in this area?
9. Who make the decision to attend ANC? Tell me about it?
10. Who makes the decision to attend delivery care? Tell me about it?
11. Who makes the decision to attend PNC? Tell me about it?
12. Do you attend GT health promotion groups?
13. What do you discuss at GTN? (Hand washing, hygiene sanitation, problems related to ANC, delivery and PNC; Infection/exclusive breast feeding/skin-to-skin; and Contraception)
14. What barriers are there to women like you to attend sessions? (Time, cost for transportation, had to work in the field, house and permission from the family)
15. Are you able to communicate freely and honestly with GTN staff? What is good, what is bad? How can GTN want to improve?
16. Since you started going to GTN, do you feel different?
17. Does anyone else in your household go to a GTN group? (Mother-in-law, sister-in-law, husband, father-in-law? Did they share anything about health with you from their group meetings?)
18. Are there any other members of the community who don't attend GTN, who are benefitting in any other way?
19. Do you go to GTN groups? Do you go to ANC, if you don't why?
20. Would you recommend a new mother (to be) in the community to attend?
21. Tell me what it is like having a new baby or being a new mother? What is the tradition in your family? (When can the new mother go out, go to her parent's house/in-laws house? When you start working?)
22. What kind of cultural practices exist around pre-pregnancy?

23. What kind of cultural practices exist around pregnancy?
24. What kind of cultural practices exist around post-pregnancy care?
25. Tell what is commonly practiced in the community during antenatal, pregnancy and postnatal care? Do mothers give ayurvedic/herbal medicines to babies? From where? Presents? What can you do? What can't you do?

Intervention area: GTN Staff Interview

1. What has changed in this area since 2007?
2. How has the population changed distribution of the communities in the last 5 years?
3. What government programmes (financial schemes or interventions) for health have been introduced since 2007?
4. In your opinion, what has changed in healthcare in the last five years?
5. Tell me how you use mobile phones to enquire about healthcare and advice in the community? How?
6. What would you like to change in the community to help improve the health of babies?
7. What would you like to change in the community to help improve the health of babies?
8. What NGO's work in this area?
9. Who make the decision to attend ANC? Tell me about it?
10. Who makes the decision to attend delivery care? Tell me about it?
11. Who makes the decision to attend PNC? Tell me about it?

GTN:

12. How do you get new mothers to attend?
13. Do you go to house visits? Why? What do you do? How different is it from the group meeting?
14. Has the home visit made any difference or any changes to the women?
15. Are there any other members of the community who don't attend GTN, who are benefitting in any other way?
16. Can you tell me why some people might not attend? How do you cope with non-attendance?
17. How do you keep people motivated with during the group meeting?
18. How do you keep people motivated after they have been to several group meetings?
19. Do you give any incentives/gifts at the meeting or at the house visits?
20. What exercises do you do? In problem solving?
21. Who do you refer to?

22. Which other agency do you work with? What partnerships do you have in the community?
23. Tell me what it is like having a new baby or being a new mother? What is the tradition in your family? (When can the new mother go out, go to her parent's house/in-laws house? When you start working?)
24. What kind of cultural practices exist around pre-pregnancy?
25. What kind of cultural practices exist around pregnancy?
26. What kind of cultural practices exist around post-pregnancy care?
Do mothers give ayurvedic/herbal medicines to babies? From where? Presents?
What can you do? What can't you do?

Intervention area: FCHVs

1. What has changed in this area since 2007?
2. How has the population changed distribution of the communities in the last 5 years?
3. What government programmes (financial schemes or interventions) for health have been introduced since 2007?
4. In your opinion, what has changed in healthcare in the last five years?
5. Tell me how you use mobile phones to enquire about healthcare and advice in the community? How?
6. What would you like to change in the community to help improve the health of babies?
7. What would you like to change in the community to help improve the health of mothers?
8. What NGO's work in this area?
9. Who make the decision to attend ANC? Tell me about it?
10. Who makes the decision to attend delivery care? Tell me about it?
11. Who makes the decision to attend PNC? Tell me about it?
12. Are you able to communicate freely and honestly with GTN staff? What is good, what is bad? How can GTN want to improve?
13. Can you tell me why some people don't attend?
14. Would you recommend a new mother (to be) in the community to attend?
15. Can you tell me why some people might not attend?
16. What care advice in your role as FCHV do you give to the new baby?
17. What care advice in your role as FCHV do you give to the new mother?
18. What is the tradition in the family?
19. When can the new mother go out, go to her parent's house/in-laws house?
20. What kind of cultural practices exist around pre-pregnancy?
21. What kind of cultural practices exist around pregnancy?
22. What kind of cultural practices exist around post-pregnancy care?
Do mothers give ayurvedic/herbal medicines to babies? From where? Presents?
What can you do? What can't you do?

Appendix V - Annex-2: qualitative topic guide, Control area

Controlled area: Very young, young, and older mothers

1. What has changed in this area since 2007?
2. How has the population changed distribution of the communities in the last 5 years?
3. What government programmes (financial schemes or interventions) for health have been introduced since 2007?
4. In your opinion, what has changed in healthcare in the last five years?
5. Tell me how you use mobile phones to enquire about healthcare and advice in the community? How?
6. What would you like to change in the community to help improve the health of babies?
7. What would you like to change in the community to help improve the health of babies?
8. What NGOs work in this area?
9. Who make the decision to attend ANC? Tell me about it?
10. Who makes the decision to attend delivery care? Tell me about it?
11. Who makes the decision to attend PNC? Tell me about it?
12. Would you recommend a new mother (to be) in the community to attend?
13. Tell me what it is like having a new baby or being a new mother? What is the tradition in your family? (When can the new mother go out, go to her parent's house/in-laws house? When you start working?)
14. What kind of cultural practices exist around pre-pregnancy?
15. What kind of cultural practices exist around pregnancy?
16. What kind of cultural practices exist around post-pregnancy care?
17. Tell what is commonly practiced in the community during antenatal, pregnancy and postnatal care? Do mothers give ayurvedic/herbal medicines to babies? From where? Presents? What can you do? What can't you do?

Intervention area: GTN Staff Interview

27. What has changed in this area since 2007?
28. How has the population changed distribution of the communities in the last 5 years?
29. What government programmes (financial schemes or interventions) for health have been introduced since 2007?
30. In your opinion, what has changed in healthcare in the last five years?

31. Tell me how you use mobile phones to enquire about healthcare and advice in the community? How?
32. What would you like to change in the community to help improve the health of babies?
33. What would you like to change in the community to help improve the health of babies?
34. What NGO's work in this area?
35. Who make the decision to attend ANC? Tell me about it?
36. Who makes the decision to attend delivery care? Tell me about it?
37. Who makes the decision to attend PNC? Tell me about it?
38. Tell me what it is like having a new baby or being a new mother? What is the tradition in your family? (When can the new mother go out, go to her parent's house/in-laws house? When you start working?)
39. What kind of cultural practices exist around pre-pregnancy?
40. What kind of cultural practices exist around pregnancy?
41. What kind of cultural practices exist around post-pregnancy care?
Do mothers give ayurvedic/herbal medicines to babies? From where?
Presents? What can you do? What can't you do?

Intervention area: FCHVs

1. What has changed in this area since 2007?
2. How has the population changed distribution of the communities in the last 5 years?
3. What government programmes (financial schemes or interventions) for health have been introduced since 2007?
4. In your opinion, what has changed in healthcare in the last five years?
5. Tell me how you use mobile phones to enquire about healthcare and advice in the community? How?
6. What would you like to change in the community to help improve the health of babies?
7. What would you like to change in the community to help improve the health of mothers?
8. What NGOs work in this area?
9. Who make the decision to attend ANC? Tell me about it?
10. Who makes the decision to attend delivery care? Tell me about it?
11. Who makes the decision to attend PNC? Tell me about it?
12. What care advice in your role as FCHV do you give to the new baby?
13. What care advice in your role as FCHV do you give to the new mother?
14. What is the tradition in the family?
15. When can the new mother go out, go to her parent's house/in-laws house?
16. What kind of cultural practices exist around pre-pregnancy?
17. What kind of cultural practices exist around pregnancy?
18. What kind of cultural practices exist around post-pregnancy care?
 - a. Do mothers give ayurvedic/herbal medicines to babies? From where? Presents? What can you do? What can't you do?

Appendix VI – Definitions

Basic emergency obstetric and newborn care (BEmONC) is critical to reducing maternal and neonatal death. This care, which can be provided with skilled staff in health centres, includes the capabilities for:

- Administering antibiotics, uterotonic drugs (oxytocin) and anticonvulsants (magnesium sulphate);
- Manual removal of the placenta;
- Removal of retained products following miscarriage or abortion;
- Assisted vaginal delivery, preferably with vacuum extractor;
- Basic neonatal resuscitation care.

Comprehensive emergency obstetric and newborn care, typically delivered in hospitals, includes all the basic functions above, plus capabilities for:

- Performing Caesarean sections;
- Safe blood transfusion;
- Provision of care to sick and low-birth weight newborns, including resuscitation.

Timing is critical in preventing maternal death and disability: Although post-partum haemorrhage can kill a woman in less than two hours, for most other complications, a woman has between six and 12 hours or more to get life-saving emergency care. Similarly, most perinatal deaths occur around delivery or in the first 48 hours afterward.

Source: UNFPA 2014, Setting standards for emergency obstetric and newborn care. <http://www.unfpa.org/resources/setting-standards-emergency-obstetric-and-newborn-care#sthash.WStPGEUc.dpuf>

Appendix VII – Published papers

Published paper from PhD thesis:

1. Sharma, S., van Teijlingen, E., Belizán, J.M., Hundley, V., Simkhada, P., Sicuri, E. 2016a. Measuring What Works: Impact evaluation of women's groups on maternal health uptake in rural Nepal, *PLOS One* 11(5): e0155144. Available from:
<http://journals.plos.org/plosone/article?id=10.1371%2Fjournal.pone.0155144> [Accessed 25 January 2017].
2. Sharma, S., van Teijlingen, E., Hundley, V., Angell, C. and Simkhada, P., 2016b. Dirty and 40 days in the wilderness: Eliciting childbirth and postnatal cultural practices and beliefs in Nepal. *BMC Pregnancy and Childbirth*, 16(1), 147. Available from:
<https://bmcpregnancychildbirth.biomedcentral.com/articles/10.1186/s12884-016-0938-4> [Accessed 25 January 2017].

RESEARCH ARTICLE

Measuring What Works: An Impact Evaluation of Women's Groups on Maternal Health Uptake in Rural Nepal

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Data Availability Statement: The data are third-party data. The data sets belong to Green Tara Nepal who gave us permission to use the data for this paper. As a charity working in the development field Green Tara Nepal is the ethical and legal guardian of the data which they are willing to provide to researchers on request. We confirm that other interested researchers can obtain the data the same way the authors obtained the data by contacting by email the Programme Manager: greenارانepal@gmail.com.

