

**THE EFFECTIVENESS OF ANTENATAL BIRTH PLANS IN
INCREASING SKILLED CARE AT DELIVERY AND AFTER
DELIVERY IN RURAL TANZANIA: A CLUSTER RANDOMIZED
TRIAL**



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ABSTRACT

Objective: To determine the effectiveness of ANC birth plans (birth preparedness and complication readiness) in increasing skilled care at delivery and after delivery

Rationale: Although birth plans are key elements of focused ANC in many developing countries including Tanzania that aim to increase skilled care utilization at delivery, after delivery and during emergency obstetric complications, robust empirical evidence is lacking on their effectiveness.

Methods

The study was a cluster randomized controlled trial (RCT) that was conducted in Ngorongoro district, rural northern Tanzania. The primary outcome was the proportion of women who delivered at the available health units and the secondary outcomes were the proportion of women who sought postnatal care within one month of delivery and women's and providers' satisfaction with ANC. The study was implemented in three phases: the formative qualitative study that aimed to understand contextual factors for the high ANC care coverage but low utilization of health facilities for delivery and how the intervention could be implemented in the study district, a RCT to determine the effectiveness of the intervention in increasing skilled attendance at delivery and postpartum, and a process evaluation of the intervention and control arms' ANC. The qualitative study involved 15 focus group discussions, 12 key informant interviews and participant observation of the ANC and delivery care at randomly selected health units. Eight health units were randomly assigned to the intervention (antenatal care with an emphasis on birth plans by care providers) and an equal number to the control group (care as provided currently). A total of 905 consenting pregnant women (404 in the intervention arm and 501 in the control) at 24 weeks of gestation and above were recruited and followed up to the initial postnatal care clinic attendance or during the postnatal interview at home depending on which occurred first.

Results

Both demand and supply sides factors prevented women from utilizing health units for delivery and immediate postnatal care, despite the high level of ANC uptake. Notably, women's lack of planning for accessing delivery care at health units, norms and traditions dictating that home delivery is equally safe and health system deficiencies (structural, process and outcome) were the key barriers identified.

Unpaired t-test statistic was used to assess the effectiveness of the intervention on the primary and secondary outcomes taking into account the clustering effect. Overall, 34.8% of women in the intervention arm and 20.3% in the control delivered in the health facilities (difference in proportion: 14.5% [-9.4-38.3] $p=0.2138$ for the crude analysis and 16.8% [2.6-31.0] $p=0.0248$ for the adjusted analysis). Postnatal care utilization was 62.1% in the intervention and 32.1% in the control group (difference in proportion for the crude and adjusted analysis 30.0% [11.3-48.7] $p=0.0040$ and 31.3% [15.4-47.2] $p=0.0009$ respectively). Altogether, 96.8% of women in the intervention and 84.7% in the control units were satisfied with the ANC they received (difference in proportion: 12.1% [-6.3-30.5] $p=0.1668$ for the crude and 12.6% [-5.4-30.5] $p=0.1454$ adjusted analysis). Similarly, 97.9% and 91.0% of providers in the intervention and control arms were satisfied with the ANC they provided (difference in proportion: crude analysis 6.9% [-3.2-17.1] $p=0.1547$ and adjusted analysis 7.8% [-0.7-16.3] $p=0.0688$).

Overall, the intervention was implemented as per study protocol. The average time for initial ANC consultation in the intervention arm of the study was 40.1 minutes (range 33-47 minutes) compared to 19.9 minutes (range 12-32 minutes) in the control arm $p<0.0001$. The average time for consultation during follow-up ANC visits was 23.3 minutes (range 15-31) for the intervention units versus 10.3 minutes (range 6-17) in the control $p=0.0001$. Likewise, providers in the intervention units spent more time for counselling/health education or promotion than in the control units at both initial ANC attendance and during subsequent visits (average time at initial attendance 24.5 minutes, range 19-32 in the intervention vs 10.5 minutes, range 5-18 in the control arm) $p<0.0001$). The respective time for follow-up visits was 13.8 minutes (range 6-17) vs 4.5 minutes (range 0-10) $p=0.0001$. Nevertheless, the improvement was largely on the discussion on birth plans and PMTCT, and not on the other topics in the national focused ANC guidelines.

Conclusion and implication for practice

A well-implemented antenatal birth plan intervention improved women's utilization of health units for delivery, and post delivery without substantially affecting the women's and providers' satisfaction with ANC. Implementation of birth plans in health care settings in low resource settings like Ngorongoro is feasible and should be promoted as an effective strategy to increase skilled delivery and postnatal uptake.

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Abbreviations and definitions

AIDS	Acquired Immunodeficiency Syndrome
ANC	Antenatal Care
COSTEC	Commission for Science and Technology
DHS	Demographic and Health Survey
EmOC	Emergency Obstetric Care
FGD	Focus Group Discussion
GBP	Great Britain Pound
HIV	Human Immunodeficiency Virus
LSHTM	London School of Hygiene and Tropical Medicine
NGO	Non Governmental Organization
NIMR	National Institute for Medical Research
PMCTC	Prevention of maternal to child transmission
RCT	Randomized Controlled Trial
TBA	Tradition Birth attendant
UNICEF	United Nations Children's Fund
VCT	Voluntary counselling and testing
VHW	Village Health Worker
WHO	World Health Organization

Preface

The research described in this thesis was designed and conducted by me in Ngorongoro district, rural northern Tanzania under the supervision of Dr Veronique Filippi and advises from Professor Simon Cousens, Professor Oona Campbell and Dr Jennifer Requejo. Some constructive ideas were also received from reviewers of the original proposal at LSHTM, World Health Organization and National Institute for Medical Research in Tanzania. I take sole responsibility for the contents of this thesis: the ideas, design, study implementation, data analysis and interpretation of the results presented in all chapters.

The first phase of this study took place between September 2007 and June 2008. The second phase commenced in October 2008 although data collection started in December of the same year. Participant recruitment took four months (ended in March 2009), but the follow-up of participants for the second interview ended in August 2009.

The paper titled, “High ANC coverage and low skilled birth attendance in a rural Tanzanian district: a case for implementing a birth plan intervention” BMC Pregnancy and childbirth 2010, 10:13 was from the initial results of this study. I collected and analyzed the data and drafted the initial manuscript for this article. I also led the reviews of the subsequent drafts and I submitted the final draft to the journal.

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I had spent more than 12 years of my medical career in Ngorongoro working in various health units, and often colleagues in Tanzania and beyond had been asking me of what attracted me to work in Ngorongoro of all the places on earth. Their curiosity is possibly justified in two ways. First, Ngorongoro is a remote and rural district with barely minimal infrastructure for a modern life. And possibly above all, is the fact that the inhabitants of Ngorongoro are still relatively traditional African communities with very different cultures and lifestyles from that of my background. Against all odds, I have lived to appear like one of them, to be trusted, and my contribution to the communities to be appreciated by many. My thanks to all women who participated in this study, TBAs, village health workers, health care providers in both the intervention and control units, health administrators and traditional leaders for your trust and for proving that it is possible for a longitudinal study to be conducted in your communities with minimal loss to follow-up. My special thanks to the Ngorongoro conservation Area Authority (NCAA) for granting me a free permission into the NCAA and the office of the Director of Research, Tanzania Wildlife Research Institute for the assistance it provided to get the permit.

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I was unfortunate to lose my father at a young age of 10 years, and for most children in my area; this would have meant the end to education pursuit and paternal parental guidance. Thanks to my brothers (Willy and Richard) for being there, for your many

sacrifices and huge support over the years that saw me through my early education unhindered.

This thesis is dedicated to my family, in particular to my Wife Rhoda. Thank you for your patience, understanding, and for taking care of our three children alone in my absence. To our children Welima-Magdalena, Geni-Doreen and Mbita-Don, thank you for understanding that Dad was away for a good cause.

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1. Introduction

1.1. Introduction

Skilled care at delivery and immediate post partum and emergency obstetric care are generally accepted as key strategies in safe motherhood in reducing maternal and perinatal mortality. Yet in many countries in sub-Saharan Africa, more women attend antenatal care (ANC) than deliver under the care of skilled providers in health service settings. In recent years, many developing countries have adopted “focused antenatal care” as advocated by WHO in which birth plans (birth preparedness and complication readiness) are promoted as a component of routine care.¹ The concept of birth plans includes knowledge, intentions and actions of individual women, their families, care providers, health units and policy makers that affect the timely and appropriate care in pregnancy, labour, birth and post delivery in the developing world.^{1 2} A priori arrangement on when, where, how and from whom the care will be obtained are made between an individual woman and her care provider(s) in order to reduce obstacles to skilled care at delivery, postpartum and during emergencies in resource poor settings. The aim is to maintain the continuum of care so that women deliver in an environment where obstetric complication are identified and managed promptly and effectively in order to reduce maternal and perinatal mortality.

1.2 Study rationale

Various projects undertaken so far to implement birth plans have been largely of quasi experimental design with pre and post intervention impact evaluation. In many cases, the effectiveness evaluations relied on interviewees’ reports on formulation and implementation of birth plans.³⁻⁶ Furthermore, composite interventions were employed in most, thus precluding the attribution of any effect to birth plan alone. Methodologically, most were flawed and lacked power to assess the effectiveness of birth plans intervention.⁷ As a result, robust empirical evidence is lacking for the effectiveness of birth plans as a safe motherhood strategy to increase skilled attendance at delivery and post partum in health care settings in areas of low utilization.

A randomized controlled trial (RCT) was conducted in Ngorongoro district, Arusha, northern Tanzania aiming at establishing the evidence of the effectiveness (or lack thereof) of birth plans in increasing skilled attendance at delivery and post partum in a health care setting. While five in ten women in Arusha region deliver under care of a

skilled provider, only one in ten women in Ngorongoro (one of the five districts of Arusha) do so despite a high antenatal clinic attendance of more than 90%.

1.3 Study aim, objectives and hypothesis

1.3.1 Aim

To contribute to the body of evidence on the range of interventions that can be used to help reduce maternal and neonatal mortality in a rural setting by using antenatal care birth plans to increase the utilization of skilled delivery and postpartum care.

1.3.2 Objective

1.3.2.1 Ultimate Objective

To contribute to improving utilization of skilled delivery and postpartum care services in Ngorongoro district, Northern Tanzania by testing the effectiveness of promoting birth plans at antenatal clinics.

1.3.2.2 Specific objectives

1: To conduct a cluster randomized controlled trial among 900 pregnant women attending 16 health units (clusters) in Ngorongoro district Northern Tanzania over a period of six months in order to:

- (i) assess the effectiveness of promoting birth plans at antenatal clinics versus standard care on use of skilled delivery care in health facilities as the primary outcome.
- (ii) Assess the effectiveness of birth plans in increasing postpartum care as the secondary outcome
- (iii) assess providers and women's satisfaction with antenatal care after the introduction of birth plans through facility based antenatal counselling, health education or promotion as the secondary outcome.
- (iv) To document the trial and focused ANC implementation in the intervention and control health units through process evaluation of the intervention and routine care provided to participating women in order to highlight factors for the effective implementation (or lack thereof) of the intervention and provision of routine care.

2: To conduct key informant interviews among maternal health service stakeholders and focus group discussions among antenatal women and care providers on:

(i) norms/traditions attached to health care seeking behaviours pertaining to antenatal care; (ii) norms/traditions surrounding delivery ; (iii) difficulties in access to skilled delivery care and how they can be surmounted; (iv) provider and client related factors leading to low utilization of skilled delivery care in Ngorongoro district, Northern Tanzania in order to understand barriers and facilitating factors for the utilization of skilled delivery care at health units in the district and refine the questionnaire and intervention protocol.

1.3.3 Research hypothesis

I hypothesized that if indeed the antenatal intervention was effective, it would increase the utilization of skilled delivery care by at least 10% (from the current 7% to 17%) among participating women, during the period of the study. The proposed antenatal care intervention with emphasis on birth plans was expected to increase the duration and quality of women's contact with the care providers. This in turn would build a relationship of trust between the women and the care providers, subsequently creating an enabling environment for women to overcome fear and barriers (cultural, social and economic) and to facilitate the implementation of birth plans detailing how, where and when to seek skilled delivery care.⁸

The effective implementation of the birth plans is an important step to health literacy, and it was expected that women with the assistance of care providers would be empowered to take positive actions in relation to utilization of skilled delivery and post delivery care.

1.4 Structure of the thesis

This document is divided into eight chapters. Chapter one consists of the introduction. Chapter two reviews the available literature on skilled delivery attendance in the context of antenatal care and birth plans and complication readiness. In this section, maternal mortality reduction strategies in developing countries including Tanzania are reviewed. The role of planning for birth and preparation for handling pregnancy-related complication (herein defined as birth plans) in increasing skilled delivery attendance and, thus, potentially to reducing severe maternal morbidity and mortality is also reviewed.

Chapter three describes the methodology and is followed by three results and discussion chapters. Chapter four focuses on the qualitative study, chapter five on the intervention effectiveness, and chapter six on the process evaluation of the intervention and routine ANC. Chapter seven discusses the main findings, and presents their implications for focused antenatal care in Tanzania and elsewhere, as well as for future studies. Finally, chapter eight presents publication from this study.

2. Background and literature review

This chapter makes a case for the promotion of birth plans in focused ANC during ANC care visits through providers-attendees dialogue as a strategy to improve skilled delivery and immediate postnatal care uptake. The chapter is broadly divided into four main sections. It starts with the background information on the high maternal mortality ratio in developing countries with emphasis on sub-Saharan Africa and Tanzania, This is followed by the review of maternal mortality reduction strategies in the developing world, the role of ANC in strengthening the continuum of maternity care (from pregnancy through delivery to immediate postnatal care) and ends with the review of available evidence for the effectiveness of birth plans in increasing skilled care utilization during delivery and after delivery.

2.1 Background

The worldwide level and pattern of maternal mortality shows huge disparity between developed and developing countries. In 2000, the estimated maternal mortality ratio for sub-Saharan Africa was 920 per 100,000 live births: approximately seven times that of North Africa, nearly twice as high as that of South-Central Asia, four times as high as that of Oceania, five times as high as that of Latin America and nearly 40 times higher than that of Europe. Compared to the world and developing countries average, sub-Saharan Africa has twice the maternal mortality ratios of these regions, and is 50 times higher than that for the developed world.⁹ While the lifetime risk of maternal death in sub-Saharan Africa is approximately 1:16, women in Asia have a lifetime risk of 1:94 and those in the developed countries have a risk of 1:2800.⁹ Since most maternal deaths occur around the time of delivery¹⁰, the availability of timely and appropriate management of pregnancy-related complications around this time is paramount for maternal mortality reduction. What works best may be debatable, but skilled delivery care and timely management of life-threatening obstetric complications are effective strategies currently promoted worldwide.¹¹⁻¹⁵

Many more women in sub-Saharan Africa attend ANC than deliver in an environment for effective management of pregnancy related complications¹⁰, although this is the region with the highest maternal mortality ratio.⁹ For maternal mortality reduction in such countries, ANC must link women to skilled delivery and emergency obstetric care. Specifically, such efforts are urgently needed in sub-Saharan Africa where unlike other regions of the world, maternal mortality has stagnated^{15 16}, with only 44% of deliveries

assisted by skilled attendants¹⁶ , and just 50% of women informed of pregnancy-related complications during ANC visits¹⁷ despite the relatively high level of ANC uptake of approximately 68%.¹⁰

The concept of birth plans, however, differs between the developed and developing countries.¹ In the developed countries model, where most women deliver with a skilled birth attendant, often in a health care setting, these involve choices related to emotional and physical support such as having a partner during labour and delivery, desired level of pain relief (if any), and any other preferences on interventions such as episiotomy or caesarean section. Commonly, birth plans start with a discussion between an antenatal care provider and the pregnant woman on the woman's birth preferences, and culminates in the development of a document outlining these preferences for the management of labour and delivery.^{18 19} In contrast, in developing countries, where many births take place at home with no assistance of skilled providers, the birth plan concept focuses on promoting access to skilled birth attendance or EmOC by discussing and shaping knowledge, intentions ,and actions that affect the timely and appropriate use of routine and life-saving maternity care services.¹

No universal definition of birth plans exists for developing countries contexts, but many projects that have promoted them^{2 5 6 20 21} have included all or some of the following elements:

- preparations for normal birth by identifying a skilled birth attendant and place of delivery
- transport arrangement to reach the place of delivery or emergency care
- financial arrangements to pay for transport and services
- provision of knowledge of where and to whom to go for help
- preparations for essential items for delivery such as clean delivery kit
- provision of knowledge on danger signs during pregnancy, labour, delivery and postpartum for the mother and newborn and when to seek help
- identification of support in looking after the home and children while the woman is away
- identification of a birth companion
- identification of compatible blood donors

Birth plans formulation is on-going throughout antenatal care visits, and culminates with their possible implementation during labour, at delivery, after delivery and during emergencies.²² Arrangement to save money to pay for services, transport arrangements to reach care services, appropriate knowledge of the danger signs and the benefits of skilled care all aim to ensure that women are able to overcome various obstacles that prevent them from utilizing skilled care for better maternal, perinatal and neonatal outcomes. Birth plans, therefore, might increase health literacy through increased comprehensive knowledge of the benefits of skilled care at delivery and immediately after, in addition to addressing the various delays leading to maternal mortality: delay in identifying the problem, delay in reaching health units and delay in getting appropriate and timely care.^{23 24} Additionally, evidence from the implementation of the new WHO ANC model suggests that good communication on pregnancy-related issues is appreciated by both women and providers²⁵, further strengthening the need for improved providers-ANC attendees communication.

Birth preparedness and complication readiness (birth plans) have been adopted into routine ANC by developing countries and are promoted as a measure to increase skilled delivery and emergency obstetric care uptake.¹ Women and their families are advised to prepare for skilled delivery and emergency obstetric care so that deliveries occur under care of skilled providers capable of managing normal and complicated deliveries. For women outside health facilities or not yet in contact with skilled delivery providers, early recognition of pregnancy-related complications is promoted so that appropriate care is sought early.^{1 2} Despite the adoption of birth preparedness and complication readiness by developing countries, evidence is lacking for their effectiveness in improving skilled delivery care uptake in areas where uptake is low.⁷

The context of Tanzania

Tanzania, like many other developing countries, faces a challenge of meeting the 4th and 5th United Nations Millennium Development goals of reducing child and maternal mortality by two-thirds and 75% respectively by 2015.²⁶ In addition to these goals, Tanzania has chosen halving maternal mortality and increasing skilled delivery care by 30% by 2010 as aims of its strategy on poverty reduction.²⁷ What effective strategies should be used in order to achieve these goals is a hotly debated topic, however. Tanzania adopted focused ANC with birth plans as one of the key components in 2002.²⁸ Countrywide full implementation, however, has been slow in some districts.

Maternal health indicators for Tanzania and Ngorongoro

According to epidemiological evidence, far more women in Tanzania attend antenatal care than deliver under the care of skilled providers.²⁹ While more than 90% of all pregnant women attend antenatal care at least once and about 62% four times or more, less than five in ten women receive skilled delivery care.²⁹ The maternal mortality ratio in Tanzania is reported to range from 197-977 per 100,000 live births³⁰⁻³², with a national ratio of 578 deaths per 100,000.²⁹ As most maternal and perinatal deaths occur around delivery,^{33 34} significant reduction in maternal and perinatal deaths requires a functioning health system with the ability to provide appropriate and timely interventions in labour, at delivery and immediately postpartum.³³⁻³⁵ Utilization of health units for delivery would ensure the timely availability of this care if competent providers and an enabling environment are available, although this is largely dependent on the women's utilization of health units for delivery.

ANC provides an opportunity to promote the importance of the continuum of care: ANC, delivery and postnatal care to women and their families. Yet current evidence from the country suggests that important elements of ANC that could motivate women to utilize health units for delivery are not consistently promoted during ANC visits. The recent DHS survey (2004-05) suggests that only 47% of ANC attendees are informed of signs of pregnancy complications²⁹, while a 2006 study in one district in Southern Tanzania indicates that only 25% of women at ANC clinics are informed of the danger signs in pregnancy and during delivery, and around 40% are informed of the danger signs after delivery.³⁶ Previously, an observational time-motion study in another district in the same region found that the average time spent on counselling during ANC visits falls far short of estimated time requirements to cover essential topics³⁷, and many women leave ANC clinics without adequate information on pregnancy and related complications and the importance of skilled delivery attendance. Thus, ANC is currently a missed opportunity to encourage positive health-seeking behaviours, including for skilled delivery care. Consequently, efforts to promote skilled delivery and post delivery care are imperative if local and international goals on maternal and perinatal health are to be realized.

Maternal health indicators among pastoralist populations in East Africa: the case of Ngorongoro

Reproductive health data on most nomadic pastoralist communities in east Africa are scarce. These are traditional communities who live in sparsely populated areas with limited access to modern health care.^{38 39} Ngorongoro, one of the five districts in Arusha region, northern Tanzania has a predominantly semi-nomadic pastoralist population. Approximately five in ten women in Arusha region deliver under care of skilled attendants²⁹, yet a recent study in Ngorongoro district found that 22% of women intended to delivery in health facilities and only 7% of women did so.⁴⁰ While 78.1% of all women (n=2499) intended to deliver under care of unskilled providers at home, but 92.4% actually did.⁴⁰ The maternal mortality ratio was 642 deaths per 100,000 live births (CI 329-955). Like other districts in Tanzania, skilled delivery attendants are only available at health units. Available data from a previous study in the district suggest that factors such as distance from health units, physical barriers, financial and socio-cultural may explain the low skilled delivery attendance.⁴⁰ The estimated mean per capita income for Arusha is \$350 (personal communication planning department, Ngorongoro). Rapid access to skilled assistance at delivery is usually low or absent and emergency obstetrics care may be limited when most deliveries take place at home without a skilled care provider. Low levels of skilled care at delivery despite the high antenatal care poses a challenge as most life threatening pregnancy-related conditions will occur when women are not in contact with health systems. Subsequently, maternal mortality will remain high despite the high ANC coverage.⁴¹⁻⁴³

2.2 Maternal mortality reduction: what has worked in the developing world?

Since most maternal deaths are clustered around the time of delivery^{8 44}, delivery under care of skilled attendants in an optimally functioning health system ensures that life-threatening pregnancy-related complications are detected early enough and managed appropriately, thus reducing the likelihood of maternal deaths.^{11 44 45} The effectiveness of skilled delivery care and timely management of life-threatening obstetric complications to reduce maternal morbidity and mortality depends on the availability of skilled delivery attendants in a functioning health care system.⁴⁶ Arguably, evidence for the support of the effectiveness of skilled attendance at delivery has not been rigorously tested, and available evidence is from historical, epidemiological and statistical modelling data.¹¹ The available evidence, however, is not only scientifically plausible in view of the timing of most maternal deaths, but it also allows specified causal pathways to be derived¹¹, thus strengthening the promotion of skilled delivery attendance as a

maternal mortality prevention strategy. In China, Malaysia, Cuba and Sri Lanka, for example, improvement in professional maternal care coverage led to significant reduction in maternal mortality at national levels.^{47 34} In Sri Lanka, the improvement of health facilities including midwifery skills along with the increase in family planning uptake was associated with a significant reduction in maternal mortality. While most births took place at home in the 1950s, over 85% of births were attended by skilled providers in the 1980s.³⁴ Correspondingly, maternal mortality fell from 1500 per 100,000 live births in 1940-1945 to 555 per 100,000 live births in 1950-1955, and had declined further to 95 per 100,000 live births by 1980. China, Cuba and Malaysia established community- based maternity care facilities with prenatal, delivery and postnatal care and good referral systems that allowed referral and timely management of obstetric complications.³⁴

Although significant reduction in child mortality has been observed in most parts of the world, thus, raising optimism that the target for child mortality reduction for millennium development goal 4 may be achieved in some countries in North Africa, South America and Asia, no similar successes have been recorded for millennium development goal 5 in most countries, especially in sub-Saharan Africa.⁴⁸ Some project-based improvements have been reported, for example, in coverage and quality of obstetric care, which sometimes translates into reduced case fatality rates in obstetric units⁴⁹. An analysis of available data from World Bank, WHO and DHS from 28 countries in sub-Saharan Africa on the determinants of maternal mortality, however, suggests that the availability of skilled personnel is important in predicting maternal mortality reduction in this region⁵⁰. Maternal mortality was inversely associated with the percentage of skilled birth attendance, although the relationship was not linear. The analysis and results of this study do not provide any measure of strengths of this relationship other than graphical presentation. Additionally, it does not state if possible confounders were adjusted for during the analysis, and the nature of the study does not allow causal inferences to be generated, thus rendering its evidence weak.

Both health centre-based intra-partum-care with skilled providers and home deliveries with skilled attendants have been suggested as feasible strategies for maternal and neonatal mortality reduction in poor settings.^{47 51} The main argument for the potential of health centre intra-partum care is the ability to ensure cheaper care nearer most women compared to higher level of services such as hospitals.⁵²

Skilled attendants' care at home assures service availability closer to women but evidence from Bangladesh suggests that the performance of skilled providers at home can be undermined by various problems.⁴⁵ Constraints such as poor transportation, inappropriate environment for delivery, insufficient supplies and equipment, lack of security and inadequate training and supervision impacted negatively on providers' performance. Additionally, socio-cultural factors and norms surrounding childbirth prevented families from accepting referrals from providers for women in need. Strengthening of health systems to respond promptly and appropriately in the management of pregnancy-related complications is also needed, as linkage of home-based care providers to health units is essential for a functioning strategy.⁴⁵ Evidence from such projects in sub-Saharan Africa is scarce if at all available. Health systems in most countries in this region have many weaknesses that are exacerbated by the critical shortage of health workers.⁵³ WHO estimates that 60% of births in developing countries occur outside health facilities, with 47% assisted by traditional birth attendants (TBAs), family members or, at times, without any assistance at all.⁵⁴ Long distances from the health units, lack of transport, user fees, lack of relevant information at antenatal clinics, poorly staffed and ill-equipped health units, and poor quality of delivery care services, including neglect and abuse of women by providers, have been documented as reasons for poor utilization of skilled delivery care in health units.^{14 55-62}

2.3 Strengthening the continuum between antenatal care and skilled delivery attendance: the role of birth plans

Although antenatal risk screening approach was initially advocated as a strategy for maternal mortality reduction¹⁰, it is now accepted that it is not very predictive of women likely to develop severe complications, and, therefore, unlikely to directly reduce maternal deaths.^{10 63-65} In low income settings including those in Sub-Saharan Africa, however, antenatal care may be the only opportunity for women to come into contact with the health care systems for their own health. It, thus, provides an ideal opportunity for health promotion on pregnancy and related complications, and on the importance of skilled delivery care, family planning, and healthy lifestyle by taking advantage of the mother's motivation to improve her own health and that of her own baby.⁶⁶ Women who receive antenatal care are more likely to deliver under care of skilled providers than those who do not.^{10 67-69}

Antenatal care as an opportunity to link women to skilled delivery care is very much dependent on women's willingness and ability to follow antenatal care recommendations. Consequently, individualized counselling at ANC is advocated as a means to empower mothers and their families to take informed decisions on various pregnancy-related issues.⁷⁰⁻⁷⁵ By addressing misconceptions or providing reassurance on maternity choices through counselling during ANC consultation, ANC addresses the women's prenatal perception of risk and delivery preferences⁷⁶ and, therefore, may increase the chances that women and their family comply with ANC advice.⁷¹ Furthermore, women's knowledge of the comprehensive benefits of antenatal care may be limited^{8 77}, such that attendances at antenatal clinics are primarily for reassurance of the wellbeing of pregnancies. Studies from Chiapas Mexico and in Uganda, for example, suggest that information that the pregnancy is healthy or normal may be taken by some women to imply that home delivery will be safe.^{78 79} Antenatal dialogues between individual women, their male partners or other family members and care providers can provide appropriate information on maternal mortality risks and the benefits of skilled delivery care and, therefore, link antenatal care to skilled delivery care.^{13 24 77 80 81} This is a key element in the birth plans model that envisages improving the utilization of skilled care at delivery, in the postnatal period and when pregnancy-related complications develop.²

In an analysis of available data from 54 countries, Stanton et al (2007) found that women's likelihood of delivering under care of skilled providers was associated with the number of ANC visits women made, such that the more ANC visits women made, the more likely they were to deliver under care of skilled providers. The percentage of women delivering under skilled providers increased from 13% among women who had no ANC to 28% among those with one visit, 45% among those with 2-3 visits and 73% among those with four or more visits. Nevertheless, far more women who received ANC did not deliver under care of skilled providers, suggesting that other factors modify this relationship. Of the mothers who attended ANC at least four times, for example, 61% in sub-Saharan Africa and 67% in South-Eastern Asia delivered under care of skilled attendants.⁷³ Although women's households' higher wealth indices were found to be highly associated with delivering under skilled providers, suggesting that improvement of women's economic status may improve care utilization, such improvement in regions with low skilled delivery care utilization in sub-Saharan Africa remains a big challenge, and is unlikely to be realized in the short term. Consequently,

innovative methods are required to increase the access to skilled delivery care so that life-threatening delivery complications are managed promptly and effectively.

A recent analysis of the available data from the Demographic and Health Surveys from 19 sub-Saharan African countries has been published on the provision of information on pregnancy complications during antenatal visits.¹⁷ Less than 50% of women reported receiving such information from providers, suggesting a high level of unmet need. The more the number of antenatal visits reported, the more women were likely to recall the provision of information from providers on pregnancy-related complications. Furthermore, having received information on complications was associated with a higher likelihood of institutional delivery. The DHS questionnaire is not without weaknesses though.^{7 82} Responses from women depend very much on their recall of the experience of their past pregnancies (usually 3-5 years earlier), and are liable to recall bias. Additionally, most questions, including the ones related to information of pregnancy-related complications have not been validated, and the questions do not include probing for information on whether women are consistently advised on skilled delivery attendance. Arguably, provision of information on pregnancy complications during antenatal visits alone may not address the multitude of barriers women in sub-Saharan Africa face to access skilled delivery care. For example, using the birth preparedness and complication readiness model², which combines skilled delivery attendance and the delay model by Thaddeus and Maine, (1994) for emergency obstetric care¹⁴, the information may address the delays in recognition of the danger signs and possibly in deciding to seek care, but not the delays in reaching the care facilities or even in getting the appropriate care after reaching the care sites. The latter requires improvement in the physical access and the availability of responsive and quality emergency obstetric care.⁴³ Unfortunately, most countries with the highest maternal mortality lack functional referral systems, and the care available to women is often poor.⁸³ Nonetheless, improving the information provided to women during ANC clinic visits may be an important step towards the provision of quality obstetric care that is responsive to the women's core needs, so that women take informed decisions for the reduction of pregnancy-related risks, including delivery under skilled care providers. Unfortunately, available evidence indicates that ANC visits remain a missed opportunity for information on positive health seeking behaviours likely to reduce maternal and perinatal morbidity and mortality. Implementation of birth plans during ANC visits provides opportunities to provide such information to women, and if such

interventions are effective, they will also provide evidence to support the continued promotion of birth plans as a safe motherhood strategy.¹⁷

2.4 Birth plans: implementation feasibility and evidence for their effectiveness in increasing skilled delivery care utilization

The WHO focused antenatal care model with reduced number of antenatal visits provides a well-defined set of activities, including health education on plans for safe delivery and obstetric emergencies preparedness (birth plans) and increased client-provider communication as a component of basic care.⁸⁴ Screening for health and socio-economic conditions likely to increase the possibility of specific adverse outcomes, early detection of complications and providing therapeutic interventions of proven benefit are also emphasized. A cluster randomized trial of two antenatal care models in rural Zimbabwe showed that reduced and focused antenatal visits are feasible in rural Africa and do not compromise maternal and perinatal outcomes.⁸⁵ Twenty-three rural health centres were randomly assigned to the intervention (ANC with reduced visits 11 health units) and control (standard ANC at the time, 12 health unit), comprising of 13,517 women in total (6897 in the intervention units and 6620 in the control). The follow-up rate was 78%. There was no difference in maternal complications such as hypertensive disorders (OR 0.91, 95%CI 0.80-1.04), antepartum bleeding (OR 0.73, 95% CI 0.29-1.86) or postpartum haemorrhage (OR 0.98, 95% CI 0.59-1.62), although women in the intervention units had less eclampsia than their counterparts in the control units (OR 0.21, 95% CI 0.05-0.93) Likewise, perinatal outcomes did not differ in the two study arms: perinatal deaths (OR 1.11, 95% CI 0.89-1.39), stillbirths (OR 0.89, 95% CI 0.62-1.27), early neonatal deaths (OR 1.23, 95% CI 0.60-2.56) and late neonatal deaths (OR 1.33, 95% CI 0.84-2.10).