Abstract

Background

There is a need for studies evaluating maternal health interventions in low-income countries. This paper evaluates one such intervention designed to promote maternal health among rural women in Nepal.

Methods and Results

This was a five-year controlled, non-randomised, repeated cross-sectional study (2007, 2010, 2012) of a participatory community-based maternal health promotion intervention focusing on women's groups to improve maternal health services uptake. In total 1,236 women of childbearing age, who had their last child \leq two years ago, were interviewed. Difference-in-Difference estimation assessed the effects of the intervention on selected outcome variables while controlling for a constructed wealth index and women's characteristics. In the first three years (from 2007 to the 2010), the intervention increased women's likelihood of attending for antenatal care at least once during pregnancy by seven times [OR = 7.0, 95%CI (2.3; 21.4)], of taking iron and folic acid by three times [OR = 3.0, 95%CI (1.2; 7.8)], and of seeking four or more antenatal care visits of two times, although not significantly [OR = 2.2, 95%CI (1.0; 4.7)]. Over five years, women were more likely to seek antenatal care at least once [OR = 3.0, 95%CI (1.5; 5.2)], to take iron/folic acid [OR = 1.9, 95% CI (1.1; 3.2)], and to attend postnatal care [OR = 1.5, 95% CI (1.1; 2.2)]. No improvement was found on attending antenatal care in the first trimester, birthing at an institution or with a skilled birth attendant.

Conclusion

Community-based health promotion has a much stronger effect on the uptake of antenatal care and less on delivery care. Other factors not easily resolved through health promotion

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interventions may influence these outcomes, such as costs or geographical constraints. The evaluation has implications for policy and practice in public health, especially maternal health promotion.

Introduction

Health and development interventions in low-income countries (LICs) need high-quality evaluation [1–3]. Although evidence-based practice is making inroads into public health, there are still too many programmes that lack impact evaluation [4–6].

The main question of impact evaluation is one of attribution: isolating the effect of the programme from other intervening factors and potential selection bias of participants [7–10]. Impact evaluation assesses the medium- to longer-term changes of selected outcomes that can be attributed to a particular intervention, such as a project, programme or policy. These may be both the intended and, unintended outcomes [9,11].

In 2007, Green Tara Nepal (GTN), a non-governmental organisation (NGO), designed and implemented a five-year intervention to improve maternal health uptake in rural Nepal. The intervention included participatory action approaches, health promotion and small incentives. In Nepal, there is inequitable access to maternal health services due to factors such as geography, caste, ethnicity, religion and corruption [12–15].

The GTN intervention was designed to fit national policies and incorporated maternal health promotion focusing on women's groups [16–18]. Such health promotion empowers women to seek care when it is needed, which is particularly important in low-income settings [4,19].

This paper reports on the impact evaluation of GTN, selecting as surrogate maternal mortality outcomes factors such as antenatal care (ANC), skilled birth attendance (SBA) and institutional delivery. These outcomes were chosen because they are indirectly correlated with maternal mortality [20–22]. Difference-in-Difference (DiD), analysis was used to identify and measure the effect of the intervention on the selected outcomes [23–28].

Methods

Study area and population

The programme selected two districts (one intervention and one control) with similar socio-economic characteristics. The districts were close to Kathmandu, each with a total population of just under 9,000. Baseline population characteristics (wealth, age, and education) and health system characteristics were not statistically different between intervention and control districts [29–30]. For instance, the intervention area has a community hospital providing basic emergency obstetric care and two health posts. The control area has two health posts and a primary health care centre nearby (similar to the community hospital in intervention area).

The intervention villages were chosen from a few pre-selected districts not far from Kathmandu that were (a) safe to work at the time of Maoist rebellion (1996–2006), which was still ongoing at the time the intervention was designed (2005/2006); (b) with the local maternal health needs identified by the community and (c) with political commitment towards change [31].

Intervention design

Two health promoters, an auxiliary nurse midwife and a community medical assistant, established and supported women's groups with enrolment running between 2006 and 2012.

Groups comprised (a) women age 15 to 49 with at least one child under the age of two; (b) mothers-in-law; and (c) husbands, as the latter two are particularly influential in terms of women's ability to access health services [19, 29, 32–33]. Family decision-making affects the first of the "3 delays" in the maternal morbidity and mortality conceptual framework, namely the delay in making the decision to seek care [34–35].

The intervention took advantage of existing regular monthly women's group meetings, which were originally savings or literacy-based. The rationale was that women's groups have the potential for scaling-up within existing social systems, where community and health institutions are working in synergy to improve access to quality maternal and newborn health services [36]. Once the GTN intervention was implemented, its groups met regularly (monthly) for health promotion activities. The evidence-based maternal health promotion was designed by GTN and maternal health researchers and delivered by GTN health promoters. Participatory activities with visual cards and role-playing were conducted on for example ANC, iron/folic supplementation, danger signs of pregnancy, safe delivery and postnatal care (PNC). The implementation consisted of 24 sessions of health promotion, each one lasting one hour. In 2010, there were 37 groups (of 12 daughters-in-law, two men and 23 mixed mothers-in-law/daughters-in-law) reaching over 1,100 people.

By 2012, there were 46 groups (11 daughter-in-law groups, two male only groups, and 33 mother-in-law and daughter-in-law groups) reaching over 733 people.

GTN's prerogative was to include all castes and empower lower castes to attend. The groups were generally mixed-caste, however, in certain areas, (where not all castes are represented) groups consisted of only one or two castes (S2 Fig).

The GTN health promoters supported the existing health system of sub-health posts by health communication training with mother-child health workers, traditional healers and hospital staff (e.g. neonatal training); and mobile clinics visits to outlying areas.

The intervention included small individual incentives consisting of a baby blanket awarded on completion of four ANC visits, safe delivery kits available at subsidised prices and other goods of the value of less than ten US cents. These incentives aimed to encourage group attendance and health-care seeking behaviour.

Finally, the intervention was flexible; at each stage, barriers were identified; solutions incorporated and the intervention was reapplied to meet the local needs [31].

Evaluation design

This was a five-year controlled non-randomised intervention. Surveys for its evaluation took place at three points in time (repeated cross-sections): before the intervention started in 2007 (baseline), after 2½ years, in 2010, and after five years in 2012. Trained fieldworkers conducted survey interviews. Surveys were conducted in four villages, two in the intervention and two in control districts. The two villages of the intervention district were the ones where the intervention took place; the two villages of the control area were very similar to the intervention villages in terms of health system characteristics and socio-economic conditions. Within the district, the intervention was carried out in two villages selected based on (a) the presence of an adequate health system infrastructure, specifically a community hospital basic emergency obstetric care and two health posts; (b) having obtained approval from the village head; (c) the willingness to collaborate of the local health staff; (d) being neither the richest nor poorest in the district. The list of all women in the four villages (N = 474, 484 and 463, in the first, second and third survey, respectively) meeting inclusion criteria (having at least one child under the age of two years at the moment of survey) was compiled for both the intervention and the control areas. Hence all women meeting the inclusion criteria in the area determined the sample size,

and the sampling frame covered the total sample. Women were then approached and interviewed at home. If women were not available on the first home visit, interviewers returned on several occasions, and after the third negative attempt women were dropped from the list. Health and socio-economic data were collected on individual, household and village level predictors/indicators using a structured questionnaire.

All women who met the inclusion criteria, not only those who participated in the groups, were eligible for this evaluation: the evaluation aimed to capture positive 'spillover' effects as any community-based programme can have an impact not only on the women directly receiving the intervention but also on the overall community [37,38].

The Nepal Health Research Council (NHRC) granted ethical approval for the study. The study aims were verbally explained to participants, as well as the consequences of their involvement and the right to withdraw at any point. After verbal consent all data were recorded anonymously.

Data analysis

Descriptive analysis included demographic, cultural and socio-economic characteristics as well as maternal outcomes data and decision-making. DiD assessed the individual probability of engaging in each of the outcome variables and measured the difference in each outcome between intervention and control groups and before and after treatment while controlling for potential explanatory variables.

Logistic multivariate regressions were applied. Control variables, in addition to the ones representing the impact of the intervention, were chosen based on the literature and from previously published Demographic Health Studies data based studies [12,39].

With the aim of evaluating the intervention at two points in time, two different types of regressions were estimated: (a) regressions on the sample of women interviewed at baseline (year 2007) and at midline (year 2010); (b) regressions on the sample of all women in the study, including baseline, midline and final evaluation (years 2007, 2010 and 2012). The former (a) permitted the research team to assess the effects of the intervention after 2 years and the latter (b) to evaluate the overall impact of the intervention after 5 years from start.

Specifically, the regressions from baseline to midline were:

$$Y_{ni} = \beta_0 + \beta_1 \text{intervention}_i + \beta_2 \text{after}_i + \beta_3 \text{after} * \text{intervention}_i + \beta_4 \text{age} + \beta_5 \text{wealth index}_i + \beta_6 \text{education}_i + \beta_7 \text{parity}_i \quad \text{Eq[1]}$$

The regressions from baseline to final evaluation were:

$$Y_{ni} = \beta_8 + \beta_9 \text{intervention}_i + \beta_{10} \text{afterafter}_i + \beta_{11} \text{afterafter} * \text{intervention}_i + \beta_{12} \text{age} + \beta_{13} \text{wealth index}_i + \beta_{14} \text{education}_i + \beta_{15} \text{parity}_i \quad \text{Eq[2]}$$

Where $i = 1, \dots, N$ is indicator of each women participating in surveys. Y_n are the binary response variables and n indicates:

- ($n = 1$) ANC attendance at least once during whole pregnancy;
- ($n = 2$) ANC attendance at least once during first trimester;
- ($n = 3$) at least four ANC visits. The WHO recommends a minimum of four ANC visits and that the first one should be within the first trimester of pregnancy [40];
- ($n = 4$) presence of a SBA during delivery; SBA in Nepal was defined as nurse-midwives, auxiliary nurse-midwives and obstetricians. The following groups were, excluded: traditional birth attendants, health attendants, medical students as they are not classified by WHO as SBA [41];

- ($n = 5$) institutional delivery (ID, including at hospital, primary health centre, private hospital or clinic. This was chosen as an outcome because it is a recognised strategy to improve maternal child health [42–44];
- ($n = 6$) attending PNC defined as mother and newborn being seen 24 hours after birth, as 60% of maternal deaths in the low and middle-income countries occur postpartum [45–47]; and
- ($n = 7$) taking iron and folic acid; in Nepal, supplementation is provided at government health facilities [39] to prevent anaemia and neural tube defects [48].