Few projects with birth plan interventions have been conducted in Africa, and information on birth plans implementation to increase utilization of health services for delivery and after delivery in health care settings in developing countries, its feasibility and effectiveness is even scarcer. A recent cross-sectional study in Uganda found that women who delivered at health units were almost twice as likely to report that they had made antenatal birth plans than those who delivered outside health units.⁸⁶ However, as expected, such study designs will not provide evidence for causal inferences in support of birth plans. Despite such compelling arguments for supporting promoting of birth plans, their widespread adoption in safe motherhood programs in developing countries,

therefore, remains unsupported by empirical evidence⁷. Nonetheless, evidence from developed countries suggests that birth plans empower women to make informed choices by increasing their knowledge and understanding of birth practices.^{22 87} Consistent implementation of birth plans in routine ANC care would allow using routine data to analyse how birth plans are implemented, to understand constraints for effective implementation, to compare data from various districts in the same country or different regions and even to assess their effectiveness in some settings. Evidence from countries like Kenya and Tanzania currently implementing focused antenatal care with birth plans as key components, however, indicates that birth plans are rarely promoted during antenatal clinic visits.^{37 88} Reasons for this discrepancy are not well understood, although weaknesses in the health care systems that lead to slow progresses in implementing recommended care cannot be ruled out. Providers' simulations of focused antenatal care in a rural setting in southern Tanzania, however, imply that birth plans implementation might be feasible, but might lengthen the duration of antenatal care consultation.³⁷ Specifically, the Tanzanian study looked at times providers spent for ANC consultations and the implication for the new WHO ANC model implementation in a rural setting in southern Tanzania, and concluded that time for ANC counselling on various topics in the national ANC guidelines is limited, with most women receiving no counselling. The need for improved counselling during ANC consultation, including for birth plans is compelling, and well designed studies to document the feasibility and effectiveness of birth plans in health care delivery settings are needed. Evidence from well designed RCTs may be more preferable, as they provide robust empirical evidence in support (or lack thereof) of birth plans as a safe motherhood strategy.

Only interventions known to be beneficial should be advocated in safe motherhood, in view of existing constraints in available resources and for ethical reasons.^{84 89} Recent RCTs on community-based behavioural change interventions in India and Bangladesh, however, showed that socio-culturally appropriate behavioural interventions result in substantial behavioural modifications that reduce neonatal mortality in weak health system settings. Nonetheless, no improvements were observed on skilled delivery care utilization in both studies.^{90 91} In contrast, a community based perinatal RCT intervention in Pakistan decreased the proportion of women delivering at home by 14% (from 79 to 65%) and an improvement in skilled delivery care utilization by 12% (from 18% to 30%).⁹² None of these studies employed birth plans, however, and their recorded improvements cannot be extrapolated, although lessons from such studied

might be valuable to understand the level of intervention for best outcomes for other MCH interventions. Nonetheless, for interventions planned at the level of health service delivery such as birth plans during ANC consultations; only interventions at this level will provide evidence for their effectiveness because their effective implementation will very much depend on the providers' skills and performance, including a well functioning and supportive other elements of the health systems.

2.5 Review of published English articles on birth plans interventions

A systematic review of published English articles using MEDLINE, PUBMED, EMBASE and POPLINE was conducted to identify interventions in which birth plans had been implemented in order to assess the reported effectiveness in increasing skilled care at delivery and after delivery. Search terms included randomized controlled trials; cluster randomized trials; intervention; birth preparedness; birth planning; birth plans, complication readiness; skilled delivery care; skilled delivery attendance; health facility utilization for delivery; postpartum; postnatal and after delivery care. Only randomized controlled trials or interventions in which birth preparedness, complication readiness or birth planning was an intervention component that were conducted in developing countries were included. Non quasi experimental or RCT, reports on birth preparedness and those whose methodologies were not well explained were excluded. (see table 2 at the end of this chapter for a summary of studies reviewed and appendix 2 for the details of systematic search strategy). Articles were extracted by the principal investigator. Only five interventions were identified, and all were non randomized field interventions. Two were conducted in West Africa, and the remaining three in Asia.

In summary, four studies had institutional or skilled delivery care as their outcome (two in Asia and the remaining two West Africa). Two studies reported EmOC access as an outcome, of which all were conducted in Asia and only one study had postpartum care uptake as an outcome. One study in Asia reported only improvement in men's knowledge on various elements of birth plans as its outcome. The increase in institutional or skilled delivery care ranged from 0%-28 with studies in West Africa reporting the highest improvement (19% and 28% respectively). Of studies which reported EmOC utilization as an outcome, the improvement was 2% and 23.9% while the increase in postpartum care was 17%.

The reviewed studies share some common characteristics: most have employed multiple interventions which were often not similar, and differed in the reported outcomes and measures of intervention effect.^{3 5 6 20 93} Additionally, the interventions were at different levels: multiple interventions at the community level^{6 20 93} or birth plans at the community level with pre- and/or post intervention interview for impact assessment^{3 5}, thereby, precluding the attribution of any effectiveness to birth plans alone. A summary of these articles, including methodological issues to provide evidence for the effectiveness of birth plans is discussed separately for each study below.

A comprehensive safe motherhood project in Burkina Faso concluded that the impressive increase in skilled birth attendance in the intervention area (from 39% to 58% over two years) was related to the promotion of birth preparedness in the community and during antenatal care.⁶ However, this was a pre- and post-intervention evaluation of the program effectiveness with no control arm and the post-intervention impact was assessed based on across-sectional survey of 180 recently delivered women and qualitative interviews with a smaller sample. The criterion for including only 180 women in the survey is not stated. Women who had birth plans (especially plans for saving money for emergency) were more than twice as likely to give birth with the assistance of skilled providers as those who did not. Given the study limitations in design and implementation, however, it is impossible to assert that this positive relationship was entirely due to the intervention or that the increase in skilled birth attendance was independent of the secular trends in the area.⁹⁴ Furthermore, reported post-intervention attitudes or behaviours among people in the intervention groups are subject to reporting bias, hence, the need for a control group, preferably in a RCT, to show the true intervention impact.⁹⁵

In another three year study in Burkina Faso in which multiple interventions were employed to increase women's use of skilled maternity care before, during, and after delivery, key determinants of access to care were also addressed.⁹³ Two districts were included: the intervention district and a comparison district. The intervention included activities to improve the quality, availability and accessibility of routine and emergency obstetric care in thirteen health centres and the district hospital. Skills of maternity care providers were improved through training in routine and emergency obstetric care; supplying essential obstetric equipment and supplies; strengthening the referral system and introducing quality assurance system for maternal health services. In addition, the

district hospital was upgraded to provide comprehensive obstetric care. A broad-based communication strategy to promote the use of skilled maternity care before, during, and after childbirth was also employed. Individualized women's counselling on birth preparedness during ANC visits, and an intensive community-level campaign to raise awareness of maternal health risks, the benefits of planning for delivery and delivering in health facilities were key elements of the communication strategy. At the community level, outreach agents were trained in each village, and performing artists and community leaders were used to sensitize the communities. The comparison district continued with routine government care which lacked community involvement. Baseline and endline samples of women in the two districts were used to assess the effectiveness of the intervention. A total of 5316 women were reported to have been interviewed at baseline (2554 in the intervention and 2859 in the control, and 7569 women: 3703 in the intervention and 3866 in the control) at endline. However, only 2489 women were reported in the analysis at baseline (1178 in the intervention and 1311 in the control). Similarly, only 3532 women were analysed (1559 in the intervention and 1973 in the control) at endline. No justification is given for this discrepancy, however.

Results of this study indicated that the utilization of health units for delivery increased from 29% at baseline to 57% at endline in the intervention district ($X^2=2185.3$, $p<0.001$). Care utilization increased by 2% in the comparison district (from 34% at baseline to 36% at endline). The gap between rich and poor women in utilization of health facilities for delivery narrowed in the intervention district, with 55% of women in the poor quintile delivering at health facilities versus 60% in the richest quintile ($X^2=10.2$, $p<0.05$). In contrast, only 26% of women in the poor quintile in the comparison district delivered in health facilities, compared to 70% in the richest quintile ($X^2=112.3$, $p=<0.001$).

This intervention had several limitations. The multiple interventions make it difficult to attribute improvements observed to any one intervention. The endpoint assessment of the intervention involved a group of sampled women in the intervention and comparison districts, and no information is provided on whether these women attended ANC to make birth plans or not. In other words, the study, therefore, does not report the proportion of women who had birth plans during the antenatal period who delivered in health facilities. In addition, far more women were sampled and interviewed than were

analyzed, and no explanation is given for this discrepancy. The health facility deliveries are not disaggregated to indicate the proportion of women who delivered in hospitals and those who delivered at lower level units. If more women delivered in the hospital than in lower level health units, for example, the measure of utilization might have been influenced more by the improvement in hospital performance than any other factor such as making birth preparedness or availability of delivery services at BEmOC health units. Information on women's place of delivery relied only on women's self report, and, thus, the possibility of social desirability bias cannot be ruled out in this case, as women in the intervention district were likely to give affirmative responses in order not to appear that they did not utilize the available health units for delivery. This was more likely because community leaders (traditional, political and religious) were involved to sensitize the community to utilize the antenatal and delivery care services available in health units.

In a safe motherhood initiative in Dinajpur, North-western Bangladesh over a four year period (1998-2001), multiple interventions were used to test strategies for increasing the utilization of health units for delivery and EmOC, knowledge of danger signs and birth planning messages.²⁰ Three sub-districts were involved: an intervention, the comparison and a control. While no intervention occurred in the control sub-district, health units were upgraded in the comparison sub-district, but in the intervention district, in addition to upgrading the health units, providers were trained to improve the quality of care, birth planning was promoted at the community level, and community support to enable women to access EmOC at health units was initiated and supported.

The intervention improved the utilization of health units for delivery by 18.1% (from 2.4% at baseline to 20.5% at endline; 95% CI 7.2-9.0 $p<0.01$) compared to an increase of 5.3% in the comparison sub-district (from 7.2% at baseline to 12.5% at endline; 95% CI 4.1-6.5 $p<0.01$). The control district recorded a dismal 0.5% increase (from 4.5% at baseline to 5.0 at endline; 95% CI 4.2-5.7 $p=0.35$). There was 23.8% improvement in the utilization of EmOC in the intervention sub-district (from 16.0% at baseline to 39.8% at endline $p<0.01$). The improvement was 13.0% in the comparison district (from 12.5% at baseline to 25.5% at endline $p<0.01$), while there was only a 1% increase in the control (from 11.1% at baseline to 12.1% at endline $p=0.69$). The reported knowledge of at least three out of five danger signs at endpoint was 45% in the intervention, 4% in the comparison sub-district and 6% in the control. The proportion of

women who could recall at least three-fifth of birth planning messages was 20% in the intervention sub-district, compared with 2% in the comparison district, and 1% in the control sub-district. However, no baseline information on the level of knowledge of danger signs and birth plans was provided.

Like the other interventions reviewed previously, the interventions in this study were multiple and, thereby making it impossible to attribute the recorded improvements to one intervention alone. Furthermore, the reported improvement in the knowledge of danger signs and birth planning messages cannot be assumed free from bias, especially where communities were exposed to the intervention. Respondents could have answered affirmatively based on previous experience that the responses were the ones expected by the interviewers. Secondly, it is not clear from the reported findings whether the assessment of the level of knowledge fell strictly within the time limit of the intervention in order to be able to attribute the improvement to the intervention alone.

A district-wide two year intervention on birth preparedness was conducted in Siraha, Nepal to determine the effectiveness of the birth preparedness program to positively influence planning for births, household-level behaviours that affect the health of pregnant and postpartum women and their newborns, and use of selected health services for maternal and newborn care through the government health system.⁵ The intervention consisted of messages on maternal and newborn-danger signs and on encouraging the use of healthcare services and preparation for emergencies. Community health workers promoted desired behaviours through inter-personal counselling with individual women who sought antenatal care at health facilities and women and groups in the community.

The assessment of the intervention effectiveness was based on reported information on thirty-clusters at baseline and endline household surveys of mothers of infants aged less than one year. The baseline and endline times are well described and fell within the acceptable time-frame for such assessment, and most likely the observed changes occurred during the intervention implementation. No comparison district was used and, therefore, the findings are only for the intervention sites before and after the intervention. In addition, only 38% of interviewed women reported to have received the intervention packages directly (counselling alone or counselled plus written information on the intervention) at endline and baseline characteristics of women who did not get the full intervention packages are not described. The provision of the intervention

messages was largely limited to women's groups in the community, and individual counselling was not common due to logistical and contextual factors that prevailed in the study areas. While the information was not exclusively for certain categories of women in the reproductive age groups, assessment of the intervention effectiveness was on recently delivered women (less than a year after delivery)

The study reported no significant improvement in access to skilled care at delivery and during obstetric emergencies, however. Delivery under skilled attendants increased by a dismal 1% (from 16% at baseline to 17% at endline $p=0.550$), and utilization of emergency obstetric care increased by 2% (from 83% at baseline to 85% at endline $p=0.320$). In contrast, the receipt of postpartum care from a trained provider within six weeks of delivery increased by 17% (from 17% at baseline to 34 % at endline $p=0.002$).

A composite index of seven indicators that measured women's knowledge, use of health services, and preparation for emergencies, was used to assess the intervention effectiveness. The index included woman's reported information on her most recent pregnancy or delivery, including: (a) receipt of antenatal care at least once from a trained provider; (b) naming prolonged labour as a danger sign during delivery; (c) naming excessive bleeding as a danger sign during delivery; (d) making financial preparations for emergencies during pregnancy; (e) making preparations for emergency transportation during pregnancy; (f) delivery under skilled attendants; and, (g) receipt of postpartum care from a trained provider within six weeks of delivery. Attending at least one ANC visit from trained providers increased by 24% (from 60% at baseline to 84% at endline $p=0.000$), and the percentage of women who named prolonged labour as a danger sign during delivery increased by 36% (from 50% at baseline to 86% at endline $p=0.000$). The proportion of women who could name excessive bleeding as a danger sign during delivery increased by 27% (from 29% at baseline to 56% at endline $p=0.000$). A similar increase in the proportion of women who reported to have made financial preparations for emergencies during pregnancy was achieved (from 45% at baseline to 72% at endline $p=0.000$). There was a 19% increase in the percentage of women who reported making preparations for emergency transportation during pregnancy (from 9% at baseline to 28% at endline $p=0.000$).

The study also reported improvement in newborn care practices. Delayed newborn bathing improved by 29% (from 12% at baseline to 41% at endline $p=0.000$). Similarly, the practice of applying nothing on the newborn's cord increased by 29% (from 42% at

baseline to 71% at endline $p=0.000$). The proportion of women who reported wrapping their newborns immediately after birth increased by 23% (from 56% at baseline to 79% at endline $p=0.000$). The proportion of women who reported that they breastfed their babies within one hour of birth increased by 19% (from 21% at baseline and 40% at endline $p=0.060$). The proportion of women who reported that they wiped their babies immediately after birth increased by 19% (from 56% at baseline to 75% at endline $p=0.001$). The authors concluded that birth preparedness can positively influence knowledge and intermediate health outcomes, such as household practices and use of some health services, but did not improve seeking skilled care at delivery and during emergency in the study community.

There were notable weaknesses in the design and evaluation of the effectiveness of this intervention. The absence of comparison clusters or districts in this study precludes the attribution of the reported improvements to the intervention alone, as this could be due to the secular trend in the study community. The characteristics of women who had no direct intervention messages are not described. If such women differed in the background characteristics from those who received direct messages, extrapolation of the study findings, even within the study district will be questionable. Furthermore, the evaluation of the intervention relied on reports by women who had been exposed to the intervention directly or indirectly and, likely, such women knew what the intervention intended to achieve. Social desirability biases in the form of affirmative responses in order not to appear different from what was expected of respondents at the intervention implementation, therefore, cannot be ruled out.

In an evaluation of a multimedia entertainment educational intervention in Indonesia that targeted husbands with messages about birth preparedness and midwives and community leaders about maternal mortality prevention, knowledge and intention to take actions on birth preparedness were reported at endpoint only.³ The level of reported knowledge on various topics on a sample of men ($n=1,507$) was high. Eighty-nine percent of husbands reported that they knew they needed to accompany their wives for prenatal check-ups, 83% knew the danger signs during pregnancy, 88% had knowledge on accompanying their wives to the delivery sites, and 85% knew that they needed to ensure that their wives receive adequate postpartum care. Men who were exposed to the campaign via print media, for example, were more likely to report taking birth preparedness actions than those who were not exposed ($OR= 4.74$ [95%CI 2.39, 4.27]

p=0.00). Likewise, men who were exposed to television, print media or talked to someone on birth preparedness were ten times more likely to have acted on birth preparedness than those who were not exposed (OR= 9.69[95% CI4.64,20.21] p=0.00). However, no baseline quantitative information on the topics was collected in this study to allow comparison of baseline and endline knowledge, except for qualitative information on a small sample of respondents. Unfortunately, the study does not report any qualitative data at endline either. In the analysis of the influence of the intervention on husbands' action on birth preparedness, no control for possible confounders is reported and the reported birth preparedness actions relied on self reporting by men. Affirmative reports by men who were exposed to the intervention in order to appear responsible in the eyes of the interviewer-even when such men took no actions cannot be ruled out. Lastly, the intervention was based on the EmOC model for reducing various delays women face to access care for pregnancy-related complications, yet they did not report improvement in care-seeking to enable the assessment of the effectiveness of the intervention.

Unfortunately, results from these studies do not allow for the calculation of a pooled estimate of intervention effectiveness to establish arguments for or against the continued inclusion of birth plans in routine antenatal care. Furthermore, little is known on the correlation between knowledge, formulation and implementation of birth plans to increase skilled attendance at delivery and postpartum.⁷ Evidence from behavioural research^{96 97} and maternal and newborn health² do not show a consistent positive relationship between intention to use services and actual use of services. In a review of methodological issues in the measurement of birth preparedness in support of safe motherhood, Stanton, (2004) found that few studies had examined the effectiveness of birth plans interventions, and the studies which existed were flawed in their study designs and sample size calculations.⁷

2.6 Involving men in birth plan formulation: review of available evidence

The Indonesian study is unique in that it aimed to improve men's knowledge on birth plans and how they could utilize that knowledge for better maternal health. Its major weakness, however, is that it did not include measurement of improvement in skilled delivery, postnatal or emergency obstetric care uptake (or lack thereof) as outcomes. Family and community involvement in antenatal care, including birth planning, in developing countries is promoted as part of routine care.^{1 2 24 98} Few studies, however,

have targeted men in formulating and implementing birth plans, or evaluating the effect of their participation in routine antenatal care in order to increase utilization of obstetric services.^{3 99} The arguments for the males' involvement in MCH services is compelling for several reasons. In some cultures, men (husbands) make decisions on many issues on behalf of women, including for seeking health care, because women's independent decision-making on many issues is not culturally, socially or religiously encouraged.²⁴ Additionally, women in most developing countries are poor and often rely on husbands to pay for health care services. As a result, when transport or service costs are the deterrent to accessing health care, men have a pivotal role to play in ensuring that women receive the required care.²⁴ Advocacy for more males' involvement in MCH services has gained impetus in recent years due to emerging evidence from studies in family planning^{100 101} and other reproductive health services^{14 102-104}, including those aiming to prevent maternal-to-child transmission of HIV¹⁰⁵, that suggests male involvement could increase the uptake of maternal health services.

MCH services attendance has traditionally been a prerogative of women, with limited men's involvement.²⁴ Consequently, evidence for the effectiveness of including men in birth plans interventions is scarce, as few studies have specifically targeted men. Promotion of male involvement in MCH services is, thus, a recent phenomenon, and more remains to be investigated on men's interest in responding to the demand of their participation. Nevertheless, the case for male involvement in birth plans formulation and implementation is compelling, and should be encouraged so that men understand the need for skilled delivery attendance for all women, and how to respond appropriately and without delay in case of pregnancy-related complications for better maternal, perinatal and neonatal survival.

Evidence from RCTs to show the effectiveness of men's participation in ANC to improve MCH services utilization, especially from developing countries is even scarcer. An antenatal RCT in Nepal to increase skilled attendance at delivery and postpartum in which the intervention included men in routine ANC consultations, found that women who attended antenatal health education with their husbands were more likely to attend a postpartum visit than those who attended alone (RR 1.25, 95% CI 1.01-1.54) or those who received no education at ANC (RR 1.29, 95% CI 1.04-1.6), and nearly twice as likely to report making three or more birth preparations than those who received no education (RR 1.99, 95% CI 1.10-3.59). No difference was observed in the level of

skilled attendance at delivery.⁹⁹ Less is known on the impact of including husbands in routine antenatal care service settings in order to improve skilled attendance at delivery and postpartum in Africa despite the advocacy by WHO for their inclusion in routine antenatal care.^{1 24} As birth plans involve family members, including husbands or male partners, they offer an avenue of including men in routine antenatal care.

2.7 Conclusion

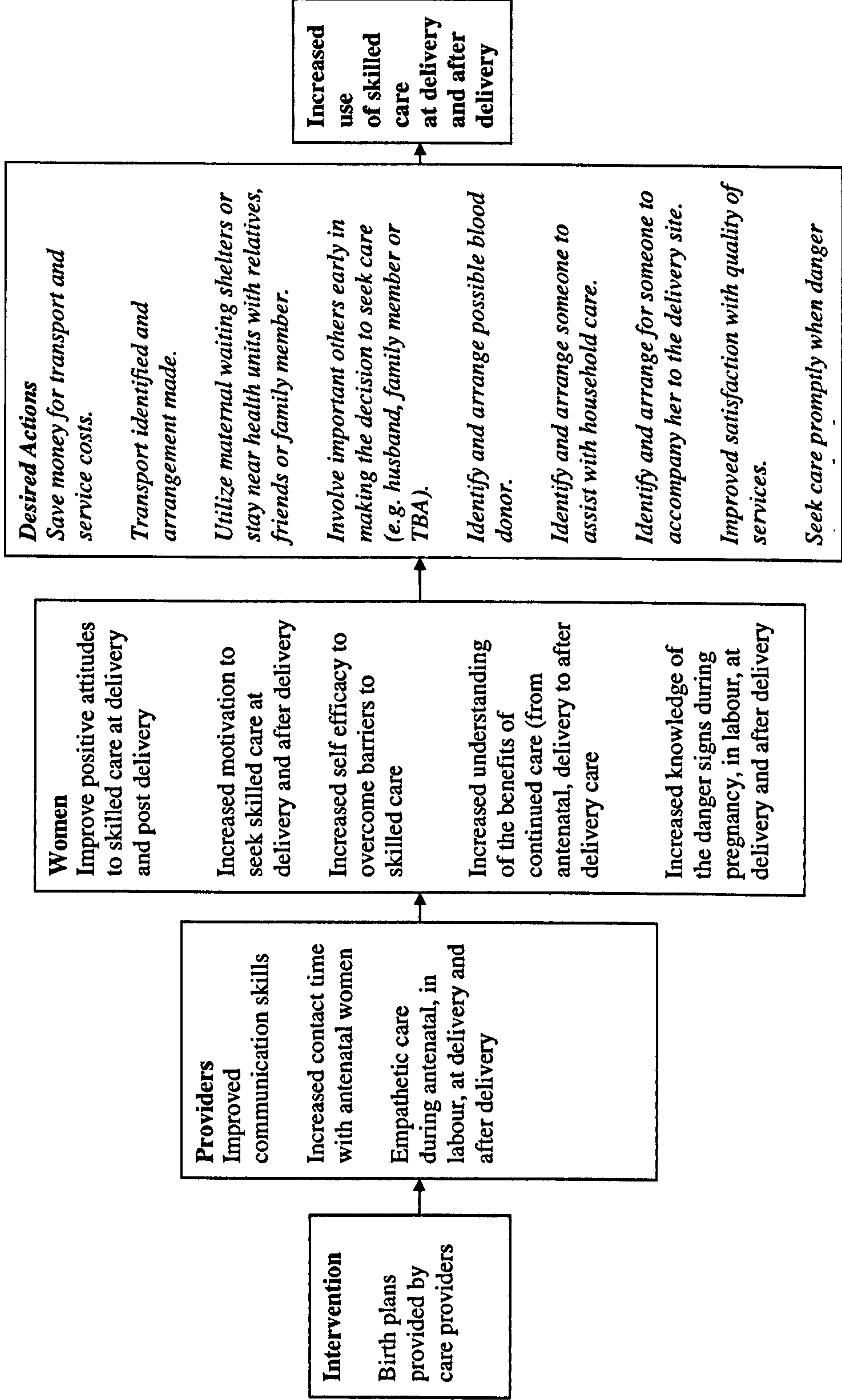
Despite the widespread promotion and adoption of birth plans in routine ANC as a safe motherhood strategy, there is no robust empirical evidence to support their inclusion. Where evidence is available from multiple intervention strategies at the community and health unit levels, the evidence is weak. Since birth plans are now part of routine ANC in developing countries, robust empirical evidence from health care settings is, therefore, needed on their effectiveness (or lack thereof) in increasing skilled care at delivery and postpartum. If birth plan interventions are effective, the approach may prove to be a valuable first step for Sub-Saharan African countries (and indeed many other developing countries) to adopt as they strive to identify appropriate interventions to improve maternal and neonatal survival.

Table 2.0: Summary of the reviewed studies on birth plans

Study	Design, setting & sample size	Authors comments/conclusion
Shefner-Rogers C & Sood S. Involving husbands in safe motherhood: effects of the SUAMI SLAGA campaign in Indonesia. Journal of Health Communication 2004;9:233-258 Ref. no. 3	Community intervention. Randomly selected sample of males exposed (n=755) or not exposed (n=752) to the media information on birth preparedness.	Men who were exposed to the campaign via television were approximately five times more likely to take actions to help women with pregnancy complications than those who were not (OR 4.74, p<0.01). Likewise men who had interpersonal communication were approximately ten times more likely to take the same actions than those who were not exposed (OR 9.82, p<0.01).
McPherson RA et al. Are birth preparedness Programmes Effective? Results from a Field Trial in Siraha District, Nepal. J Health Popul Nutr 2006;24(4):479-488. Ref. no. 5	Multi stage cross sectional cluster surveys on the effectiveness of birth plans to positively influence planning for births, household-level behaviours that affect the health of pregnant and postpartum women and their newborns.	Knowledge of respondents' use of health services, and preparation for emergencies increased from 33% at baseline to 54% at follow-up (p=0.001). Skilled birth attendance and use of obstetric care, however, did not change.
Moran AC et al. Birth-Preparedness for maternal health: findings from Koupe la district, Burkina Faso. J Health Population Nutrition 2006;24(4):489-497 Ref. no. 6	Quasi experimental design using community messages reinforced with radio messages. Pre and post intervention areas surveys and qualitative interviews used to assess intervention impact. 180 randomly selected pregnant women and 180 women who gave birth within 12 months of the survey were interviewed.	Skilled delivery attendance increases from 39% at baseline to 58% at follow-up approximately two years later. Among women who had given birth within twelve months, having birth plans especially planning to save money was associated with a higher likelihood of skilled delivery attendance (P=0.05)
Hossain J & Ross SR. The effect of addressing demand for as well as supply of emergency obstetric care in Dinajpur, Bangladesh. International Journal of Gynecology and Obstetrics (2006) 92, 320—328 Ref no 20	Quasi experimental design using an intervention district, a comparison district and control district. District hospitals upgraded in the intervention and in the comparison district. In addition, in the intervention district, improvement in the quality of care in the facilities which included team-building among providers, case reviews and establishing a stakeholders' committee. Community mobilization intervention, which included birth planning, establishment of community fund support systems to enable transportation of women to health units in case of need and arrangement for, blood donation were also introduced. Nothing was done in the control district	The intervention improved the utilization of health units for delivery by 18.1% (95% CI 7.2-9.0 p<0.01) compared to an increase of 5.3% in the comparison sub-district (95% CI 4.1-6.5 p<0.01). The control district recorded a dismal 0.5% increase (95% CI 4.2-5.7 p=0.35). There was 23.9% improvement in the utilization of EmOC in the intervention sub-district (95%CI 19.2,28.5 p<0.01). The improvement was 13.0% in the comparison district (95%CI 8.9-17.1 p<0.01), while there was only a 1% increase in the control (95%CI8.9-14.6 p=0.69). Conclusion: The best results were achieved through a combination of facility improvement, quality of care activities and targeted community mobilization activities.
Brazier E et al. Improving poor women's access to maternity care: Findings from a primary care intervention in Burkina Faso. Soc Sci Med 2009;69:682-90. Ref no 93	Comparative study in which multiple interventions were employed. Two districts were included: the intervention and a comparison district. The intervention included activities to improve the quality, availability and accessibility of routine and emergency obstetric care in thirteen health centres and the district hospital. Skills of maternity care providers were improved through training in routine and emergency obstetric care; supplying essential obstetric equipment and supplies; strengthening of the referral system and introducing quality assurance system for maternal health services. . Individualized women counselling on birth preparedness during ANC visits was also provided	The utilization of health units for delivery increased from 29% at baseline to 57% at endpoint (X ² =2185.3, p<0.001) in the intervention district. Care utilization increased by 2% 2% in the comparison district (from 34% at baseline to 36% at endline. The gap between rich and poor women in utilization of health facilities for delivery narrowed in the intervention district, with 55% of women in the poor quintile delivering at health facilities versus 60% in the richest quintile (X ² =10.2, p<0.05). In contrast, only 26% of women in the poor quintile in the comparison district delivered in health facilities compared to 70% in the richest quintile (X ² =112.3, p=<0.001).

	in the intervention district as well as upgrading of the district hospital to provide blood transfusion and c/section. Intervention effectiveness was assessed on 1178 women in the intervention and 1311 in the control district at baseline and 1559 women in the intervention and 1973 in the control at endline.	
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Fig 1: The conceptual framework of how birth plans work



3. Methodology

The chapter is divided into nine sections. It starts with the description of the study design, sites and setting followed by the description of the primary and secondary outcome measures. The other sections are on sample size calculation and cluster randomization, participant recruitment and data collection procedure, quality assurance, data management, data analysis, staffing, and finally, ethical consideration before, during and after trial implementation.

3.1. Description of the study design, sites and setting

3.1.1. Study design

The study was a cluster randomized controlled trial (RCT) in a health service setting in which health units were randomly assigned either to a new model of antenatal care in which birth plans were promoted to pregnant women in the late second and third trimesters or to the standard of care as per district protocol (see appendix 15 for the focused ANC schedule in Tanzania). Cluster randomization rather than individual randomization was chosen for two reasons. First, this was a health service intervention and implementation needed to fit with the service delivery organization. Second, women attending the same clinic may live in the same village or even the same household as co-wives and, thus, were likely to interact easily. Individual randomization would, therefore, create a potential for contamination of the control group.

3.1.2. Study sites and setting

The study sites (clusters) included all health units other than hospitals (16 dispensaries) in Ngorongoro district in northern Tanzania that offered MCH services (see figures 2a & b for the district location). This is a rural district whose inhabitants are mostly semi-nomadic pastoralists: Maasai (80%) and Watemi (18%). Traditionally, most pastoralist families migrate from their villages to areas of good pastures in the dry season but return during the rainy season. Pregnant women and young children, however, are largely sedentary. My personal experience in the district is that despite being sedentary, women have limited power in most decision making in seeking health care. According to the 2002 Tanzania national census, the district had a population of 130,000 inhabitants, of which 29,499 were women in the reproductive age group.¹⁰⁶ Using the national crude birth rate of 44.8 per 1,000 population for rural Tanzania²⁹ and the district population estimate of at least 140,625 in 2006 (personal communication with district planning department), about 6,300 deliveries occur in the district each year. The

antenatal clinic attendance is parallel to the national figure (over 90%), with initial attendance at 24 weeks gestation on average.^{29 40} Far fewer women, however, utilize the available health units for delivery with skilled delivery attendance as low as 7% for Ngorongoro vs 46% for Tanzania.⁴⁰

In accordance with the available district guidelines, antenatal and post natal care is available to women on all working days Monday to Friday from 07.30 to 03.30. Providers at all health units had been trained in provision of focused ANC in which women with uncomplicated pregnancies are required to attend four times, with the first visit preferably before the 16th week gestation. Subsequent visits are at 20-24, 28-32 and 36-40 weeks.²⁸ In the past women were required to seek initial postnatal check-up approximately six weeks after delivery, the advice is to attend postnatal care three times during the first six weeks after delivery: initially within the first seven days (preferably in the first two days), at four weeks and at six weeks. Care is mostly provided by a range of MCH nursing staff (public health nurses, midwives and nurse officers). In a few health units, however, clinical officers and nurse attendants provide the care. While the midwifery skills of clinical officers (trained for three years in medicine and midwifery) may be reasonably good, that of nurse assistants (usually trained for at most two years in basic nursing and midwifery) may be limited. Antenatal and postnatal care is provided at both fixed and mobile health units, the later by car or planes to women in villages far from health units.