The control variables were:

- Intervention (treat) {Eqs [1] and [2]} denotes the observations of the two groups: intervention and control;
- After {Eq [1]} denotes time, before (baseline) and after intervention started;
- After*intervention (treat-after) {Eq [1]} identifies the group of observations belonging to the intervention group after the intervention started as compared to the remaining observations (namely all observations belonging to control group and intervention group before the programme started), its estimated coefficient, β_3 represents the impact of the intervention [49].
- Afterafter {Eq [2]} identifies the observations collected both in the midline and in the final evaluation as compared to baseline. As for the variable after in Eq [1], this variable also represent time;
- Afterafter*intervention (treat-afterafter) {Eq [2]} identifies observations belonging to the intervention group at the midline and at the final evaluation as opposed to baseline and to all the observations in the control group at any time. Its estimated coefficient, β_{11} represents the impact of the overall intervention [49].
- Age = {Eqs [1] and [2]} represents the age of the individual.
- Wealth index {Eqs [1] and [2]} is extracted from a series of assets owned (see details below). This variable tests the hypothesis of maternal attendance/compliance depending on women's socio-economic status [50–52]. This variable was included instead of caste due to the statistically significant relationship between the two variables both in the midline and in the overall evaluation (Respectively: Pearson $\chi^2(14) = 326.14$; $Pr = 0.00$ and Pearson $\chi^2(14) = 424.75$ $Pr = 0.00$).
- Education = {Eqs [1] and [2]} indicates women's level of education.
- Parity = {Eqs [1] and [2]}.

S1 Table further describes control variables.

Wealth index construction

The wealth index was constructed using Principal Component Analysis (PCA) among a number of assets owned by women's families [53–54]. PCA is commonly used when household expenditure or income data are not available [55]. Assets included in the PCA were: owning a bicycle, motorcycle, goat or car, type of access to hygienic facilities (source of drinking water, type of toilet), number of rooms in house, and materials used in the dwelling (materials used

for flooring, walls, roofing). A description of variables included in the PCA is provided in [S1 Table](#). In [S1 Fig](#) we present the distribution of wealth according to high, middle and low castes, according to the published definition of caste [39,56]. High caste (= 1) included: Brahmin, Chhetri, Newar; middle caste (= 2) included: Tamang middle, or low (= 3): Newar Dalit, Balami, Dalit and others (Christian or Muslim), S1. In [S1 Fig](#) the zero represents the median of the wealth index ranking. The distribution is skewed to the left due to the poverty level of this population.

Data were analysed with STATA™ version 11.0 (Stata/SE 11.0 Stata corporation, College Station, TX, USA).

Results

A total of 1,236 women (611 in the control and 625 in intervention area) completed the surveys, with an overall average response rate of 87%. Specifically, N = 412 women participated in the first, N = 421 in the second and N = 403 in the third survey ([S2 Fig](#)). Overall, the mean age of respondents was 25.4 ± 5.1 years, the mean age of marriage 19.6 ± 3.3 years and the mean age at their first pregnancy 20.9 ± 3.2 years. The main occupation of respondents was either housewife or farmer (89.5%). Most women were multigravida (56.1%) and 43.9% were primigravida ([Table 1](#)).

In the five-year period, the characteristics of the sample changed, the number of Buddhists decreased, while Hindus remained the majority. At baseline, most women were married before the age of 20; this proportion fell to 40.4% in the control group and to 48.5% in the intervention group in last survey. Literacy rates increased steadily ([Table 1](#)).

In terms of decision-making, over time a larger proportion of women reported to have planned pregnancy and to have more autonomy over maternity care, for instance ANC and place of delivery self-decisions increased over the duration of the study ([Table 2](#)). These changes were statistically significant in the intervention area.

At baseline 80.4% of women in the control area attended ANC compared to 84.6% in the intervention area. In the intervention area, from baseline to final evaluation, the proportion of women who sought ANC at least once significantly increased from 84.6% to 98.0%. The proportion seeking ANC in the first trimester significantly increased from 47.7% to 62.4%; those seeking ANC four or more times significantly increased from 67.3% to 81.0%. In addition, a greater proportion of women reported taking iron/folic acid (from 86.5% to 96.0%) and seeing a SBA (from 60.6% to 82.0%). Significant increases were also seen in seeking an institutional delivery (from 60.6% to 76.0%) and PNC (from 52.2% to 85.9%). Use of safe delivery kit significantly increases from 5.0% to 34.3%. Improvements were also registered in the control group but not all were significant ([Table 3](#)).

Impact of the intervention

Tables 4 and 5 show the estimated odds ratios (OR) for the mid and overall evaluations, respectively. The effect of the intervention is represented by the estimated values of the OR of the variables treat-after (midline evaluation) and treat-afterafter (final evaluation). From baseline to the midline there was an increase in women's likelihood of attending ANC at least once during whole pregnancy by 7.0 times [OR = 7.0, 95%CI (2.3; 21.4)]. A significant increase was also seen in the probability of taking iron/folic acid [OR = 3.0, 95%CI (1.2; 7.9)]. The probability of seeking four or more ANC check-ups had doubled, but this increase was not statistically significant [OR = 2.2, 95%CI (1.0; 4.7)] ([Table 4](#)). Over the five years (from baseline to final term), women were three times more likely of seeking ANC at least once [OR = 3.0, 95%CI (1.5; 5.8)].

Table 1. Characteristics of respondents (intervention/control).

Characteristic used as denominator	Control			p-value*	Intervention			p-value*
	Baseline2007	Midline 2010	Final 2012		Baseline2007	Midline2010	Final 2012	
N	204	204	203		208	217	200	
Religion		%		0.0014		%		0.0042
Buddhist	34.8	18.1	31.0		31.7	22.6	18.5	
Hindu	62.3	80.4	68.0		66.4	74.7	77.5	
Other (Christian, Muslim)	2.9	1.5	1.0		2.0	2.8	3.0	
Caste/Ethnicity				0.2048				0.0358
Brahmin	10.3	10.8	6.9		19.2	13.8	13.5	
Chhetri	20.6	18.1	17.2		14.9	7.8	12.5	
Tamang	38.2	35.8	38.4		39.9	51.2	40.5	
Newar non Dalit	25.5	27.5	26.1		14.4	13.4	19.0	
Newar Dalit	1.5	2.5	2.5		1.4	0.5	1.5	
Dalit	1.5	2.0	2.5		1.9	3.2	3.0	
Balami	0	0	0		6.3	5.5	7.0	
Other (Gurung etc.)	2.5	3.4	6.4		1.9	4.6	3.0	
Age of marriage (yrs¹)				0.0173				0.0165
15–19	50.0	52.9	41.4		60.6	60.4	48.5	
20–24	38.4	40.7	45.3		37.0	35.0	43.5	
25–29	10.8	5.4	10.3		1.9	4.2	7.5	
30 and above	2.0	2.0	3.0		0.5	0.5	0.5	
Age of 1st pregnancy				0.0135				0.0001
14–19	37.7	37.3	27.6		51.4	37.8	31.5	
20–24	47.1	52.0	52.7		42.8	52.5	53.5	
25–29	13.7	8.8	15.3		4.8	8.7	13.0	
30 and above	1.5	2.0	4.43		2.0	2.0	2.0	
Literacy	64.2	77.0	70.4	0.0187	66.4	73.3	81.0	0.0037
Education				0.1269				0.0025
None	43.6	31.4	33.0		39.9	33.2	24.5	
Primary	28.4	41.7	34.5		31.7	42.9	38.0	
Secondary and higher	27.9	27.0	32.5		28.4	24.0	37.5	

¹ Yrs—Years

*p-values are based on Kruskal Wallis test to compare each categorical variable across time.

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Women were nearly twice as likely [OR = 1.9, [95% CI (1.1; 3.2)] to take iron/folic acid, and once and a half times as likely to attend PNC [OR = 1.5, [95% CI (1.1; 2.2)].

No effect was seen in the midline, or in the overall evaluation, on attending ANC in the first trimester, seeking an institutional delivery and having a SBA (Tables 4 and 5). A high OR was found for four ANC visits (Table 4), but not in the overall evaluation (Table 5).

Results on remaining covariates

Wealth was a significant factor explaining a high proportion of the variation in all the outcomes both in the midline and in the overall evaluation. In particular, being richer (3rd tertile) compared to being poorer (1st tertile) increased substantially the probability of having a SBA at birth by the midline [(OR = 11.0, 95% CI (6.3; 19.4)] and by the overall evaluation [OR = 9.3, 95% CI (5.9; 14.7)].

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25–29	10.8	5.4	10.3		1.9	4.2	7.5	
30 and above	2.0	2.0	3.0		0.5	0.5	0.5	
Age of 1st pregnancy				0.0135				0.0001
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25–29	13.7	8.8	15.3		4.8	8.7	13.0	
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¹ Yrs—Years

*p-values are based on Kruskal Wallis test to compare each categorical variable across time.

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Results on remaining covariates

Wealth was a significant factor explaining a high proportion of the variation in all the outcomes both in the midline and in the overall evaluation. In particular, being richer (3rd tertile) compared to being poorer (1st tertile) increased substantially the probability of having a SBA at birth by the midline [(OR = 11.0, 95% CI (6.3; 19.4)] and by the overall evaluation [OR = 9.3, 95% CI (5.9; 14.7)].

Table 4. Difference in difference analysis of maternal health uptake (intervention and control) at the midline evaluation.

	Seeking ANC ¹ at least once	Seeking ANC in the 1st Trimester	Seeking ANC 4 or more times	Taking Iron/Folic Acid during pregnancy	SBA ²	ID ³	Seeking PNC ⁴
Observations	832	714	832	831	832	830	832
Treat	1.3 (0.7; 2.4)	0.7 (0.4; 1.1)	1.2 (0.7; 2.0)	2.3 (1.2; 4.1)**	1.2 (0.7; 1.9)	1.2 (0.8; 2.0)	1.5 (0.9; 2.3)
After	1.2 (0.6; 2.2)	1.6 (1.0; 2.6)	0.9 (0.5; 1.5)	1.0 (0.6; 1.7)	1.3 (0.8; 2.0)	0.8 (0.5; 1.3)	2.3 (1.5; 3.6)**
Treat-after	7.0 (2.3; 21.4)**	1.2 (0.6; 2.4)	2.2 (1.0; 4.7)*	3.0 (1.2; 7.9)**	1.5 (0.7; 2.8)	1.7 (0.9; 3.3)	1.6 (0.9; 3.1)
Wealth							
Wealth 2	3.4 (1.9; 6.0)**	1.7 (1.1; 2.5)**	1.2 (0.8; 1.9)	2.6 (1.5; 4.4)**	2.7 (1.9; 3.9)**	2.2 (1.5; 3.2)**	1.7 (1.2; 2.5)**
Wealth 3	6.0 (2.3; 15.7)**	3.1 (1.9; 4.9)**	5.2 (2.6; 10.8)**	2.8 (1.3; 5.8)**	11.0 (6.3; 19.4)**	7.6 (4.6; 12.7)**	4.0 (2.5; 6.4)**
Age	0.9 (0.9; 1.0)**	1.0 (1.0; 1.1)	1.0 (1.0; 1.0)	0.9 (0.9; 1.0)**	1.0 (1.0; 1.0)**	1.0 (1.0; 1.0)	1.0 (1.0; 1.0)
Education							
Education 2	5.2 (2.7; 10.1)**	1.5 (1.0; 2.3)**	1.0 (0.6; 1.5)	4.0 (2.3; 7.0)**	2.0 (1.3; 2.9)**	2.0 (1.3; 2.9)**	2.1 (1.4; 3.0)**
Education 3	9.3 (3.1; 28.0)**	2.6 (1.6; 4.2)	2.0 (1.0; 3.9)**	10.1 (3.9; 25.8)**	4.7 (2.8; 8.1)**	4.3 (2.6; 7.1)**	4.5 (2.8; 7.3)**
Parity							
Parity 2	0.7 (0.4; 1.2)	0.6 (0.4; 0.9)**	0.6 (0.4; 0.9)**	0.5 (0.3; 1.0)**	0.5 (0.4; 0.8)**	0.53 (0.4; 0.8)**	0.7 (0.5; 1.0)**
Parity 3	0.5 (0.3; 0.9)**	0.6 (0.4; 0.9)**	0.6 (0.4; 1.1)	0.3 (0.2; 0.6)**	0.6 (0.4; 1.0)*	0.6 (0.4; 1.0)**	0.75 (0.5; 1.2)