Ngorongoro was chosen for this study for several reasons. First, it is a rural district with low skilled delivery care utilization and, thus, interventions are urgently required to increase this level. Second, the district has a well-established antenatal care network through fixed health units and outreach clinics in its three administrative divisions of Ngorongoro, Salei and Loliondo. Third, I was an investigator in a previous study of 2500 women in the district which showed that there is hardly any inter-clinic migration of antenatal attendees⁴⁰, thus, making the sites ideal for cluster randomization. The same study showed that pregnant women can reliably be followed up in a research setting at the antenatal and postnatal clinics with minimal loss to follow-up. Overall, 96% attended four or more visits, 95% made the initial attendance before 36 weeks and 94% were followed-up to nine months postpartum. Finally, I had over 12 years of service in the district and, therefore, extensive knowledge of the study area and good links with

local representatives from the Ministry of Health, other government departments and traditional leaders.

Figure 2b: Ngorongoro district



3.2. The outcome measures

The primary outcome measure was the proportion of women enrolled in the study who delivered in the available health units. The secondary outcome measures were the proportion of women who attended postpartum care within one month after delivery; and level of satisfaction with antenatal care among women and providers as measured on a modified five point Likert's scale.¹⁰⁷

Delivery in health unit and initial postnatal clinic attendance were assessed using maternal report at the postnatal interview and were verified using health facility records. Health units' delivery was recorded in the health units' delivery register and in a birth registration form made specifically for the study which was filled by delivery attendants in labour and delivery rooms (appendix 14). Initial postnatal care attendance was verified using the health units' postnatal registers and information filled on the women's ANC cards by care providers. When necessary, other maternal records such as TT immunization cards were used to confirm the date of initial attendance. However, only providers and women's reports of care satisfaction was used to assess care satisfaction.

The data collection supervisor reviewed all new filled questionnaires at least twice weekly to compare each woman's report of the place of delivery and initial postnatal care and the health units' records. For the primary outcome, women's report of health units' delivery and information in the delivery records in health units and the birth registration form were similar except for one case. The case was erroneously recorded as home delivery by the interviewer, but health unit records and the woman's report later confirmed that indeed she had delivered at a health unit. For initial postnatal attendance, interviewers used information on the women's antenatal cards which were kept by women even after delivery to verify if she had attended postnatal care or not. The date of initial attendance is usually filled on this card. Additionally, the data collection supervisor and the investigator reviewed the health units' postnatal registers to verify the information filled on the questionnaires by interviewers. Except for two women (one from the intervention arm and another from the control) who reported to have attended initial postnatal care but had lost their antenatal cards, the women's reports and the available records at health units and TT immunization cards were similar. The interviewers used the antenatal clinic numbers on their TT immunization cards to trace the two women's postnatal attendance records at health units. The two

health units had recorded their attendance correctly. There was no woman who reported not to have attended initial postnatal care who was recorded to have attended in health units' registers.

Care satisfaction was assessed by asking the woman whether she would recommend ANC to someone else or not and whether she was satisfied or not with the ANC she received. Additionally, the woman was also asked to rank her ANC satisfaction on a five point Likert's scale (1-5) of very satisfied, satisfied, indifferent, dissatisfied and very dissatisfied with very satisfied ranked highest. Very satisfied and satisfied were categorized as satisfied with ANC at analysis.

Reviewed questionnaires were sealed and stored in secure lockers for each health units before they were transported by plane from the district to the data entry clerks in the regional capital weekly. Each woman was assigned with a unique identification number which was used by the interviewers and the data collection supervisor to track her for postnatal interview.

3.3. Sample size calculation and cluster randomization

3.3.1. Sample size calculation

Available data for 2006 from the district annual report showed that the delivery rate in the available health units ranged from 0-10% of expected births (personal communication with the district MCH coordinator, Appendix 9). Given that approximately 7% of women in the district delivered in the available health units⁴⁰, a coefficient of variation (k) of 0.36 was calculated by dividing the standard deviation of utilization of health units for delivery among antenatal women (estimated at 0.025 from the range of delivery rate in the available health units in the district) by the average delivery care utilization at health facilities of 0.07 in the district.¹⁰⁸ The sample size formula for cluster randomized trials as described by Hayes & Bennett (1999) and Hayes & Moulton (2009)^{109 110} was used to calculate that, given 18 clusters, an average sample size per cluster of 35 women would be required to detect an absolute change in improvement in skilled delivery care utilization of 10% (from the current 7% to 17%) as statistically significant ($P < 0.05$, two sided) with power of 80%. This gave a total sample size of 630 women for the 18 clusters. However, assuming loss to follow-up of at most 20%, the required sample size was set to 790 (395 participants in the intervention and control groups respectively, an average of 44 women per facility).

Assessment of all the health units in the district at the preparatory stage, however, revealed that one dispensary was not providing MCH services and another had an unusually high rate of institutional delivery of approximately 30%. These two units were therefore excluded from the study leaving 16 units that were eligible. Recalculating the sample size based on 16 facilities rather than 18 resulted in a required average sample size of 45 women per facility (720 in total). Allowing for 20% loss-to-follow-up resulted in a required total sample size of 900 women.

3.3.2. Randomization

Available data for the previous year for antenatal attendees and institutional deliveries were extracted from the eligible health units' records and sent to a statistician at London School of Hygiene and Tropical Medicine for randomization into the study arms. The statistician had never visited the area and had no personal knowledge of the district. Health units (clusters) were stratified into two groups based on the level of skilled delivery attendance of at least 3% of all ANC attendees in the year preceding the study (4 facilities) or less (12 facilities). Within these strata facilities were randomly assigned to the intervention or control arms in a 1:1 ratio using computer-generated random numbers. Thus, eight health units were assigned to the intervention arm and the same number to the control.

3.4. Participant recruitment and data collection procedures

The study was conducted in three chronological phases.

3.4.1. Phase I of the study

Phase one (formative) involved qualitative data collection using trained Maasai and Watemi facilitators in Ma, Kitemi or Kiswahili language, (depending on the interviewee's background) and observation. This phase was exploratory. Its first aim was to investigate the local provider and community-level factors contributing to the very sharp contrast between high antenatal attendance and particularly low utilization of health units for delivery and immediate postnatal care. The second aim was to understand obstacles that prevent women from giving birth in facilities and accessing care during the immediate postpartum period so that the intended intervention was contextualized to ensure effective implementation. In particular, this first phase of data collection sought to determine the appropriateness of introducing birth plans into antenatal care as a means of improving usage of skilled delivery and immediate postnatal care.

Nine health units were selected for the study (both hospitals and seven randomly selected dispensaries). Study participants were selected from these units and their catchment areas.

Data were collected through 15 focus group discussions (FGDs) involving 160 people total, 12 key informant interviews, and participant observations. I observed and participated in the delivery of care that was provided at antenatal clinics (six clinic days observed) and in the labour and delivery rooms of the two hospitals and one dispensary (four deliveries observed). All observations were recorded on the same day in a field diary.

Semi-structured interview guides were used for both FGDs and key informant interviews (Appendices 11 & 12) and were initially pre-tested and piloted for cultural relevance in the communities surrounding the participating health units. The main topics covered included the decision-making process for accessing antenatal, delivery and postnatal care; perceptions of the quality of antenatal, delivery and postnatal care at available health units; perspectives on planning for birth and emergencies; and the reasons underlying the pattern of almost universal use of antenatal care services at health units but low utilization of skilled delivery care. Relevant issues surrounding the implementation and uptake of PMTCT programs were also explored in order to understand the level of counselling and health education communication skills among care providers and how skilled delivery attendance is integrated into PMTCT activities.

FGD participants and key informant interviewees were purposively selected to ensure adequate representation of the Maasai and Watemi ethnic groups and all key stakeholders in maternal health in the Ngorongoro district.

A group of 6-16 participants formed a single focus group. FGDs were conducted by trained Maasai and Watemi facilitators in the Ma or Kitemi languages and, when appropriate, in Kiswahili. The facilitators were social scientists who were trained in community development, and had been trained previously in collecting qualitative data for another project. They also participated in pre-testing and piloting the FGD guides for this study. Facilitators were assisted by a sociologist who noted all non-verbal communications and recorded the discussions. The discussions were audio-taped using

a digital voice recorder and later transcribed into English. Anonymity is usually emphasized in FGDs ¹¹¹. The Maasai and Watemi in Ngorongoro, however, are tightly knit communities and most people are acquainted. Speaking with strangers on intimate issues that touches on traditional norms is also not usually practiced in these two ethnic groups (personal experience). For these reasons, people familiar with one another were often recruited for the FGDs as recommended under such circumstances ¹¹¹. Separate FGDs for men and women were held under a tree at sites chosen by the participants, emulating how communal gatherings are typically organized in the two ethnic groups. Holding discussions outside the health units also ensured that participants could speak more freely about their perceptions of available care. FGDs with care providers were held at health units.

FGDs were conducted with care providers (3 FGDs held with a total of 18 providers – all except three were trained up to the level of nurse midwife and 17 of the 18 were women); women seeking antenatal, delivery and post-delivery care at these clinics (6 FGDs, total of 66 women; three for Maasai and another three for Watemi women); TBAs (3 FGDs, total of 36 TBAs); and male Elders (3 FGDs, total 40 men). Health care providers at two or more clinics in the same ward were asked to participate in the FGDs. One FGD was held in Ngorongoro division and two in Loliondo to ensure balanced participation of providers serving the Maasai and Watemi ethnic groups. Users of antenatal, delivery, and post-delivery care were randomly selected for FGD participation out of the pool of women who attended an MCH clinic during unannounced visits to the clinic sites. Lists of all practicing Maasai TBAs in the surrounding catchment areas were obtained from the health units. A total of 36 TBAs were purposely selected and invited to participate in the FGDs. They were divided into three groups (one group of 8 TBAs from areas served by dispensaries for ANC, and two groups of 12 and 16 from areas served by the two hospitals for ANC) and invited for the discussions. Watemi TBAs were not interviewed because of their limited role in antenatal, labour and delivery care. The principal investigator visited the ward offices to get the list of all elected elders. A maximum of 16 Elders from the wards located in each of the three divisions were purposely selected to include elders from all existing ethnic male age sets and invited to participate in the FGDs. This inclusion was culturally and socially acceptable in the two ethnic groups.

The principal investigator conducted the key informant interviews. The interviews were held in the Ma, Kitemi, or Kiswahili languages depending upon the interviewee's background. Participants were to provide information on antenatal, delivery and postnatal care seeking behaviours in the two ethnic groups, how such care is provided at health units and perceived by women and their important others and the discrepant pattern of near universal utilization of ANC but low use of delivery care at health units. The information was important to understand how the intervention could be effectively implemented in the study district. The participants included 2 women with previous experience with antenatal and delivery care services in the district who were recruited during a hospital outreach visit, the husbands of these 2 women, 2 women admitted to the hospitals for pregnancy or delivery related complications, 2 traditional leaders, the district MCH coordinator, one prominent Maasai TBA, and senior Elder males from the two ethnic communities (2). All informants were interviewed once except the TBA and the district MCH coordinator who were interviewed twice to clarify some issues that surfaced during the FGDs and interviews with other informants.

3.4.2. Phase II of the study

The second phase involved refining training materials and questionnaires on the basis of the results of the key informant interviews and focus group discussions and a review of materials already available in this area. In particular, information on another project in neighbouring Kenya was reviewed to understand more on antenatal interventions to improve access to maternal and neonatal care services in the region, http://www.changeproject.org/technical/maternalhealthnutrition/mstoolkit/bp_kenya/overview_bp.htm). Health care providers in the intervention and control units and interviewers were trained: care providers with respect to the study requirements in their respective arms and interviewers on how to use the questionnaire to collect the required information.

Eight providers in the intervention units were trained for a total of two half working days at a training workshop and two half working day at their respective units. At the training workshop, providers received theoretical training on the concept and implementation of the intervention which preceded practical training with pregnant women invited for this purpose. They received constructive feedback on their performance. This was followed by further training in their respective health units during clinic days to reinforce their initial skills.

Providers in the control units were trained on the study concept for their arm for one half working day during a workshop. They were informed that the study aimed at understanding how routine ANC was provided in their respective health units. Additionally, they also received training for one half working day in their respective health units to make sure that they collected all the required information.

3.4.3. Phase III of the study

Phase three was divided into two main sections: the intervention implementation and process evaluation of the intervention and control ANC.

Phase IIIa: The intervention implementation

During this phase, women were recruited and followed-up to initial postnatal care consultations at health units or the second interview at home depending on what occurred first.

1. Inclusion and exclusion criteria

The inclusion criteria included (i) all 16 health units other than hospitals in the district that offered MCH services; The district has 20 health units (two hospitals and 18 dispensaries), all owned by Christian churches or the government; (ii) women with proven pregnancy through abdominal palpation of at least 24 weeks gestation age attending at any of the above health units in the trial, a resident of Ngorongoro district and planning to deliver in the district; (iii) and not already referred to a hospital for specialized pregnancy care. A cut off point of 24 weeks was chosen because the median gestation age at initial ANC initiation in the district is around six months and that at least six in ten of all attendees do so round this time.⁴⁰ Two other reasons were also behind this decision. I had a fixed time for support for my PhD study, and, therefore, a longer follow-up time would have been difficult. Additionally, the available resources did not allow a longer follow-up time. Women who attended before this gestation age were later included in the study after reaching this cut off point.

The hospitals were excluded from the study due to the nature of the study design (cluster RCT). The two hospitals had approximately 45% of all antenatal attendees in the district and differed significantly in the level of skilled delivery attendance. Their inclusion in each arm, therefore, would have resulted in significant clustering of the results around them. Other exclusion criteria included: planning to deliver outside the

district and or move out of the district after delivery and before the follow-up interview and delivery site ascertainment. A previous study in the district showed that very few women deliver or move outside the district after delivery.⁴⁰

The 16 health units had a total of 23 workers of various cadres who were involved in MCH care services that included nursing officers (2), midwives (5), MCH nurses (8), nurse auxiliaries (4) and clinical officers (4). Except for the midwives, the distribution of the other cadres in the two arms of the study was similar. There were two midwives in the control arm of the study vs three in the intervention arm.

Interviewers requested for informed consents from all pregnant women for the initial and follow-up interviews and those consented were recruited by the same interviewers before they headed into consultation rooms in the intervention and control health units. For women who were seen during outreach clinics, they were recruited into the study by interviewers as they approached the clinic sites before they were seen by providers. All women meeting the inclusion criteria were recruited into the study except two (one from an intervention and another from a control clinic respectively) who declined to participate.

2. Format of birth plans and how they were implemented in the intervention arm

The intervention was an antenatal care model in which birth plans were introduced and promoted in the intervention health units' clinics through provider- client dialogue. These included discussions on birth preparedness and complication readiness: planned place of delivery if other than health unit, transport arrangements to the delivery site or during emergency, funding arrangements for delivery or emergency care services, identification of possible blood donors, identification of a birth companion if needed and if appropriate, support in looking after the household while the woman is away. Obstacles to skilled delivery attendance and how to overcome them, and danger signs during pregnancy, labour and postpartum were also discussed.

In developing the birth plans, each woman was asked about her choice of a place of delivery and the reason(s) for the choice explored. Where necessary, and with woman's consent, her male partner or another important person she identified was invited to attend subsequent visits in order to participate in the dialogue regarding the possibility of delivering at any of the available health units (dispensary or hospital) of her choice. In view of the median initiation of antenatal attendance at around 24 weeks gestation, it

was expected that most participants would undergo a minimum of three sessions on three different clinic attendances before delivery.

Initially, the birth plans were in a written and pictorial format, the later for women unable to read and write (Appendix 7). During the intervention implementation, however, most women did not like the pictorial format of the plans and instead insisted that providers talk to them verbatim on what was required for the formulation and implementation of the plans. The experience was similar to what the investigator had encountered in the same communities previously that despite most women's lack of formal education and hence inability to read and write in Kiswahili or any of the two languages, women insisted on being given oral instruction or provided with written instructions to follow instead of pictorial designs. In this study, women argued that most households had someone who could read in Kiswahili and such people were often used to read and interpret materials on behalf of illiterate family members. In addition, people from both ethnic groups reported that abstract materials and information was traditionally not valued, and thus not the most effective way of disseminating information.⁴⁰ Traditionally, people in the two ethnic groups gather and discuss issues and what is agreed therein is binding to all members in the communities. Although weaknesses in the pictorial designs cannot be ruled out, culturally appropriate communication strategies, especially the need for emphasis on oral communication in low literacy communities, have previously been argued for, as some people with low literacy may have difficulties with visual than oral language communication.¹¹² Evidence from a recent study in Makwanpur, Nepal, however, suggests that visual literacy through photoelicitation is an effective way to help women groups and researchers to communicate and improve knowledge and adopt behaviours that might increase neonatal survival.¹¹³

At each subsequent visit, the birth plans were reviewed through maternal-provider dialogue in order to identify any deviation from the initial plans if already finalized; or if not, women were assisted to finalize them. Each woman in the intervention group was given a copy of the completed birth plans to keep together with her antenatal record.

Financial costs and distance from health units are major obstacles for accessing health services in most developing countries, including in the study sites. The two hospitals in the district have maternal waiting units for those living far away, but very few women

utilize them (personal experience). Further, maternity care in public and most religious owned health units in Tanzania and Ngorongoro district in particular is free. Indirect costs such as transport, food and opportunity costs, however, are a reality many women in Tanzania face when they try to access health care for themselves or for their newborns. Lack of delivery essentials such as gloves and razor blades (which can lead to extra costs for women and their families) was reported in a recent study in southern Tanzania.⁶² My personal experience is that such situations are rare in the study district's health units, and all the necessary delivery essentials are available and free. The low level of utilization of health units for delivery might be the reason, although better planning at the district level cannot be ruled out. The intervention model aimed at enabling women to overcome various delays that prevented them from utilizing the available health units for delivery and for emergencies when they occurred and thus, prepared women and their families to find ways of meeting the indirect, opportunity and other unforeseen costs among others.

The intervention was based on the principles developed by the theory of reasoned action⁹⁷ and the health belief model¹¹⁴. The theory of reasoned action views a person's intention to perform a certain behaviour (or not to perform) as the function of the individual's attitude toward the behaviour (the person's judgement that performing the behaviour is good or bad), and the perceived social subjective norms (social pressures on someone to perform or not to perform the behaviour). The health belief model describes how health beliefs interact with modifying factors (perceived susceptibility and severity of the problem versus the perceived benefits and barriers attached to the problem) to determine health behaviours. If birth plans were effective, women, through dialogue with ANC providers during care consultations, would develop positive attitude towards delivering at health units and the social pressure from family members and care providers will provide high motivation to overcome some barriers to skilled delivery and postpartum care. The study did not aim to prove these theories, but they provided a comprehensive framework to explain the theoretical construct for birth plans formulation and how they would work to obtain the desired study outcomes.

A major challenge was how the health units could cope with a sudden increase in the number of women who seek delivery care if the intervention was effective. A sudden increase in care uptake could strain the available resources, and potentially affect the quality of care that could subsequently affect the women's confidence in the health

system to assist them at delivery and immediately after. The increase in delivery with skilled care was expected to fall within the existing capacity of the health units in the study district, as extrapolations from the available data indicated that even with 100% health units delivery (unlikely probability), there would be at most two deliveries per working day in the busiest units (Appendix 9).

According to the WHO criteria⁴⁶, a skilled delivery care provider was defined, as a person with midwifery skills who has been trained to proficiency in the skills necessary to manage normal deliveries and to diagnose and/or refer obstetric complications. Since not all women who deliver in health units in Tanzania are assisted by providers who fit this definition, skilled delivery attendance meant delivery under care providers in any of the health units in the district.

3. Data collection in control and intervention arms

Explanation was made to all women in the control arm that the study aimed at future improvement of the quality of care provided in health units and that ultimately this would be beneficial to both women and their unborn babies.

Variables that were collected are summarized in appendix 3. Collected information for the components of antenatal care based on those defined in the Tanzanian national ANC guidelines and those that were assessed in the 2004-2005 demographic and health survey (DHS).

In assessing the providers' or women's satisfaction with the care they provided or received, participants were asked two main questions: Are you satisfied with the care you provided/received at this clinic today? How satisfied are you with the care you provided/received today? The latter was recorded on a five point Likert's scale (1-5) corresponding to level of satisfaction or dissatisfaction with the highest score denoting very satisfied and the lowest denoting the lowest level of dissatisfaction (very dissatisfied).

4. Interview schedule and sites

Women were interviewed twice: first on the day of their recruitment and second immediately after the initial routine postpartum care visit in the health units or approximately six weeks postpartum at home (depending on what occurred first). The

second interview took place at home two weeks after a woman had failed to attend her scheduled postnatal care appointment or if she requested so for personal reasons.

Phase IIIb: Process evaluation of the intervention and routine care

Process evaluation for all intervention and control clinics activities was conducted concurrently to the trial. The aim was to understand how the intervention was implemented and routine ANC provided to women. It also aimed to understand if the intervention was implemented as per protocol and discover factors that facilitated or hindered the implementation of the intervention and the provision of effective care at the control units. The information was important to explain the trial results, whether positive or negative.

The evaluation took place from 15th January 2009-24th March 2009. Health units in both the intervention and control arms of the study were visited twice for the evaluation of ANC and once for the post natal care evaluation.

Several data collection methods were used to collect this information including interviews of providers and clinic attendees, audio recording of the provider-client interactions, recording of the time spent for various care components and observation of the providers-client interaction. In addition, a health unit assessment form was used to evaluate further the intervention implementation and the care that was provided at the control units focussing on facility level factors that prevailed at both the intervention and control units at the time of the implementation of the intervention for antenatal, delivery and post delivery services, and provider-women interaction (Appendix 8). Many questions in the assessment form were adopted from the Tanzania Service Provision Assessment Survey 2006 questionnaire. A few more originated from the literature on ANC and the Tanzania 2004-06 DHS survey questionnaire (see appendix 16 for the summary of the various sources of information collected).

All providers involved in MCH services in the 16 health units were observed (11 in the intervention arm and 12 in the control) during ANC and post natal care consultations. The number and distribution of the providers in the two arms of the study was as described earlier in the inclusion and exclusion section.

Health units in the study were visited on unannounced days, providers interviewed and the provider-client interaction during care provision on the particular days observed and

recorded on a digital voice recorder. Various steps of antenatal care were timed using a stopwatch to document the time providers spent for providing care. The observed information was noted in a diary on the same day at the clinics or immediately after leaving the clinic sites and later compared to the information that was obtained from the recorded consultations. In case a discrepancy was noted, providers were contacted for clarification(s).

At most five consultations were assessed on any single unit assessment for the initial and re-attendance ANC. Unless a health unit had less than five new or re-attending women, systematic sampling was used to select five participants among the pool of women in the respective category of ANC consultation (new or re-attending). Where fewer than five women attended initial or re-attendance ANC, all were included in the assessment. Four steps of care were defined for this study: history taking, health education, examination and drug administration including immunization. Women for initial postnatal clinic attendance were few, and consultations for all women attendees on the particular day were included in the assessment.

Initially, the timing of the various steps of care consultation and audio-recording of the provider-client interaction were to be done by the research assistant or the PI (two men). However, realities in clinic sites quickly showed that this would not be possible without intruding too much on the clinic attendees' privacy as it would entail observing all stages of the care provision including when women were examined physically. Early on during fieldwork, we therefore decided that the recording would be done by the provider. The provider hanged the digital voice recorder around her neck to enable the recording of the entire provider-woman interaction. Providers were told of the nature of this assessment and that the evaluation aimed to understand the providers' skills in implementing the intervention (for the intervention clinics) and how routine antenatal care was implemented in the control units during the training workshop before data collection commenced.

The principal investigator or his assistant timed the care consultations. All women would pass through all the steps of ANC consultation during the initial visit, but some steps would be skipped by providers in subsequent clinic visits if they had been provided previously, and were not indicated basing on the available national guidelines for ANC. The observed time for each step of care consultation was filled in a designed

form for each unit that indicated time spent for each attendee. The form was later reviewed by the principal investigator or his assistant together with the provider at the unit at the end of the clinic day, and where necessary, clarifications for some issues were sought.

The total time spent for antenatal care for each clinic was the average time for ANC consultation that was obtained by dividing the total time for ANC consultations by the number of consultations observed for the particular clinic. The time spent for each step of antenatal care for each unit was the average time spent for providing the particular step of care. It was obtained by dividing the total time spent by providers for each step of care for all women who received the step of care by the number of consultations (women) observed on the day of the evaluation. The providers recorded time for consultations and that obtained from timing the various steps of care consultation were later compared, and were largely similar. In few instances where they differed, the investigator or his assistant together with the provider reviewed the records to get the total time for ANC consultation for the health unit. The counselling time included the entire time spent for health education on that particular clinic day and in most cases, only counselling for PMCTC, syphilis and skilled delivery attendance were covered. At the time of this study, only one unit in the intervention had reagents for routine syphilis screening and time for this activity was excluded in the assessment.

The quality of the provider-client interaction was also assessed by analysing the recorded information on women's participation in the discussions during antenatal care provision as well as the degree of providers' respect and compassion towards women. The quality of the provider-client interaction was ranked good and recorded 1 if the provider allowed women to ask questions for things they did not understand and the provider was able to respond to such questions. It was ranked fair and recorded 2 if the provider would allow women to ask questions but had little or no time to respond to their concerns or did not ask them questions to try to ascertain if they understood what was discussed. The discussions were ranked bad and recorded 3 if the provider neither asked women questions to ascertain if they understood what was discussed nor allowed them to ask her any question. The interactions were also ranked undetermined and recorded 4 if for any reason the ANC sessions were too short to allow assessment of the provider-women interaction. Providers' attitude on women attendees (respect and compassion) was ranked good and recorded 1 if the provider listened to women

attentively and was able to ask them questions to ascertain whether women understood what was discussed. It was ranked fair and recorded 2 if the provider listened to women attentively or otherwise but did not ask them questions to ascertain whether women understood what was discussed and/or if women asked question and the provider did not respond. The attitude was ranked bad and recorded 3 if the provider did not listen to women concerns and gave them no time to ask questions and undetermined if for any reason the ANC sessions were too short to allow assessment of the provider attitude towards women attendees.

In the post natal period, time spent for initial post delivery care attendance was also assessed. Providers were also asked to report if both the mothers and their babies were always examined during the initial post natal care (see appendix 16 for the summary of what was assessed).

3.5. Quality assurance

The data collection tools (FGD and key informant guides & questionnaires) were translated into Kiswahili and the two major languages in the district and back into English in order to ensure the initial translation was correct. The data collectors were trained in using the FGD guides/ questionnaires and the tools pre-tested and piloted using the same data collectors. Qualitative data transcription and translation were done by people conversant in the two languages in the district and in Kiswahili. All transcribed materials were reviewed independently by a team of people (not the transcribers) in order to check for consistency and, in case of any disagreement, a consensus was sought from a third party, who was also conversant with the two languages and Kiswahili. The exit interviews/discussions were organised in such a way that they could provide opportunities for women to speak freely of their care experience in order to reduce social desirability bias.

In order to document the primary outcome accurately and consistently, health unit delivery records were checked regularly, and, where necessary, providers' record keeping skills upgraded before and during data collection. The providers' skills were reasonably good as per available national guidelines of the health information management system. The system was introduced a decade ago countrywide and is compulsory and strictly supervised to provide routine data. All deliveries at both lower health units and at hospitals were recorded accordingly in the health units' registers and

participants' reports of health units' deliveries were confirmed using the registers. Additionally, all health units had been provided with the birth registration form specifically for the study which was filled by delivery attendants in labour and delivery rooms (appendix 14). Initial postnatal care attendance was confirmed using the postnatal information filled on the women's ANC cards by care providers and from health unit registers. Where necessary, other maternal records such as the TT immunization cards were used to confirm the date of initial attendance.

A data collection supervisor was recruited to assist in supervising the research activities. He reviewed all completed questionnaires regularly and where possible daily for accuracy, consistency and completeness and errors were immediately communicated to the interviewer for correction. Where necessary, he requested the interviewer to make additional field visits to clarify inconsistencies, to collect any missing data or to correct errors.

In order to maintain a close supervision of the research activities, I was stationed in the district throughout the data collection period. The trained research assistant and the researcher visited the study units in both arms fortnightly on unannounced days to supervise the data collection process, reinforce the providers understanding of the research protocol during the recruitment of the study participants. This included the training of previously trained staffs and their assistants experiencing difficulties with the program. All providers on duty on that particular day were involved. Filled birth plans forms (Appendix 6) at the intervention units were reviewed and where possible errors corrected. Providers were also provided with forms with key message to discuss with the women attendees (Appendix 5). Providers filled the birth plans forms with mothers as part of the birth planning formulation in duplicate. One copy was kept at the health unit and another given to the woman after the last ANC consultation before she delivered. The two copies were reviewed by the principal investigator before data entry to verify the filled information. Regular communication with all health units via mobile phone and/or radio calls to the service providers and interviewers were maintained throughout the data collection process. In addition, the district health units' supervision team assisted the study activities by reinforcing the supervision of the research activities at all units during their routine supervisory visits.

Evaluation of the intervention and routine care were done during surprise visits separate from the supervisory visits to health units. Allowing care providers to record the ANC consultations, however, had a potential for bias as care providers could modify their behaviour, especially when they knew that their performances were being assessed. Collection of important information like time spent for ANC consultation was triangulated, and findings were discussed with the providers on the same day to ensure that what was recorded or timed reflected what happened on the evaluation day. Additionally, an experienced MCH nurse was also used to assess the quality of provider-client interaction and the recorded ranking was the consensus of her opinion and that of the researcher. The approach, although not the best, was the most pragmatic for ethical and operational reasons in the study setting.

3.6. Data management

The hand written qualitative data transcripts were entered into Microsoft Word. Quantitative data were double entered into SPSS statistical package data entry program with necessary range and consistency checks by trained data clerks. Checks for consistency and validation were done periodically using the same package by reviewing frequency distribution and cross tabulations. Data were then imported into STATA statistical package in Windows version 9 (STATA Corporation, Texas, USA 2005) for analysis.

The distribution of each variable was run to check for possible errors. Observations were checked to see if they related to the allowed categories and to ensure that frequencies made sense. Range checks were performed to see if some values fell outside the allowed range and where possible appropriate corrections were made. Histograms were inserted to check for outliers.

Consistency checks were conducted to identify if there were some variables that were inconsistent. Scatter plots were used to check consistency for numerical variables, and inconsistencies were corrected where possible but where not possible, they were recorded as missing. Borderline inconsistencies that were not considered impossible were retained and analysed as such.

3.7. Data analysis

3.7.1. Analysis of qualitative data

Qualitative data transcripts were coded in a process that involved identifying emergent themes and connections between and across them (constant comparison) using the principles of grounded theory. The aim was not to prove any aspect of this theory but to understand various factors that affect utilization of health units for delivery so that the birth plans and the intervention implementation were contextualized. The analysis started with open coding of the first few transcripts to identify key analytical concepts that were used as the base for analysis of transcripts from subsequent FGDs and key informant interviews.¹¹⁵ Indicators (text) explaining antenatal, delivery, emergency obstetric and postnatal care were identified. Similar indicators were grouped together to generate categories on reasons for seeking antenatal, delivery, postnatal and emergency obstetric care, topics discussed during ANC consultations, roles of TBAs and men in care for pregnancy, delivery and after delivery, decision making for care seeking and traditions and norms attached to pregnancy, delivery and postnatal care. Similarities, ambiguous, contradictory or missing information were noted and addressed during subsequent FGDs, key informant interviews and observations. For example, initial evidence suggested that the role of TBAs in pregnancy care and childbirth differed among women in the two ethnic groups, and more Watemi than Maasai thought that TBAs were not useful. Additionally, participants in both ethnic groups thought service cost was not a major deterrent for women to deliver at health units. These were followed up in subsequent FGDs to gain an in-depth understanding of the reasons for the difference or similarities. Emergent themes and connections between and across them were identified while maintaining constant comparisons and an open approach. Since qualitative data collection was triangulated, data were compared across methods: FGDs and key informant in-depth interviews and participant observation findings.¹¹⁶ Discrepant findings between the observations and the transcripts were addressed by follow-up informal discussions with care providers. The approach enabled the uncovering of various categories of childbirth operative in the study population and to determine how they overlap. This allowed for an in-depth understanding of participants' health care seeking behaviour (antenatal care and skilled delivery attendance), and providers' and clients' related factors for the low skilled delivery attendance, but relatively very high antenatal care uptake.