¹ ANC—Antenatal care

² SBA—Skilled birth attendant

³ ID—Institutional delivery

⁴ PNC—Postnatal care

**pvalue<0.05

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Relative to the construction of the wealth index, the first component extracted explained 20% of total variability in the population. The scores based on the first component were grouped into tertiles in S1 Fig, with the lowest (group 1) representing the poorest and the higher (group 3) representing the richest women. Age was a significant factor in determining whether women sought one antenatal visit and took iron/folic acid both at the midline and final evaluation. In both cases, being older lowered the probability of a positive outcome. Having higher education compared to no education increased the probability of all the outcomes considered. In particular, having secondary school or higher-level education increased the probability of attending ANC at least once in the midline [OR = 9.3, 95% CI (3.1; 28.0)] and overall evaluation [OR = 11.0, 95% CI (4.2; 29.0)].

In the intervention area (variable treat), women were more predisposed to seek an institutional delivery [OR = 1.5, 95% CI (1.0; 2.3)] and PNC [OR = 1.5, 95% CI (1.5; 2.3)] at any time. Women in the intervention area were 2.3 [OR = 2.3, 95% CI (1.2; 4.1)] times more likely at midline to take iron/folic and 2.4 [OR = 2.4, 95% CI (1.4; 4.2)] by year 5. Over time (variable after-after), women become increasingly more likely to have a SBA at birth [OR = 1.3, 95% CI (1.1; 1.7)], institutional delivery [OR = 1.3, 95% CI (1.0; 1.6)] and PNC [OR = 1.8, 95%CI (1.4; 2.2)], reflecting background changes. With increasing parity, the ORs for all outcomes remain significantly below 1, indicating a negative relationship between having more than one child and the

Table 5. Difference in difference analysis of maternal health uptake in the overall evaluation.

	Seeking ANC ¹ at least once	Seeking ANC in the 1st Trimester	Seeking ANC 4 or more times	Taking Iron/Folic Acid during pregnancy	SBA ²	ID ³	Seeking PNC ⁴
Observations	1235	1086	1235	1233	1235	1233	1235
Treat	1.5 (0.8; 2.6)	0.7 (0.5; 1.0)	1.5 (0.9; 2.4)	2.4 (1.4; 4.2)**	1.3 (0.9; 2.0)	1.5 (1.0; 2.3)**	1.5 (1.0; 2.3)**
Afterafter	1.2 (0.9; 1.6)	1.0 (0.8; 1.3)	1.0 (0.8; 1.3)	0.9 (0.7; 1.2)	1.3 (1.1; 1.7)**	1.3 (1.0; 1.6)**	1.8 (1.4; 2.2)**
Treat-afterafter	3.0 (1.5; 5.8)**	1.2 (0.9; 1.7)	1.1 (0.7; 1.6)	1.9 (1.1; 3.2)**	1.0 (0.7; 1.5)	0.9 (0.7; 1.3)	1.5 (1.1; 2.2)**
Wealth							
Wealth 2	2.5 (1.6; 4.0)**	1.8 (1.3; 2.4)**	1.4 (1.0; 2.0)	2.6 (1.7; 4.0)**	2.6 (1.9; 3.5)**	2.2 (1.6; 3.0)**	1.7 (1.2; 2.3)**
Wealth 3	4.7 (2.2; 10.4)**	2.8 (1.9; 4.1)**	3.3 (2.0; 5.6)**	2.4 (1.4; 4.2)**	9.3 (5.9; 14.7)**	7.0 (4.6; 10.6)**	3.8 (2.6; 5.7)**
Age	0.9 (0.9; 1.0)**	1.0 (1.0; 1.0)	1.0 (1.0; 1.0)	1.0 (1.0; 1.0)**	1.0 (1.0; 1.0)	1.0 (1.0; 1.0)	1.0 (1.0; 1.0)
Education							
Education 2	4.7 (2.7; 8.1)**	1.4 (1.0; 1.9)	1.0 (0.7; 1.5)	3.3 (2.1; 5.1)**	1.9 (1.4; 2.6)**	1.9 (1.4; 3.0)**	2.2 (1.6; 3.1)**
Education 3	11.0 (4.2; 29.0)**	2.2 (1.5; 3.3)**	1.8 (1.1; 3.0)**	9.3 (4.6; 18.9)**	4.6 (2.9; 7.1)**	4.0 (2.6; 6.0)**	4.7 (3.1; 7.1)**
Parity							
Parity 2	0.6 (0.4; 1.0)*	0.7 (0.5; 1.0)**	0.7 (0.5; 1.04)	0.6 (0.4; 0.9)**	0.5 (0.3; 0.6)**	0.5 (0.4; 0.7)**	0.6 (0.4; 0.7)**
Parity 3	0.4 (0.3; 0.8)	0.6 (0.4; 1.0)**	0.7 (0.4; 1.09)	0.3 (0.2; 0.5)**	0.5 (0.3; 0.8)**	0.5 (0.4; 0.8)**	0.7 (0.4; 1.0)**

¹ ANC—Antenatal care
² SBA—Skilled birth attendant
³ ID—Institutional delivery
⁴ PNC—Postnatal care
 **pvalue<0.05

doi:10.1371/journal.pone.0155144.t005

attendance to any type of maternal health service (either ANC or PNC) or the adherence to any type of pregnancy intervention, such as folic acid and iron intake.

Discussion

This evaluation showed that the health promotion intervention had a positive effect on the uptake of ANC (attending at least once), iron/folic acid intake and PNC, but not on institutional delivery. While there was a positive effect on ANC attendance at least once during pregnancy, no effect was seen on ANC attendance in the first trimester. This may be because women become aware of the pregnancy status later or there are cultural reasons for the pregnancy to be kept a 'secret' [33–34, 42, 57]. Often first-time mothers need to ask permission and money from her family to attend ANC [58].

ANC attendance reduced from the midline to the overall evaluation, suggesting that the intervention may have diminishing returns: it could be argued that the effect was stronger when moving from low coverage to a medium level beyond which marginal improvements started decreasing [59]. The same trend as for ANC at least once was seen for iron/folic acid supplementation [60].

The barriers to accessing institutional delivery may be due to distance and socio-cultural factors (e.g. not part of a family's birth preparedness plans) that cannot be overcome by a

community-based intervention. Other studies in Nepal have suggested socio-economic, financial and geographical obstacles to seeking delivery care [45,61]. Studies with a focus in similar interventions have found that women's groups in LICs increase the knowledge of obstetric 'danger' signs but have little impact on SBA due to other barriers, such as the cost of reaching a facility [62–64].

Although ANC attendance and provision of iron/folic acid during pregnancy are targets likely to be achieved in a community-based intervention such interventions without additional resources (such as ambulances) may not be influential enough to increase SBA or institutional delivery. Whilst PNC uptake is generally low for similar reasons to ANC non-attendance [65–66]. According to descriptive statistics, coverage of PNC greatly increased over the five years, yet the intervention only had a positive and significant effect at the very end of the intervention.

However, during 2007–2010, improvements were not associated with the GTN intervention but were due to other determinants, as witnessed by the significance of the variable "time" in both midline and overall regressions. The progressive improvement in women's level of education and empowerment within the household may have played a role. Empowerment increased for women in particular with regard to decision-making power for ANC and delivery care. However, empowerment was not included in the estimated models as the trend was captured both by time and education (education, age and parity were strongly correlated). Interestingly, the increased women's empowerment could be attributed to the health promotion intervention itself. Complex relationships are likely to exist among education, empowerment, maternal outcomes and the health promotion intervention [67,68].

In the overall evaluation, the factor "time" (represented by variable "afterafter") was significant for PNC, delivery care (SBA and institutional delivery) outcomes, highlighting that other factors, not the GTN intervention, played a role. For instance, women were more likely to attend care if they have high household wealth, higher levels of education and lower parity [57,69]. A wealth index was preferred to caste as a more refined measurement for its greater inclusivity as a socio-economic indicator.

These results suggest that health promotion groups improve access to maternal health when individual, socio-economic and environment (health system) conditions are addressed [70]. Moreover, for this rural LICs setting, a health promotion intervention facilitating behavioural change may be more suitable as opposed to a cash transfer scheme alone. Cash transfer schemes, such as the 'Safe Mother Program' (*Aama-Suraksha-Karyakram*) maternity incentive scheme, are often not financially sustainable [71–72].

Measuring the effect of a community-based intervention is not straightforward because of confounding environmental factors. Therefore, a (quasi-) experimental design is needed to ascertain whether the changes or improvements are due to the intervention or to external factors [5,28,73]. Previous studies have evaluated community-based interventions through randomised controlled trials (RCTs), the gold standard methodology for measuring effectiveness [74]. However, RCTs are difficult to organise, expensive and often setting-inappropriate for up-scaling or replicating and difficult to set up and run in LICs [25,75].

There is a need for community-based interventions to be accompanied by proper evaluations. Such evaluations can take the guesswork out of policy-making by knowing what works, what does not work and why [76–79]. Given the quasi-experimental study design, DiD permitted an approximation as close to an assessment of the effect of the programme on the outcomes of interest. Previous studies have assessed the effectiveness of programmes whereby a DiD approach was applied to community-based interventions [24–25]. In terms of data analysis, the criteria for inclusion of variables in a multivariate model vary between problems and disciplines. We followed methodologists suggesting the inclusion of all relevant variables in the

model regardless of their significance in order to control for as many as possible covariates [80]. This approach, however, led in some cases to wide standard errors in estimated parameters, but as control variables were based on the literature, the impact of irrelevant variables was limited.

For this evaluation, maternal health behaviour before and after the intervention was not independently measured but based on self-reporting, which may have led to issues of validity and to recall bias. However, it is unlikely that the quality of self-reporting was different between intervention and control groups.