3.7.2. Analysis of quantitative data

The unpaired t-test statistic was used to test the intervention effectiveness. However, in view of the few clusters in each arm of the study, and the fact that some variables deviated significantly from normality, the rank sum statistic was also performed for all hypotheses generating and intervention effectiveness analysis in order to check the reliability of the t-test statistic. Although the t-test statistic is generally robust enough for parameters not normally distributed such as proportions¹¹⁰, occasionally test based confidence intervals (CI) for a difference in binomial proportions, particularly when the parameter estimates are near the boundaries (0, 1) may be problematic.¹¹⁷ Indeed in the analysis, upper interval estimates of more than 1 were at times found. To avoid presenting such logically implausible figures, results are presented as mean difference of the proportions for the respective variables between the intervention and controls arms of the study and the 95% confidence intervals (95% CI) for these differences based on the t-distribution.

Randomization of large numbers of units protects against imbalance between the two arms for all potential confounders. However, in this study, only 16 units were randomized, providing only limited protection against imbalance. Known determinants of skilled attendance such as participant's and male partner's education, ethnic group (as a proxy of traditions and norms), parity, marital status, wealth quintile (from household possessions), distance from health units/hospitals and previous experience with the health system in the previous pregnancy/delivery (whether a participants had ever had ANC or delivered in a health facility in antecedent pregnancies) were recorded and, their distribution in the two arms of the study calculated. Such covariates were adjusted for during analysis of the intervention effectiveness.

In calculating the wealth quartile, the household possessions that an individual had including type of house (walls, roof and floor), source of drinking water, source of energy for cooking for the household, source of power for lighting, whether the family had cattle, radio, bicycle or television and the type of toilet were entered in a principal component analysis (PCA) model in STATA and the Kaiser- Mayer-Olkin (KMO) measure of sampling adequacy applied. Household possessions with a KMO of less than 60% were excluded in a later model which was used to calculate the wealth index.

Only the source of drinking water, the type of toilet for the family, the source of energy for cooking, having a radio, bicycle, television and cattle were retained in the model. Subsequently, the index was divided into quartiles: the lowest, the second, the third and the highest in order of the wealth the individual household had.

The quality of provider-woman interaction was coded as 1 (good or fair) or 0 (bad) while providers' attitudes on women attendees were coded as 1 (good or fair) or 0 (bad).

Analysis was by intention to treat taking into consideration the cluster randomisation by computing cluster level summaries and basing the assessment of the intervention effect on these cluster-level summaries.¹¹⁰ No subgroup analysis was planned a priori and subgroup analyses were regarded as exploratory and their results as hypothesis generating. Such analysis involves multiple comparisons, with 1 in 20 chance of significant difference even when no such difference exists. Furthermore, the power of the study was calculated only for the primary outcome, and thus the power to detect differences in sub-groups was low.¹¹⁰

Baseline characteristics were summarized and presented in tables. For categorical variables, the number of individuals and their respective percentages in the particular arm are presented while for continuous variables, the mean and standard deviations are presented when presenting individual data.

To calculate for the cluster level summaries for the various components of care women received (exploratory analysis), individual data were collapsed to obtain the cluster level data and the unpaired t-test statistic applied to test the difference in proportions of the component of interest in the two study arms. In estimating the effect of the intervention effectiveness (endpoints: delivery at the available health units in the district, attending initial post natal care within the first month of delivery and providers' and women's satisfaction with care) both unadjusted and adjusted analysis were conducted. For the unadjusted analysis, individual data were collapsed to get cluster level data and the unpaired t-test applied thereafter to test if the difference in the proportion of women in the two arms of the study was statistically significant at 95% confidence level. The analysis of the effect of the confounding variables was made by carrying out an individual level logistic regression analysis ignoring for clustering. All potential confounding variables were entered into the model except for the intervention effect and

the summary measure for each cluster from the observed outcome in the cluster and the predicted outcome in the absence of the intervention was the residual for each cluster. The residuals were then compared using an unpaired t-test to provide the intervention effect adjusted for the covariate as described by Hayes & Moulton, 2009.¹¹⁰

Factors that were associated with delivering at health units among women who made plans to deliver at health units during ANC consultations in the intervention arm were also analyzed. Individual level analysis taking into account the clustering effect using the svy command in STATA was used. For each factor analyzed, the proportion of women who delivered in health units, the Chi-square and p-values are reported.

3.8. Staffing

A data collection supervisor and 16 nurse midwives/public health nurses/clinical officers from the 16 health units were recruited to assist in implementing the study. Additionally, 29 questionnaire interviewers (approximately two per health unit), two FGD facilitators and two transcribers/translators were recruited. To reduce data entry errors, two data clerks were also recruited.

Although pregnant and lactating women are usually sedentary, a possibility that some might migrate with the core family could not be ruled out, thus, making it difficult for a visitor to track them. The semi nomadic lifestyle of the majority of the participants, therefore, demanded a well established follow-up mechanism, preferably with people well conversant with the district environment. Thirty six VHWs were paid to locate women who failed to attend postnatal clinic on scheduled dates so that interviewers could track and interview them in their respective homes.

3.9. Ethical consideration

3.9.1. Review boards and informed consent

Ethical review and approval were sought from World Health Organization, London School of Hygiene and Tropical Medicine, and National Institute for Medical Research in Tanzania. Ngorongoro district health, administrative and traditional authorities were informed and their approval for the study sought. After being provided with information about the study, each participant was asked to sign an informed consent form (Appendix 4). Since, most women and traditional leaders in the district did not know how to read and write in the local languages, English or Kiswahili, for non-literate women, the information sheet was read aloud in its entirety in the participants' respective local

languages or Kiswahili, and the individual woman asked to stamp her thumbprint in the designated section of the consent form to signify her consent. Information that participation was voluntary and that she was free to withdraw at any time without affecting the care she received at the clinics was provided.

In the course of implementing this study, a small number of women were found with problems which required treatments. These women were treated at their respective care units as per available clinics' guidelines. Two women were referred for emergency care at the available hospitals and both had uneventful pregnancy outcomes. The phone numbers of the PI, the data collection supervisor, ambulance services and the two hospitals where women are usually referred during emergency were given to all women, VHWs and providers; and they were free to seek help from the PI or data collection supervisor anytime. In addition, all health units in the study had all time radio link to the two hospitals where comprehensive obstetric care could be obtained. The trial was registered with the Australian New Zealand Clinical Trial Registry as number ACTRN 12609000268246.

As the study was a behavioural intervention in a health care setting (routine antenatal care) and of very short duration (six months) with no a priori envisaged significant risk(s) to the participants, no interim Data and Safety Management Board meeting was planned or held.

3.9.2. Confidentiality

Interviews were in private and the information collected was kept confidential at all stages of the research process. Each participant was assigned a unique identifier such that no one could link any information to individual participant other than the unique identifier. Participants found with condition requiring clinical attention in the course of the study, however, were advised to seek appropriate care.

Skilled attendance at delivery and postpartum is important in maternal mortality reduction. Available national and district standard information on skilled attendance was sought and given to both the intervention and the control arms' participants, but to the former, in addition, birth plans. If birth plans were to be found effective, we intended to scale them up to all health units in the district.

3.9.3. General ethical considerations

Since the intervention was supposed to be part of the routine care provided to women in the study district, some issues are worth consideration. As mentioned in the background section, birth plans were not routinely implemented in the district, and evidence from other parts of Tanzania suggests that counselling and health education or promotion for maternal health seeking are not widely done as per available recommendations during ANC visits.³⁷ The intervention was intended to provide evidence for the effectiveness of the supposed routine care which lacked empirical evidence for its wide implementation. Indeed, the review of the available evidence by Stanton, 2004 questions the scientific evidence for the adoption of birth plans as a strategy to increase the uptake of skilled delivery care.⁷ The Tanzanian 2008-2015 road map strategic plan to accelerate the reduction of maternal, newborn and child deaths calls for efforts to provide evidence on how birth plans can be effectively implemented.¹¹⁸ Arguably, denying women of what is considered routine care may be considered unethical. The principles of uncertainty and equipoise, however, demand that denying someone care of known quality for that of low or unknown quality is unethical.^{119 120} No such evidence existed to support the adoption and the subsequent implementation of birth plans in some developing countries' ANC programmes. If the adoption of birth plans continued to rely on normative rather than empirical evidence, and there is no evidence for their effectiveness, this may be considered unethical. The study aimed to produce evidence (or lack thereof) of birth plans to increase skilled care at delivery and after delivery, and hence, was based on ethical principles.

4. Factors influencing the utilization of antenatal, delivery and postnatal care services in a rural district in northern Tanzania: a case for the birth plan intervention

4.1. Results from the formative qualitative study

The results are mainly organized into four dimensions of obstetric care: antenatal, labour and delivery, emergency, and postnatal care. Within each category, major themes related to the factors influencing women's ability to access care such as health system barriers (structural, process and outcome) and community perceptions of the quality of available care are presented. Both health care providers' care attendees and community members' perspectives on these issues and key findings on PMTCT programs are also discussed. The edited version of the results and discussion of this section has been published as a paper titled "High ANC coverage and low skilled attendance in a rural Tanzanian district: a case for implementing a birth plan intervention" BMC pregnancy and childbirth 2010, 10:13.

4.1.2. Antenatal Care

4.1.2a. Perceptions of the need for professional care and quality of available care

According to the Maasai and Watemi women, TBAs, husbands, and Elders interviewed, antenatal care is highly regarded in both communities, the quality of available care is considered good, and most women feel obligated to attend. Regular ANC attendance is believed to guarantee healthier pregnancies and uneventful deliveries, and women who miss visits are considered at risk of poor pregnancy outcomes. Reasons given for high ANC attendance include perceived health benefits to women and their unborn babies from receiving periodic examinations, vaccinations, and treatment for detected diseases; reassurance of the pregnant woman's wellbeing; referral of women with problems to hospitals for needed care; receipt of antenatal clinic attendance cards that guarantee free health care; and assistance with transport to reach health units for delivery.

The perceived benefits of ANC attendance goes beyond biomedical boundaries. Typically, Maasai and Watemi women require permission from husbands to leave their households except for activities such as fetching water or firewood for the family use. However, permissions are not needed for ANC attendance except for women married to older and relatively less educated husbands. Consequently, most women view ANC visits not only beneficial for their health and that of the unborn babies, but also as a rare opportunity to leave their households and exert control over their pregnancies.

“This clinic has given us power. We meet and discuss many issues and our husbands are supportive. For example, recently the examination house was damaged and we met here on a non-clinic day and decided to contribute money to repair it. It was repaired in one week and now it is OK. If we have a serious problem we send the village health worker to the village elders’ meeting and her opinions are honoured”. [Lactating Mtemi mother at FGD]

“No; we do not need permission from anyone. Most men are motivated to assist us to attend clinics. They want us all to attend”. [Maasai gravida at FGD]

Care providers interviewed reported that the ANC services they deliver meet the needs of most of their patients, and that they fully inform women of the benefits the care offers. Providers noted that effective treatment of diseases such as syphilis and the provision of preventive drugs for anaemia and malaria convinces women of the value of ANC, and fosters a sense of trust which encourages them to return for additional visits. Occasional drug and vaccine stock-outs, language barriers preventing effective communication with patients, poor communication with the district health headquarters, and the remoteness of most women’s residences from health units were mentioned as factors impeding their ability to consistently deliver quality ANC services.

“Most women come to ANC clinics because they have confidence in the benefits of the services. For example, women know the benefits of various vaccinations and will demand them even when it is not appropriate to receive them. It is not uncommon to see a woman complaining why she has not been vaccinated against tetanus even when her gestational age does not qualify her. They also like the drugs given during antenatal clinic visits”. [Provider participant at FGD]

“Benefits of ANC are well recognized in our community. For example, a woman who has been losing pregnancies may come to the clinic seeking assistance and after screening, a provider discovers that she has syphilis. If treatment is provided and she manages to carry successful subsequent pregnancies, she will believe in the services. Such women are many in Maasailand”. [Provider participant at FGD]

4.1.2b. Integration of PMTCT activities into routine ANC

According to all participants, PMTCT services are widely supported in the Maasai and Watemi communities in Ngorongoro. Although only recently introduced at scale into routine antenatal care (less than one year at the time of the study), PMTCT services such as HIV testing, counselling, and the provision of antiretroviral drugs are prioritized in the study clinics and husbands are encouraged to participate. However, messages about the importance of skilled birth attendance are not always relayed to couples who attend PMTCT counselling sessions despite Tanzania's policy that all pregnant women, and particularly those found to be HIV positive, must be advised to deliver in health units.²⁸

Providers view maternal-to-child transmission of HIV as easily preventable through adequate counselling and the provision of antiretroviral therapy. In contrast, they described maternal deaths as rare and not always preventable events, often following unexpected complications. Furthermore, PMTCT providers are expected to regularly submit performance reports to the international HIV/AIDS care funding organizations in Tanzania. Supervision related to counselling on skilled delivery care falls under the auspices of the district supervision team and is much less rigorous.

4.2. Labour and Delivery Care

4.2.1. Why do most women fail to utilize health units for delivery?

Most women in Ngorongoro deliver at home assisted by TBAs (Maasai) or other female relatives and neighbours (Watemi). As soon as labour begins, women typically contact their TBA or female relatives who stay with them through labour and up to five days post-partum.

We are always there in labour up to a few days after delivery to take care of both the mothers and the babies and we decide on what they should eat and do".
[Maasai TBA-Key Informant Interview]

Delivery care at health units is usually sought as a last resort after serious complications have developed. Barriers identified as detracting from women's ability to access skilled delivery and emergency obstetric care include distance from health units, lack of reliable and affordable transport, and lack of advanced planning for accessing delivery care units including during emergencies. Other detracting factors include widely held

beliefs that pregnancies labelled as ‘normal’ during ANC visits will result in successful deliveries at home, failure of providers to convey information about the importance of skilled delivery care for all women, and women’s low social status and inability to independently make labour and delivery decisions. These factors are discussed in more detail below.

4.2.2. Barriers to receiving skilled delivery care – planning in advance, transportation and cost issues

The consensus among women, husbands, TBAs, and Elders is that a major obstacle to receiving skilled and emergency obstetric care is failure to plan in advance for transport.

“Home delivery occurs because we do not plan for transport to the nearby health units in advance. I believe if we can plan in advance, we will be able to travel to health units before the onset of labour pain (uchungu)”. [Recently delivered Mtemi woman at FGD]

Planning in advance for delivery is not widely practiced among women in the two ethnic groups. Although all participating units except two dispensaries (which lacked separate consultation rooms) are equipped with private consultation rooms, visual aids, antenatal care guidelines, and client record cards, providers fail to consistently counsel women on the importance of planning for delivery including making transport arrangements.

The interviews with the women, TBA, and Elder participants indicated that antenatal care providers do not adequately explain the meaning of the expected date of delivery in terms of when labour onset is likely (two weeks before or after this date). Most women believe that the date listed on their antenatal cards is their actual delivery date and wait until around this time to make delivery plans. As a result, women who start labour before their expected delivery date often end up delivering at home even if they expressed interest in delivering in health care facilities.

(...“I’m pregnant for my first child. I’ll be due next week (five days from the expected date of delivery). I’ve come to request for a lift to Wasso hospital for delivery”.[A Mtemi woman at term]

Maasai and Watemi women living in remote villages depend upon mobile clinics for antenatal care. Transport to health units for delivery or emergency obstetrical care from these villages is unreliable and unaffordable for most families.

“...Our village is remote and not easily accessible. Hiring transport from this place to the nearby hospital is expensive and as a result some women referred from the nearby dispensary to deliver at Wasso [the district hospital] fail to get the required money especially during emergencies”. [Six-month pregnant Mtemi mother of 1]

Despite provider assertion to the contrary, the interviews with women, husbands, and Elders showed that most community members are aware that obstetric and child care services are free or highly subsidized. Thus, perceived costs of services are not likely a major barrier to seeking skilled delivery care in the study area. While transport costs are often prohibitive for many Maasai women, Watemi women have more financial security.