A weakness of this study is that the data collected did not identify any social barriers (e.g. gender of health worker), financial or geographical barriers (e.g. travel distance) to healthcare uptake that might account for the changes found, or lack thereof, between the data collection points. Moreover, for any intervention to improve maternal care and leverage commitment that maternal health should be a human right, it is important to know whether it is sustainable, scalable and cost-effective [81].

Conclusion

This impact evaluation suggested that the community-based health promotion intervention had a greater effect on the uptake of ANC than on delivery care. Other factors, not easily resolved through health promotion interventions, may influence the latter outcomes, such as costs or geographical constraints. However, all the selected maternal outcomes improved in time while, in parallel, women's level of education and empowerment also increased, which may either have facilitated or be the consequence of the intervention. Interventions should prioritise impact evaluations to inform future health policies.

Supporting Information

S1 Fig. Wealth index distribution of participants.

(DOCX)

S2 Fig. GTN health promotion intervention in Nepal and its evaluation.

(DOCX)

S1 Table. Variables description and codification, overall evaluation.

(DOCX)

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Author Contributions

Conceived and designed the experiments: SS EvT PS. Analyzed the data: SS ES. Wrote the paper: SS EvT JMB VH PS ES.

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RESEARCH ARTICLE

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Dirty and 40 days in the wilderness: Eliciting childbirth and postnatal cultural practices and beliefs in Nepal

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Abstract

Background: Pregnancy and childbirth are socio-cultural events that carry varying meanings across different societies and cultures. These are often translated into social expectations of what a particular society expects women to do (or not to do) during pregnancy, birth and/or the postnatal period. This paper reports a study exploring beliefs around childbirth in Nepal, a low-income country with a largely Hindu population. The paper then sets these findings in the context of the wider global literature around issues such as periods where women are viewed as polluted (or dirty even) after childbirth.

Methods: A qualitative study comprising five in-depth face-to-face interviews and 14 focus group discussions with mainly women, but also men and health service providers. The qualitative findings in Nepal were compared and contrasted with the literature on practices and cultural beliefs related to the pregnancy and childbirth period across the globe and at different times in history.

Results: The themes that emerged from the analysis included: (a) cord cutting & placenta rituals; (b) rest & seclusion; (c) purification, naming & weaning ceremonies and (d) nutrition and breastfeeding. Physiological changes in mother and baby may underpin the various beliefs, ritual and practices in the postnatal period. These practices often mean women do not access postnatal health services.

Conclusions: The cultural practices, taboos and beliefs during pregnancy and around childbirth found in Nepal largely resonate with those reported across the globe. This paper stresses that local people's beliefs and practices offer both opportunities and barriers to health service providers.

Maternity care providers need to be aware of local values, beliefs and traditions to anticipate and meet the needs of women, gain their trust and work with them.

Keywords: Traditional practices, Nepal, Postnatal period, Women, Babies newborns postnatal care

Background

Pregnancy and childbirth encompass many physiological changes which social and cultural norms influence (Fig. 1). Every society has cultural practices, beliefs, superstitions or taboos concerning pregnancy and childbirth. These can translate into restrictions governed by the family, for instance what women can eat, with many cultures making distinctions between 'hot' and 'cold' foods, a distinction not necessarily related to temperature or how spicy a

particular food is [1, 2]. Moreover, foods are deemed inappropriate (taboo) for consumption in pregnancy or during lactation; in some instances the new mother is perceived as not being hungry and is therefore not fed immediately after the birth [3]. Other examples include limitations on women's mobility, such as being prevented from crossing a river during pregnancy, which can restrict access to antenatal care [4]. Therefore, traditions or cultural practices may restrict what new mothers can do. The culture or traditions remain very strong even among relatively highly educated women, as will be discussed in this paper.

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Fig. 1 Photograph of a mural of a pregnant woman in Nepal

In countries like Nepal, socio-cultural practices around childbirth include maternal seclusion after labour and birth. Moreover, cultural beliefs in a community play a vital role in non-utilisation of postnatal care (PNC) [5, 6]. Coverage of PNC in Nepal is inadequate, especially among the poorest women and those living in remote rural areas; a recent study suggested that only 21 % of new mothers receive any PNC whether they birth in a facility or at home [6]. Both the neonatal and infant mortality have declined over the past two decades, levelling off at 33/1,000 for neonatal mortality and 46/1,000 for infant mortality [7], while the maternal mortality is estimated at 258/100,000 [8]. It has been suggested that simply providing a postnatal check-up on the first day before women are discharged from the health facility could prevent up to 38.7 % of maternal deaths during that period [4].

This paper explores social and cultural practices that have health implications in the childbirth and postnatal periods of rural Nepali women; and places it in the context of the global literature on such practices. The study explores the extent to which such practices, especially in low-income countries, are part of the cultural adaptation of becoming a mother and identifies why women might not access services, particularly PNC.

Methods

Qualitative approach

This study consisted of primary qualitative research on traditional practices around pregnancy, childbirth and the puerperium in rural Nepal. A qualitative approach was considered appropriate for exploring the views of women and health care providers [9].

The study setting was both PNC clinics in a community hospital and participants' homes, open fields and the village health post in two villages in rural Nepal (identified as A and B for the purpose of this paper). The new mothers went to these clinics for check-ups and vaccinations. The health service characteristics were

similar between village A and B. In village A, there were two health posts and a primary health care centre nearby. In village B, the hospital was a community hospital with maternity services (Basic Emergency Obstetric Care Centre) and there were two health posts. Data collection took place in July 2012.

As qualitative methods are most appropriate for exploring complex phenomena [9], interviews and focus groups (FG) were used to explore behaviour and practice [10, 11]. Face-to-face interviews and FGs were conducted with: (a) women with a recent pregnancy and/or with a child under the age of two; (b) their mothers-in-law; (c) their husbands; and (d) healthcare workers in the area.

The sampling was purposive and potential participants were recruited through a network of health centres and women's groups. Purposive sampling was conducted in order to obtain a broad view of perspectives from a range of participants that included health workers and health service users of diverse social classes. As various ethnicities exist in Nepal (Gurung, Newari, Tamang, etc.) each with their own practices, any cultural issues raised by participants around childbirth were explored in-depth and the all-female interview team enabled postnatal practices to be probed [12]. The FGs and interviews lasted some 45 min each and were recorded (with permission), translated and transcribed [12]. First, five semi-structured interviews involving eight health workers were conducted in English by the first author (SS), as the participants spoke English, typical of higher caste/educated/health professionals in Nepal [13]. The researcher did not have a dual (clinical) role. The interviews were conducted in offices to explore the responses of the participants and gather more and deeper information by probing their answers. Secondly, fourteen FGs (each with 3-9 participants to keep the group manageable but yield good discussion) were conducted in participants' homes, open fields or the village health post with the aid of a Nepali translator. The latter was a maternal health researcher, as recommended in a study by Pitchforth and van Teijlingen [10]. The qualitative data were analysed independently by two of the researchers (SS and EvT) using a thematic approach. They then compared and contrasted the findings to minimise bias and to ensure the reliability of the data [13].

The Nepal Health Research Council granted ethical approval for the qualitative study (Reg. No. 37/2011 on 1/08/2011). Consent was obtained from each individual participant, and participants were assured that they were able to withdraw, if they so wanted.

Literature review methods

The literature review on global PNC provision and utilisation was undertaken alongside the qualitative data collection to offer suggestions for areas to explore during or

after the interviews/focus groups. We searched the following electronic databases: PubMed (or Ovid MEDLINE), EMBASE, Cochrane Library, PsycINFO, Scopus, Web of Science, WHO (World Health Organization), CINAHL and Popline. Databases were searched from the start of the database until May 2013 for cultural issues, practices and beliefs. Inclusion criteria were: English language; qualitative and quantitative research; primary studies; all health care settings, including general practice, midwifery, outpatient, clinics, hospitals; all participants; with no time limit. Exclusion criteria were non-English language, papers that did not contain primary research or did not focus on maternity and childbirth. The search terms were 'cultural practices', 'cultural practices AND beliefs related to postpartum/natal period', and finally '40 AND days AND postnatal AND belief'. The term '40 days' was included as a search term as it was mentioned in the interviews and the initial literature search revealed that these 40 days are considered the postpartum period [14].

The qualitative findings are presented first and the captured key study themes are then put into context through an analysis of the global literature.

Results

The five interviews included eight health workers who were aged between 18 and 37 years old. The interviewees included primary healthcare workers (Table 1). The 14 FG included: 9 groups of women separated into distinct groups of women who had recently given birth and mothers-in-law, aged 17–38; two groups involving men aged 35 to 61 years (some were partners of women who had recently given birth) and two FG with female community health volunteers (FCHV) and one FG with maternal and child health workers (MCHW) aged 32 to 52 (Table 2). Nearly all participants were Hindu. All of the men and two-thirds of the women were literate, at least to primary school level. All 70 participants were married, and many were initially reticent to speak of 'traditional practices' for fear of being judged, however as the interview went on they became more confident and open in their disclosures.

Table 1 Characteristics of interviewed health workers

Health worker interviews	Age	Village
Hospital staff, Primary Health Nurses (2)	25 and 28	B
Sub-Health Post In-charge, Community Medical Assistant	40	B
Health promoters, Auxiliary Nurse Midwives (2)	30 and 40	B
Maternal & Child Health worker (Outreach clinic)	36	A
Primary Health Nurses/Maternal & Child Health worker (2)	42 and 52	A

Table 2 Characteristics of focus groups

Group Interviewed	Age	Village
Mothers with children ≤24 months	25–35	B
Mothers with children ≤24 months	21–28	B
Mothers with children ≤24 months	17–23	B
Mothers with children ≤24 months	26–48	B
Mother-in-law groups	37–55	B
Mother-in-law groups	40–62	B
Female Community Health Volunteer	26–48	B
Maternal & Child Health workers (MCH)	24 and 31	B
Extended family (Husband/Father-in-law) Focus Group Discussions	29–47	B
Female Community Health Volunteer	32–36	A
Mother-in-law groups	55–60	A
Mothers with children ≤24 months	22–28	A
Mothers with children ≤24 months	28–34	A
Extended family groups (Husband/Father-in-law) Group Interview	46–66	A

The key findings will be presented within four themes that permeated from a thematic analysis of the research, starting with: (a) cord cutting & placenta rituals; (b) rest & seclusion; (c) purification, naming & weaning ceremonies and (d) nutrition & breastfeeding. Under each heading the findings from the qualitative interviews are presented, followed by the findings of the literature analysis to put the former into context.

a) Cord cutting & placenta rituals

Participants discussed how the cord was cut, and how the placenta was expelled and then buried. No participant mentioned eating the placenta. Cord-cutting practices could involve a variety of substances and diverse types of tools to cut the cord, for example one health worker said:

(Mothers) say to us they have used sickle to cut the cord or razor blade...and then apply sometimes antiseptic, cooking oil, ghee (butter), toothpaste, ash or nothing to the umbilical cord. Health promoter/ Auxiliary Nurse Midwife, Interview

A few postnatal Tamang women mentioned the cutting of the umbilical cord at home:

The cord was cut by 'hasiya' (scythe)... (and then) cleaned with plain water. Tamang mother, FG

Gurung women commonly bury the placenta at the foot of a tree, while the Newari and Tamang bury it at a junction or under the road. For example, a Tamang mother referred to burying the placenta.

Then placenta was buried in the road where there is a junction (laughing...). **Tamang mother, FG**

It is believed that the child's future health is linked to the method of disposal of the placenta:

The placenta here is buried. It should not be eaten by a crow and should not be eaten by insects. If it happens, it won't be good for child, they will be sick.

Tamang mother, FG

There are "low-resource" interventions (i.e. practices) used to expel a retained placenta:

If placenta is not expelled, a piece of cloth is inserted/packed in woman's mouth so that she has nausea. That helps to expel the placenta.

Tamang mother, FG

b) Rest & seclusion

Generally, Nepalese women rest after labour and delivery, with duration of rest differing between the various castes. Dates of significance in Nepal include the date when the new mother can leave her in-laws' home (after 30 days) to go to her parents' home for a period of rest that lasts from a few days up to a month. At this time her nutrition becomes a priority. One Tamang respondent describes this period:

... Then the postnatal mother is allowed to go in kitchen on the 9th day. The postnatal mother is sent to her mother's home at around 10-15 days and she can stay in mother's home as she wishes, sometimes up to a month. **Tamang woman, FG**

In this time a massage is given to both baby and mother, it typically involves mustard oil to relax the muscles and help the child grow with the smoothing of joints. Nepalese women have a postnatal caregiver who comes to massage the abdomen. In her maternal home, the new mother is cared for and is fed a specific diet of lentils and spices, such as cumin, believed to stimulate her breast milk production.

...from this day (nwaran or baptism) onwards, mother and baby are given mustard oil massage and stay in the sun (laughing). **Brahmin woman, FG**

Most women reported that, unlike in the past (in the last decade) where they would return to household duties soon after birth, they were now allowed to rest in their in-laws' home. Perhaps, the underlying issue is that there existed a lack of awareness of the physiology of

pregnancy and childbirth; that in the postnatal period women need 'time to heal' and were therefore 'isolated'. Isolating pregnant women in the shed was also mentioned during the men's FG, typically in a cowshed. In Nepali the word for such a shed is 'chhaupadi', which is also the word for this excluding practice:

There is not such an influence or effect in this village, but in some place there is still the practice of isolating women during menstruation/pregnancy (chhaupadi), sometimes the women have to stay in the stable (shed) also. In my thinking in this place (cough) there are not so bad practices. Everyone is doing equity behaviour (treating women equally to men). **Tamang and Newari Men FG**

c) Purification, naming & weaning ceremonies

The qualitative data indicate that in rural areas of Nepal, a purification ceremony is performed as birth is believed to be unclean. The naming and purification ceremony *nwaran* involves a day of cleaning the home, bathing the mother and baby, and choosing a name. The ceremony takes place anywhere between the 3rd and 12th day after birth. A priest performs the 'baptism' ceremony of "*nwaran*" at home, which includes the horoscope from the child's birth details, and the mother and child are 'purified' (from their 'past birth', in the religious sense).

In the days before the *nwaran* ceremony, the new mother cannot go out. She should not visit the (Hindu) temple and no one will touch her or take the child directly from her, as a vaginal birth is deemed 'dirty'. The mother-in-law will use her old sari or old clothes to pick up the child. In the past women would warm/cleanse their hands over the fire before holding the baby. Finally, fire is also used to burn the woven mat on which the *Bahun* women lie during and after childbirth.

Thus, birth is considered 'dirty' and the *nwaran* ceremony comprises the cleansing of the mother and house as well as naming of the child.

Delivery is considered dirty and untouchable. Usually, nwaran ... here takes place on 3rd day of delivery. Some (families) invite the lama (local Tamang priest) to pray and purify home and to name the newly born baby. **Tamang woman FG**

After the *nwaran* ceremony the new mother is included back into the household activities. The sleeping child is placed in a sari, as the used cloth is believed to offer protection from the 'evil eye':

The evil eye is averted when you have the baby sleep in the mother-in-law's sari; even mothers who are

teachers (or who are educated) follow these practices.
Brahmin new mother and schoolteacher, Interview

Until they are 'cleansed', women have other restrictions imposed on them, including not being allowed near a deity's statue or a temple (Nepal is a strongly Hindu country) during late pregnancy:

She (mother) is not allowed to worship God from around the 6th month of pregnancy until nwaran.
Bahun and Chhetri mothers FG

Furthermore, a secret *nwaran* name based on their 'rashi' (astrological sign) is given to the baby in Nepal. This rashi is astrological and dependent on the time of day of the baby's birth.

Nwaran celebrated on 9th day for girl and 11th day for boy, which at the same time they do the purification ceremony. The name is given based on time, day and date of the birth. The Jyotishi (astrologer) is responsible to extract the name for the baby. **High caste (Brahmin) health worker, Interview**

The new mother in Nepal also has dietary restrictions.

Until the nwaran purification day, (the) a mother is not given salt, green vegetables, and is not exposed to the sun. Nwaran is done on 9th day of delivery both in Bahun and Chhetri communities. **Local hospital staff, Interview**

Among some Tamang there are two stages of purification *chokyaune* usually on 7th day of delivery, and *nwaran* usually on the 9th day and on that day the mother and baby are taken outside for the first time. Then they are considered 'clean' and can be 'touched' by others.

We cannot go to the kitchen, we stay (in) one corner of the ground floor; we cannot go up the stairs (laughing).
Tamang mothers FG

The laughter seemed to be more about the perceived oddness of the situation rather than embarrassment. The father is part of the cleansing ritual *nwaran*, after the child's mother is allowed outside the house.

Then only we are taken out of the home in sun. Usually the child's father does hom (special worshipping) on the third day also. **Tamang mothers FG**

These ceremonies vary between different ethnic groups. *Nwaran* takes place on the 3rd day among in Tamangs, the

7th day among the Bahun and Chhetri; and in Newar communities between the 9th and 12th day. It seems the higher the caste the later the ceremony. Similar to the rice 'weaning' ceremony *pasni*, *nwaran* takes place later for boys than girls.

Keep her (the mother) warm, give hot food, oil massage, and keep in the sun, burn lamp on 6th day and rice feeding on 5th month for daughter and on 6th month for son. **Tamang and Newar FG**

The rituals carry on until the 10th day:

On the 10th day lanterns surround the baby's mother. Nwaran is done usually on 12th day for daughter and 5th or 7th day for a son in the Newar community. Baby and mother are given a bath, and then the priest comes home and organizes the puja (prayers). Then, (they are) considered purified. Afterwards, mother and baby (are exposed to the) sun every day. **Newar hospital staff, Interview**

Alongside *nwaran*, cow urine is used to purify the walls of the house. Family members of the newly born baby consume a drop of cow urine and cow dung is used with red soil to clean the house; as the cow is considered the national and holy symbol of Nepal.

The weaning *Pasni* ceremony occurs at 5 months for girls and at 6 months for boys. In this ceremony solid silver anklets called *khalis*, carved with dragons at both the ends, are given to keep the bad omens away from baby, and they are believed to help the baby's legs grow stronger. Gifts are given to the child and the mother may observe a fast. The fasting then coincides with weaning of the baby and the introduction of solid food.

d) Nutrition & breastfeeding

Food practices mentioned by women in the interviews included special attention given to nutritious food and the use of ayurvedic medicine. The new mothers are given a special diet in the postnatal period like "*kwati*", a special soup prepared from various beans with some meat. Several Tamang women said that "*dahi-chyura*" (curd and beaten rice accompanied by meat curry) is postnatal food. Mothers are also given "*gudpakhi*", a special sweet in the form of a cake, rich in calories, made from flour, clarified butter, cashew nuts and coconut.

Mothers take gudpakhi; mother becomes strong during pregnancy time. They prepare it at home. Those who visit the mother, they get it from outside. At home they prepare with milk... till baby is 2 years old we put a

chain around their neck made of the umbilical cord.
Newari mothers-in-law FG

Additionally, *janma ghuti* (a commercial ayurvedic medicine for digestion), *balmrita* (herbal ayurvedic medicine) and *jaiphal* (nutmeg) and herbs and spices are given to the newborn baby. Traditional healers use these as medicine.

Some of the ayurvedic foods include quati quati or ghuti aushodi (a soup of mixed pulses); in it is supari (crushed betel-nut), jaiphal, pepper and cashew nut... So that baby's heart become strong and even for strong bones. Newari mothers-in-law FG

Discussion

The qualitative research conducted in Nepal highlighted that (a) birth was perceived as 'polluting'; (b) postnatal women were perceived as being 'polluted'; and therefore isolated and (c) cleansing rituals were required for mothers after the resting/isolation period. Consent was obtained from each participant, this was particularly important within a culture where most women have to ask their husbands. Although, the husband's permission is needed, during the interviews and focus groups the discussions were 'organic', i.e., women openly spoke of their beliefs and practices.

There was a major overlap with existing literature, with the themes of the qualitative study (cord cutting and placenta, purification, naming and weaning ceremonies, rest and seclusion, nutrition and breastfeeding) echoing what researchers had found in other countries. This sets the study in a wider global perspective.

(a) Cord cutting & placenta rituals;

In Nepal, it is considered lucky to cut the umbilical cord on a coin [15]. The treatment of umbilical cords is very ritualistic, and various household tools are used to cut and tie the cord. The qualitative research suggests that in rural areas the cord is often cut with a sickle or an unsterilized knife, a practice noted in similar communities in Bangladesh [3, 16].

Poor cord hygiene is a common issue in many low-income countries and particularly in births taking place outside of health facilities. For instance, in India the tool used is related to the trade among the caste; for example the use of a scythe by farmers, however tetanus is reported in new-borns [17, 18]. In Bangladesh, the cord is only cut after the placenta is delivered; the 'cord cutter' remains 'unholy' and cannot go for prayer for 41 days. The mother is already considered unclean due to having recently given birth, so she can cut the cord, as can a child that has not begun to pray as (s)he is also considered to be unclean [3].

In Nepal the placenta is generally buried, to protect the baby. If the placenta is retained the practice is to try to make the woman vomit to help expel it; while in other low-income countries accounts exist of massaging and sitting on the abdomen [19]. The practice in Mayan Yucatan is to treat a retained placenta with abdominal massage, applying hot water and alcohol, and then covering the woman with blankets [20]. In Malaysia, the midwife massages the mother's abdomen after the birth to facilitate the expulsion of the placenta [21].

All of these are low-cost, but not necessarily low-risk, interventions to address the problem of a retained placenta. However, the placenta's "low-resource" practices mentioned are not without risk, indeed as the literature shows sepsis remains the major cause of neonatal mortality in Nepal and the second leading cause of maternal mortality. WHO recommendations for achieving a clean birth include a clean surface for delivery, clean hands of the birth attendant, clean cutting of the umbilical cord, clean perineum, clean cord tying, and clean cord care, since use of household tool and substances may lead to sepsis [22, 23]. It has been estimated that these clean birth practices can avert 20–30 % of newborn deaths due to sepsis and tetanus [24].

In the literature, many cultures link the baby's demeanour and future with the placenta. Placenta, the Latin word for cake, is referred to in France as a baked good; the 'other' bun in the oven [17]. Furthermore, a placental recipe from 1983 published in the magazine *Mothering* mentions the oxytocin contained within the placenta might prevent postpartum haemorrhage; placenta phagy benefits are known [17, 25]. However, we found no evidence of this in our study in Nepal.

There are also rituals associated with placental burial. For example, placentae are buried at a junction in Mexico, similar to the Newari community in Nepal [17]. One possible explanation can be identified from Indian, Semitic myths; old Jewish texts tell pregnant women not to stand alone at the crossroads as they may "*see the foetus taken away by evil powers*". It seems a crossroad is the place where spirits dwell [26]. Perhaps burying the placenta at a crossroad diverts evil spirits away from the new baby towards the 'useless/less important placenta. Similar to Nepal, in Lao the placenta is considered a dirty object to be buried and a fire is lit over the buried area in order to prevent spirits and animals from reaching it. If any part of the woman touches the placenta, it is believed that the lochia might dry up, causing harm to her baby and even neonatal death [27]. Lao and Burmese ethnic women still practise traditional childbirth rituals during birth preparedness, umbilical cord cutting, where they 'roast' or provide heat to mothers to stimulate healing [2, 27]; a practice also seen in traditional medicine in Laos [28].

(b) Resting and Seclusion

From the data it seems that women were housebound for a number of days after the birth and the length of this period of seclusion varied by caste or ethnic group. This is a phenomenon found across the globe, including in high-income countries in the recent past. The length of time a woman is secluded or rested varied across different countries and the principles underpinning this isolation (to heal vs. being unclean) also seem to differ greatly. After the period of seclusion there is often a ceremony to purify women to publically accept them back into daily life. The literature supports the concept of a resting – a lengthy lie-in or lying-in period, a period of seclusion, as women need to rest in order to heal, yet it may mean that they are neglected. In Greece, birth customs include women and babies resting and being isolated for 40 days after birth, a period that is still observed [29]. The 40-day period is called the lochial period, from 'lochia' the normal vaginal discharge of cell debris and blood after birth. The Bible says "40 days" for the vaginal discharge resulting from involution and can also be described as the red lochia, lasting 4–6 weeks [29]. The lochial period is a time when the "woman can be cherished and pampered without feeling inadequate or shamed", noted Mead and Wolfenstein, some 60 years ago [30]. As mentioned in the interviews, in remote rural parts of Nepal women are isolated made to birth in the cowshed 'chhaupadi'; women menstruating or in labour are thought to be ritually polluted and must be kept at a distance from the family in these sheds [31]. Women in Zaire and India are also secluded in a hut [32]. For Muslims the period of postnatal seclusion traditionally lasts 40 days. The religious rituals are performed on the 40th day and these include shaving the child's head, as a vaginal birth is considered unclean. This act permits, what is considered, the growth of 'new' and 'clean' hair [33]. This 'seclusion' around the time of birth also occurs in Burma and in Turkey where it is believed that postnatal women are more vulnerable to evil forces and "the grave of women who have just given birth is open for 40 days": postnatal women are at risk and can easily die in 40 days and in that period, mother and baby are not left alone, lactating women do not go out, they and their children are not bathed [2, 34]. This is in contrast to women in Nepal; where they are left alone. Purdah (female seclusion) is observed in Bangladesh lasting 5 to 9 days and there exist dietary restrictions that last up to 6 months [3]. Similarly, among the Negev Bedouin in Israel, a 40-day postnatal period includes seclusion (homestay), followed by congratulatory visiting, the reciprocal exchange of gifts and money, and observance of a special diet [35].

A number of cultures have beliefs, taboos and behaviours relating to women and newborns in the postnatal period, a period lasting up to 40 days. Among Mayans the period lasted 20 days and Japanese mothers remained in a birth chamber for 3 weeks [17]. In Chinese the postnatal period of rest is called the 'sitting month' or 'doing the month' and lasts for 30 or 40 days. This exists, according to Chinese traditional medicine, as postpartum women are considered to be in a 'weak' state, and the practice is still observed with primiparous women [1]. Keeping mothers together with their babies is medically important but also culturally: in southwest Nepal new mothers stay with their babies continuously for 6 days [36]. Higginbottom refers to a 40-day period after the birth in which particular foods are eaten [37]. Cassidy also refers to "the up sitting" where bed linens would be changed and on the 10th day the mother was allowed to perform housework, and that hard labour ought to be avoided in the weeks after birth for the risk of uterine prolapse [17]. Burmese women also observed rest in the postpartum period [2]. The 40-day period has often been put into practice as the 'quarantine' period for women, a period of rest and purification [17]. The word "quarantine" originates from the Venetian dialect *quaranta giorni*, meaning 'forty days' for the length of isolation of ships for detection of plague symptoms [38]. This separation of infected people was used to prevent the spread of disease, and is recorded as far back as the Old Testament [39]. Culturally and historically, birthing women are considered 'unclean' [2, 19]. In many cultures postnatal women are believed to be dirty and weak [16, 40, 41]. Moreover, the pollution of birth is detailed; for example in Nepal, Maori (Aetoroa/New Zealand), Japan, China, Inuits in Canada, Turkey, and Bangladesh [1, 3, 16, 17, 34, 40].

Evidence of isolating practices can also be seen in western countries. In Europe in the recent past women were considered 'polluted' and dangerous to men, so new mothers were not allowed to prepare or cook food for 40 days [17]. The immediate period after childbirth is referred to historically as the 'lying-in period' in English and "Wochenbett" in German or "week bed". Browne and Browne refer to the lying-in period as 8–10 days after labour and birth; similar to the time it takes for the stump of the umbilical cord to fall off naturally [42].

Historically women in the British Isles were unclean after birth [43]. Purification as a ritual is likely to have at least some physical foundation, such as notion of infection control in modern medicine. The 40-day period presents vulnerability in mother and child which can be targeted in this time; as a frequently described postpartum problem is infection [3].

In the USA, self-help books on childbirth inform new mothers and their partners that the postnatal period lasts 6 weeks [44]. Six weeks is, of course, a different way of expressing 'the 40-day period'. The explanation

such self-help books give is that “the uterus has returned to a non-pregnant size and bleeding has abated” [44]. Similarly, one of the first UK guides for new mothers recommended that women visit their doctor at 6-weeks postpartum for a range of physiological check-ups (a period of 6–8 weeks for uterus and other pelvic structures to ‘heal’ the puerperium), [45, 46]. Eastman and Russell also suggested that energy demanding activities such as tennis, cycling, jogging and heavy housework/lifting be postponed until the “lochia has ceased” [29]. In the 1960s, Browne and Browne claimed that red lochia lasted 24 days and only after that time should women resume household duties, start going out again or drive a car, whereas the shampooing of hair could be done as desired [42].

Caring or nourishing of women during this period is seen in the literature. In Nepal, women can have a postnatal massage to the abdomen in order to promote blood circulation and therefore healing in the first weeks post-childbirth [36]. Mayan women get “one or more massages” from their midwives 28 days post-partum [47]. In Nepal, our findings were that traditional postnatal care includes baby massage with mustard oil, massaging the mother, and an emphasis on nutrition. In higher castes (Brahmin, Chhetri, Newar and Bahun; in Nepal Tamangs are lower caste) these tasks are performed by a birth assistant, who will stay in the house for a month to wash the child’s clothes and cook for the mother.

Mothers need rest and seclusion, thus there are advantages for new mothers of having a lying-in period with its associated rituals and taboos. The historian Cressy (1993) uses the term postnatal privileges to reflect this positive notion [48]. Women need rest after childbirth but should not be treated as ‘infected’ or ‘dirty’ during their seclusion period; research from China has found that the 40-day seclusion custom can adversely affect women’s mental health with reports of postnatal depression occurring due to the feeling of isolation [49]. Also adversely affecting women’s mental health are folk beliefs or traditional attitudes around stillbirth, which are slightly different in Nepal. This might reflect a lack of research on the impact of stillbirth on maternal mental health. Another concern is the issue of alcohol consumption as mentioned by some ethnic groups in Nepal, although this appeared to be a less common issue globally. Another issue of concern is sexual violence as the prevalence of sexual violence within marriage ranged from 12 to 50 % in Nepal [50]. Lastly, three studies have reported post-partum depression among women in Nepal to be between 4.9 and 12 % [51–53]. However, postpartum depression, it seems, is not discussed with women from low-income countries [54].

(c) Purification, naming & weaning ceremonies

The Hindu caste system and its associated behaviours have an impact on birth customs. Similar to Nepal, in India the naming ceremony takes place on the 10th or 12th day after birth after which the mother is considered ‘clean’ and can carry out normal household chores (e.g., cooking); furthermore male visitors can visit the nursing mother. A weaning ceremony at 6 months (*Annaprasana*) is believed to be necessary for the baby to become more mobile; gifts here too are given to the child and the mother may observe a fast. Glass bangles worn during pregnancy are gifted to the midwives. Mothers in India also return to their parental home for 40 days after the birth. These customs are also practised by the Hindu diaspora and can lead to antenatal and postnatal non-attendance [40]. The literature also demonstrates the religious importance of ritual cleansing. Traditionally the Church of England had a thanksgiving ritual welcoming new mothers back in the church after childbirth, which was also a ritual cleansing ceremonial. The ritual referred to as ‘churking’ lasted well into the twentieth century [43]. Similarly, historically ‘kirking’ was found in the Highlands of Scotland. Associated with the Church of Scotland, it referred to the cleansing ritual to allow the women polluted in childbirth to come back into the kirk (church) [55]. The Greek Orthodox Archdiocese in the U.S.A. states that women may stay home for a period of 6 weeks after giving birth [56]. *The Holy Bible* in Leviticus XII: 2 notes that where the woman

“born a man child: then she shall be unclean seven days; according to the days of the separation for her infirmity shall she be unclean.” ... “And she shall then continue in the blood of her purifying three and thirty days; she shall touch no hallowed thing, nor come into the sanctuary, until the days of her purifying be fulfilled” (*The Holy Bible*, Leviticus XII:4) [57].

Similarly, Jewish women were allowed back into the temple 33 days after the birth of a son and 66 days after the birth of a daughter [17]. The notion of purification in the 40 days also denotes the temptation of Christ when Jesus was in the wilderness “And when he had fasted forty days forty and forty nights...” (*The Holy Bible*, Matthew, IV: 2) [57]. We must bear in mind that in *The Bible* 40 days may refer to a long period of time rather than exactly 40 days [58].

Ceremonies frequently involve burning as part of the cleansing. In Indochina fire in the postpartum period plays a central role in ritual cleansing. In Lao PDR the confinement period of rest and “lie by the fire” is perceived as positive, the ‘bad blood’ bleeds out as women lie on the floor [28]. Furthermore, women in Laos refer to being ‘roasted’ and that advance preparation of, for example, baby clothes would lead to death of the

newborn [27]. Interestingly, allopathic practitioners have now incorporated some of these traditional practices in Laos [28].

(d) Nutrition & breastfeeding

The literature discussed the role of food in the postpartum period. In Bangladesh on the first day after birth, to continue the healing of the birth passage, no food is given, and in the following days meals are nutritionally deficient consisting of rice only, as polluted women are not perceived to be hungry. Burmese women and women in Turkey who adhered to traditions of food restrictions and prescriptions during the postnatal period were traditionally not given any water to drink for 2–3 days after the birth [2, 34].

There are many references in the literature to hot and cold foods [40, 59]; and it is worth noting that hot in one country is not necessarily hot in another [60, 61]. For instance, China has the notion of 'Qi' deficiency and blood loss, 'heat' or 'cold', which may cause health problems like dizziness; thus 'cold' foods should be avoided 'hot' should be encouraged [1]. This notion of hot and cold also exists in Laos, whilst taboos include not bathing, no hair washing or teeth brushing and staying in bed between 18 h to 2 days [1, 2]. The notion of 'hot' and 'cold' is not only related to the food, but can also relate to the stage of pregnancy and birth. In Malaysia pregnancy is 'hot' [59], in Cantonese China the pregnant mother is 'cold' and the foetus 'hot' [62], whilst in Vietnam both the mother and foetus change from 'cold' in the first trimester to 'hot' in the last [41]. The notion of 'hot' and 'cold' with regards to pregnancy also exists in Laos [28]. In the literature however there was no indication of herbal ayurvedic medicine/food being harmful, suggesting a gap in existing evidence.

Dietary and breastfeeding restrictions exist; some offer women poor diets for a variety of days in Laos [28]. In Nepal, India and elsewhere in South Asia, colostrum is not given until a priest approves it, as it is considered to be pus [3, 17]. This is not unlike seventeenth century England when medical texts recommended against the feeding of colostrum [63]. In common with Nepal, the initial breastfeeding practice in Bangladesh is poor, as colostrum is not given, as it is deemed to be 'dirty milk' due to its pus-like appearance. Taboos are also evident in relation to the baby. In Bangladesh in the first 40 days breast milk is given; as is sweet water "*misri pani*". The latter is thought to have benefits. While, in richer households goat or cow milk is given after 40 days, yet in poorer houses *misri pani* often leads to a high incidence of diarrhoea [3]. The breastfeeding diet is observed for 40 days. In Cairo, infants are breastfed exclusively for the first 40 days after birth [64].

The majority of women in the qualitative interviews reported that they discarded their colostrum, which they felt was inadequate in nutritional value. Whilst this is contrary to the World Health Organization (WHO) recommendation that breastfeeding should commence in the first hour after birth [65]; it is significant because it indicates that women were actively expressing colostrum. This is vital in terms of stimulating their breast-milk supply [66]. This may be why the practice of discarding colostrum as done in South-East Asia is not as detrimental as previously thought [67]. Although, this is less than ideal in terms of the beneficial constituents of colostrum and definitely harmful if other substances are given, such as honey, butter or unclean water. Breastfeeding rates are high in Nepal (although not necessarily exclusively breastfeeding) when compared with UK rates at 6 weeks and 6 months, but not on the first day or two, as is common in South Asia. Some authors have suggested that women in South Asia generally do not breastfeed on the first or second day; but they do stimulate their breasts for the milk supply [3, 33]. Breastfeeding statistics for the UK show reasonably high initiation rates (81 %) but at 6 to 8 weeks the prevalence is down to only 47.2 % [68, 69]. Breastfeeding is associated with reduced risk of infection (colostrum contains elevated concentrations of multiple antimicrobial proteins), prevention of dehydration and hypoglycaemia in babies and reduced risk of breast and ovarian cancer in mothers and increased mother-baby bonding. Breastfeeding has short and long-term health benefits for both baby and mother [70]. Potential long-term health benefits in children include reduced blood pressure, cholesterol concentrations, and obesity [67, 70].

The literature illustrates that alcohol plays an important role in both birth and the postpartum period. In Nepal the Tamang mothers drink *jad* during their pregnancy and post-pregnancy, similar to the 'god-sips'. The term 'god-sips' is thought to have arisen because when a woman went into labour, her 'gossips' were sent forth to gather for merriment and to partake in a drink at the labour [71]. Indeed the drinking midwife is mentioned in Shakespeare's Twelfth Night: "like aqua vitae with a midwife" [72]. In the Tamang community *jad*, an alcohol, is taken during pregnancy and post-pregnancy to celebrate the birth, and Gurung women may drink it to put the child to sleep during breastfeeding as alcohol will certainly pass into the breast-milk [68].

Alcohol and pregnancy are linked culturally, for instance in Africa rum was given to the Akan and Igbo child. Furthermore, the birth was celebrated with alcohol and at the naming ceremony [73]. Drugs passing into milk as cathartics were identified by Greek physicians and Gurung women use it to put the child to sleep [29]. Alcohol is also used in the protection of children; Malaysians bathe children in stout as they

believe it protects babies and to help new-borns suffering from jaundice [32, 74].

This article has discussed that there are logical reasons for practices that are linked to the physiology of pregnancy, birth and the postpartum period. The umbilical cord if left alone typically falls off after six to ten days, whilst the lochia heal in about 40 days/6 weeks [75]. The latter ties in with the International Classification of Diseases' definition of maternal mortality [76]. However, the origin of the 42 days limit is historical, i.e., in the old Anglican Church and the Jewish faith where purified women resumed attending prayers 40 days after childbirth, rather than medical. Clinically, the relevance lies in the first menstrual bleeding in non-lactating women occurring 6 to 8 weeks after parturition. The literature finds that the 42 day limit was not based on a study of the timing of maternally related deaths [14]. Some practices, however, clearly put women at risk; isolation may mean rest but if the woman is alone and suffers a postpartum haemorrhage, this may result in a preventable maternal death. Also unclean tools such as a scythe used to cut the cord may lead to infection, or fasting can lead to malnutrition, and most commonly the discarding colostrum may reduce the protective effects of early breastfeeding.

It is easy to forget that childbirth is a hazard for mother and child in many low-income countries; some traditional practices reduce and others increase the chance of dying. This article highlights that cultural practices exist universally between days 3–10 and 40, and that many of these can be linked to physiology. The timing of these important events means cultural influences play a role in postnatal practices [77]. In society, rituals develop over time to deal with the physiological and social aspects of birth and are internally consistent.

The study and literature within this article have shown that reproductive health is shaped by culture and women's position may be influenced by social and cultural aspects rather than biological factors: The role and place of women in society is 'lowered' in a patriarchal society where historical social norms are maintained. Several studies refer to cultural sensitivity when dealing with women, focusing attention on improving the maternity services rather than on women and their cultural differences [12, 78, 79]. As social cultural practices are passed down from senior females to younger generations, postpartum home visits may play an important role in helping women to change behaviours [1]. Nepalese maternity care should focus on the rural population to be more sustainable and maternity nurses/midwives can use health promotion interactions during home visits [37].

Strengths and limitations of the study

This is one of the first studies of its kind in Nepal. Women were interviewed individually, which allowed them to

speaking about the issues anonymously. However, due to accessibility, time and resource constraints men had to be interviewed in groups. This is a limitation as male participants in the focus group stated that the topic was women's 'business' and they felt that they could not comment in any depth. A minority of the interviews were conducted in English, which may have influenced the way Nepali professionals expressed themselves. Most interviews and all focus groups relied on a translator, which also may have affected the data. The translator had a health background and was trained prior to the research and the interviewer spoke Hindi and a few words of Nepali which helped ensure the quality of the data. A limitation to the search strategy is that it did not include 'stillbirth' and 'nutrition'.

Policy relevance

A gap in knowledge surrounding social cultural conditions may explain the failure of some health policies and programmes to address such issues [80]. Therefore, it is important that, even in the postnatal period, childbearing women feel they can discuss non-health worries that relate to superstition, myths and taboos. Culture and traditions are fraught with ambiguity, especially as many health programmes aim to integrate 'evolving modernities' with the influence of globalisation [37]. Furthermore, social cultural practices can affect women's health status, and therefore a westernised model of care is not advocated, rather informed decisions should be taken regarding locally appropriate illness prevention. In addition, health policymakers and international development advisers need to take social and cultural conditions into consideration to formulate evidence-based policies to reduce morbidity and mortality in mothers and their babies, and reduce gender inequalities [80–82].

Implication for practice

Understanding childbirth values and beliefs of specific cultural groups can promote culturally appropriate evidence-based care. Cultural postnatal practices can be harmful or ineffective, but changing deep-rooted practices, often with religious origins, is challenging even among educated women. Understanding the social cultural environments should be part of health providers training to change these behaviours or incorporate them into the care. The clearly detrimental behaviour will require culturally sensitive re-educative programmes that create new understandings in both practitioners as well as women of childbearing age and their family and local communities. Some of the interventions should address the physiology of childbirth, which is often poorly understood by rural women and/or those with low education levels. If local people know how their traditional behaviour fits with the physiology of childbirth it might be slightly easier to change some of the undesirable or

risky behaviours. This understanding is also of importance when designing culturally appropriate interventions: such as birth kits in low-income countries [83].

Finally, practitioners in high-income countries can learn from those in low-income countries to help provide culturally appropriate care that is accessible. This will be especially beneficial to high-income countries with large ethnic minorities to help avoid discriminatory policy and practices.

Conclusion

Social cultural practices may prevent women from accessing postnatal care. Although there are physiological explanations that underpin some of the beliefs and practices around, for example, a new mother needing rest for a 40-day period, it is important to stress that not all practices necessarily have a physiological origin. The role and place of women in society probably have a much greater negative effect on postnatal women. Some of these influences are negative as they can prevent women accessing postnatal care in low-income countries and the more positive consequences of having a 40-day period come from a 'socially enforced' rest and seclusion.

Abbreviations

FCHV, female community health volunteers; FG, focus groups; I, interviews; MCHW, maternal and child health workers; PNC, postnatal care; WHO, World Health Organization

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Authors' contributions

Evt and SS, VH, CA and PS have contributed to design the original study including analysis plan and initial interpretation. SS collected the data. All assisted in the interpretation of data, commented on drafts and approved the final submission.

Competing interests

The author(s) declare that they have no competing interests.

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