“Transport costs are not much unless you hire a car in case of emergency. The usual cost is five thousand shillings (~4USD). This is less than the price of a tin of beans (5L tin). We all have farms and delivery at health units is free” [other women nod in affirmation] [A health unit delivered lactating Mtemi woman at FGD]

“It is well known that health unit delivery at Wasso hospital is free and at Digodigo health centre we pay a token of three thousand shillings (~USD 2.5) for everything. Money is not a problem anymore; thanks to our government”. [Other women cheer her followed by laughter] [postnatal Mtemi woman FGD participant].

4.2.3. Barriers to seeking skilled delivery care – Social roles and traditional family structure

The opportunity costs of delivering at health units were considered high by some women interviewed. Pregnant and recently delivered women are not given reprieve from their heavy workloads, and the need to resume family responsibilities, including

looking after cattle, soon after delivery was mentioned as a key reason women opt to deliver at home.

“You know what, Watemi women are the workforces for their husbands. We look after cattle and farms. It can happen that you start labour when you’re away from home taking care of your husband’s cattle and end up delivering in the bush. When you come back home with the baby, this is seen as normal and there is usually nobody to assist you with household chores unless someone from your home comes to assist”. [Mtemi gravida FGD participant]

Elders and TBAs interviewed mentioned that children in both ethnic groups are cared for by other relatives or neighbours in the mother’s absence, and co-wives are expected to assist each other when necessary. These practices, while supportive of new and expecting mothers, do not appear to offset women’s perceptions of their need to quickly resume their roles as wives and mothers soon after childbirth.

Husbands typically decide on place of delivery in both ethnic communities, although the expressed preferences of Watemi women are beginning to be respected. Most Maasai women will only leave their households during labour after being granted permission by their husbands or developing a serious complication.

“It is our decision as women. Men may have a say but finally our preferences are respected”. [Recently delivered Mtemi FGD participant]

“How can you leave your household and you go to a health unit to deliver without your husband’s consent? He is the one who pays for the costs”. [Maasai gravida FGD participant]

Health care providers interviewed noted that Maasai and Watemi families will not readily accept the need for skilled delivery care without the approval of traditional leaders.

“...traditional leaders are very powerful in this district such that whatever they say is automatically binding. Unless they are involved in convincing the community that health unit delivery is good, we will not succeed in having more women come to deliver at health units”. [Service provider at FGD]

In contrast, traditional elders and TBAs hinted that traditional leaders are all men who are traditionally not involved in pregnancy and delivery issues; and that they would only intervene on such issues only if they are deemed to seriously undermine the societal fabric. No such experience had ever been reported, although they accepted that traditional leader can be helpful in mobilizing more men to get involved in MCH activities.

4.2.4. The role of TBAs in pregnancy and childbirth care

The role of TBAs in antenatal and delivery care differs between the two ethnic groups. TBAs are an integral part of a woman's care during pregnancy, labour, and delivery among the Maasai, and Maasai TBAs commonly accompany women to antenatal clinics, examine women at home, and refer them to health units for care if they identify a potential problem. On the contrary, TBAs serve a limited role in the Watemi community and are only used in emergency situations when quick transport to health units is not possible during labour and delivery. The reason for this difference is traditional and historical and will be explored further in section 4.2.5.

Health care providers expressed concerns that Maasai TBAs may be actively dissuading women from delivering at health units, citing as supporting evidence Maasai women's faith in TBAs to refer them to health clinics when necessary if complications occur during labour or delivery, Maasai women's practice of seeking TBA approval before heeding referrals, and admission by some TBAs that they would lose status and the gifts they receive from attending deliveries if all women opt to deliver at health units. All key informants, TBAs and Elders interviewed asserted that where a woman delivers largely depends on family (especially the husband's) preferences, and that TBAs are, if requested, willing to encourage all women to deliver at health units.

4.2.5. Who should deliver in health units?

Perceptions, particularly among the Maasai, about the 'naturalness' and safety of home delivery is an obstacle to convincing women of the need for skilled delivery care in all cases. Although the women, TBAs and Elders from both communities expressed awareness of the potential risks of delivering at home, they stressed that delivering at health units is only beneficial for women with known complications. Women with "normal" pregnancies (those with no problems or risk factors identified at ANC visits) are expected to be able to deliver without incident at home as their mothers and grandmothers did before them.

“Most women do not have problems so they prefer to deliver at home. The few women with problems try to deliver at health units”. [An eight months pregnant Maasai at FGD]

“Most women deliver at home because we are Maasai. Our mothers did so before us. We’re just doing what others did”. [Seven-month pregnant Maasai FGD participant]

Providers interviewed agreed that most women attend ANC visits for reassurance that their pregnancies are “normal” so that they can deliver at home. Providers re-enforce this pattern of behaviour by advising only pregnant women with identified risks to deliver at health units. The information that all pregnancies carry risks and that labour complications are often unpredictable is inconsistently communicated to women and not prioritized during routine ANC visits. Most providers cited heavy workloads at antenatal clinics as the main reason for lack of dialogue on the importance of skilled delivery care for all women.

“If health unit delivery was that much important, why is it that our providers fail to tell us so? We attend ANC well but they do not tell us. I’m eight months pregnant and I’ve attended ANC three times so far. Nobody has talked to me to deliver at any health unit”. [A pregnant Maasai FGD participant]

“If indeed we’re risking our lives with home delivery, I’ve a complaint to make; why is it that our providers fail to tell us this information? We hardly have time for thorough discussion on such issues. TBAs, on the other hand tell us to go to health units when problems have already developed. It may be too late for some”. [Recently delivered Maasai FGD participant responding to a comment by a fellow participant]

Some women commented that problems arising during labour and delivery among women with normal pregnancy histories would occur equally to those delivering at home or at health units and that ultimately, only ‘God’ can protect women from a maternal death. These sentiments are rooted in traditional beliefs, although waning, in

both communities about pregnancy complications and maternal death as punishment for past transgressions:

“In the past, serious and life threatening delivery complications were blamed on women’s marital infidelities before or during pregnancy and complications were thought to be curses from elders and thus divine punishments upon women. Unless such women confessed to adulterous relationships to their delivery attendants, it was believed that they would die together with their attendants. All women who died during childbirth were believed to have committed adultery and brought shame to their families. To make sure that such secrets were not confided to other people, more and more women delivered with assistance from their own mothers to whom they would make confessions, and even when both had to die, it was seen as more preferable than dying with TBAs who were often of no blood relationship to the pregnant women, and thus confining TBAs to a lesser role. Over the years, the role of mothers have declined too because many women who develop problems and are sent to hospitals survive, the curses notwithstanding”. [Mtemi elder at one FGD (Other participants laugh)]

4.2.6. Communication problems and treatment of labouring women

The scope of delivery care services provided at health units and the referral process is not clearly communicated to women, TBAs and husbands during routine ANC visits. Thus, community members interpret instances when health care providers at dispensaries fail to manage difficult cases as proof that such units are not suitable places to seek delivery care. Consequently, some participants mentioned that they would advise women to bypass nearby dispensaries and go directly to hospitals.

“You know we do not trust our dispensary because they [providers] often fail to manage some conditions and refer them to the district hospital. Most of us would like to deliver at the district hospital where all conditions can be managed”. [A six-month pregnant Mtemi at a FGD]

Many of the women interviewed, especially Maasai, expressed concerns about specific routine and life saving procedures conducted by health care providers during labour, delivery and immediately postpartum. Maasai women perceive digital vaginal examinations performed at health units as painful, likely to damage the baby, and a cause of labour retraction. Similarly, some Watemi women and men consider digital examinations performed by male providers dehumanizing. In contrast, Maasai women

felt that TBAs perform digital vaginal examinations gently and only when the baby's head is crowning. All FGD participants indicated that caesarean sections performed with no explanations provided to families in advance and long recovery times evoke fear in pregnant women that they will undergo unnecessary caesarean sections if they deliver in health units. Episiotomies and repairs of genital tears sustained during delivery also deter Maasai and Watemi women from seeking skilled delivery care. Genital tears are viewed in the two ethnic communities as inevitable complications of childbirth that do not require medical intervention. Health care providers interviewed blamed Maasai and Watemi women's low education level as the underlying cause of their misperceptions of and concerns about routine labour and delivery procedures.

Squatting is the preferred labour position by some women in the two ethnic groups, but skilled providers are only trained to assist women in the orthodox supine position. Community members and providers interviewed agreed, however, that labour position is not a crucial factor in the decision making process about where women deliver, and some women contended that they should accept whatever position the provider decides is best. This sentiment may be a reflection of the scope for deference to authority figures Maasai and Watemi women are expected to show:

"It is bad for an expectant mother to be so demanding. How you deliver and who assists you does not matter but your safety and good care. Since not all providers are of our ethnic group, it is bad to impose our norms on others. We need to show respect to the providers as much as they respect us. If you have any birthing preferences and your provider suggests that she may not be comfortable with your choice, you must listen and abide. Even when we deliver at home, attendants may not like us to impose our choices on them. You must discuss and understand the best position to them in order to get the best out of their skills". [Recently delivered Mtemi FGD participant]

Health care providers interviewed noted instances when they observed colleagues verbally abuse, and force Watemi and Maasai women in labour to bathe and put on uniforms. Such treatments may be perceived as disrespectful, and likely deters Maasai and Watemi women from seeking skilled delivery care (MM observed such treatments of Maasai and Watemi women by providers at the two hospitals).

4.2.7. Perceptions of the quality of care

The health care providers and other reproductive health stakeholders interviewed all contended that TBAs and women relatives provide better emotional support and continuity of care than what is provided at health units. TBAs and older women relatives who serve as birth assistants are viewed as affordable (e.g., no transportation costs required), and able to meet the service expectations of pregnant and labouring women. These expectations include continual support and advice during pregnancy and after childbirth, the provision of body massage and constant encouragement throughout labour and delivery, and knowledge of a variety of delivery positions. Provision of such holistic care is not considered possible at health units where the sterile environment and languages used are foreign to most women, and the few providers available have many responsibilities besides labour monitoring.

“Not all units have qualified staff at the level of a midwife or above. It may be that clients feel safer with TBAs than such providers”. [District nursing officer, Key informant interview]

The women and elder participants expressed trust in health care providers at health units and described them as well trained, competent, and compassionate. Most of the women interviewed who had previously delivered at health units hoped to have this opportunity in future pregnancies and would recommend the health units to others. Of the women who had subsequent home deliveries after delivering in health units because of labour complications, all expressed disappointment over being denied the opportunity to repeat this experience by their husbands.

“I delivered my second child at Wasso hospital and the care was very good. I’m sure most women here have the same opinion [most women nod to show that they agree with her]. My husband sent me there because I had some problems. I was weak and my lower abdomen was painful. I tell you I’ll never forget the courteous welcome and care I got. I vowed that my subsequent deliveries will all be at this hospital. My husband did not allow me to go there for delivery in my third pregnancy because I had no problem. I felt disappointed”. [Maasai gravida at FGD]

“Most people know the good care provided at our health units especially at our two hospitals in the district. They have saved the lives of many women who would have died had it not been for the good care they received at these health

units. We pray that they maintain the same level of care”. [Maasai traditional leader-Key informant interview]

“Any sane person will never question the quality of care provided at the dispensary in our village and at the district hospital. They have saved many lives and our community is proud of having them. Most families and women speak highly of the care they provide”. [Mtemi traditional leader-Key informant]

TBAs interviewed similarly view health care providers as highly trained and well equipped to handle normal deliveries as well as life threatening conditions arising during labour, delivery or the postpartum period. They listed health care providers’ failure to encourage women with ‘normal’ pregnancies to deliver at health units as the key reason for the low utilization of skilled delivery care in the study area.

4.2.8. Emergency Obstetric Care

In general, Maasai and Watemi women are able to leave their households to seek care at health units during emergencies without needing their husbands’ permission. Maasai women in Loliondo, however, must receive permission from their husbands to seek skilled delivery care even under life threatening situations. Advanced planning for possible blood donation in case women require a blood transfusion during and immediately after childbirth is not currently practiced nor encouraged during ANC visits.

4.3. Postnatal Care

At the time of the study, the national guidelines for postnatal care had been revised from advising women to seek care at six weeks postpartum to advising women to seek care at one, four and six weeks post delivery. Some health care providers interviewed were unaware of this policy change, and care providers rarely promote the importance of immediate post delivery care during routine ANC visits at the participating clinics (MM observation).

“Providers tell us to come for after delivery care after one and a half or two months after delivery and not otherwise. Unless your baby is unwell, why should one attend earlier than this?” [A Mtemi gravida-key informant]

“The earliest time a woman should start to attend after delivery care at a clinic is one and a half months. If she fails, she must not do so later than two months.

This is what providers tell us to teach women". [Maasai TBA- key informant interview]

The women participants explained that they attend post-natal clinics to be examined and treated for any post-delivery problems, to have their babies examined and vaccinated, and to receive under-five growth monitoring cards. The latter are required for obtaining birth certificates and free health care, and to enrol children in primary schools. Most Watemi women and elders interviewed stressed that not attending post-delivery clinics can be disastrous and mentioned that serious and life-threatening conditions can occur suddenly and unexpectedly after delivery. In contrast, the Maasai women indicated that if a woman delivered normally, post-natal care is beneficial exclusively for the baby.

4.6. Discussion and recommendations

The aim of the formative qualitative study was to understanding the range of supply and demand sides' barriers impacting women's ability and willingness to access skilled delivery care. In addition, it helped to gain essential information on how various factors interact to facilitate (or prevent) utilization of the available health units for delivery. The findings from this study were used to refine the questionnaires and intervention protocol. Importantly, ANC providers were trained on how to overcome the various challenges they were likely to face when they assisted women to develop and implement birth plans, the birth plans were contextualized, and ensured that contextual specific information were included in the questionnaires.

4.6.1. Understanding factors that prevent women from utilizing delivery and immediate after care at health units

Although MCH services at all health units except one were free, women in this study faced many obstacles that prevented them from delivering at the available health units. Distance from health units, transport problems, ignorance of the importance of delivering under care of skilled providers, antenatal care not tailored to the promotion of skilled delivery care, women's lack of power to decide where they wanted to deliver, women's belief that home delivery would be equally safe if they had no identified antenatal risks, and tradition and norms that home delivery was preferable were mentioned as the major reasons for the low level of deliveries at health units. Although comparative efficacy of delivering under care of skilled providers at the available health units versus TBAs in favour of the latter did not feature prominently in the focus group discussions and key informants interviews, it might be another reason why some women, especially from the Maasai ethnic group, prefer home delivery. Their pervasive consultation of TBAs to check-on the wellbeing of their pregnancies and on delivery related issues besides the care they received from providers at the available health units is indicative of this phenomenon. Noted discriminatory treatment of Maasai and Watemi women, for example, likely detracts from some women's willingness to utilize skilled delivery care in the study district. Providers' attitudes have been described in other African settings as an obstacle to increasing the utilization of skilled delivery care.^{58 79 121 122} Nevertheless, the interplay of these factors from both the supply and demand side are likely to be overcome if there is shared responsibility in planning for birth and complication readiness.²

Essential procedures such as labour monitoring through digital vaginal examinations and repair of genital tears are essential and routine procedures in obstetrics and the former is promoted in the Tanzanian national labour monitoring guidelines as part of routine care. Caesarean sections commonly performed for both foetal and maternal indications are important life saving procedures worldwide yet women in both ethnic groups in the study district fear them. Apparently, there is lack of effective communication at antenatal clinics and between the birth attendants at health units and the women they serve on the indications of these procedures. Consequently, some women do not perceive a procedure like Caesarean section as a life saving technique for both mothers and infants, but rather as a convenient but unnecessary procedure employed by care providers. Although similar perceptions have been described in other Tanzanian and African settings^{59 123}, such weaknesses need to be addressed urgently to increase SBA at health units.

A striking discrepancy is observed in the reasons given by providers and care users on why few women prefer to deliver in the available health units. Providers mention birthing positions; trust in TBAs and older women at home; and perceived better quality of delivery care at home as important reasons for not preferring health units for delivery. Although information bias cannot be ruled out, most women attending MCH clinics, TBAs, and male elders at FGDs and key informant interviews have contrasting opinions. For example, providers' failure to promote skilled delivery care and post natal care as a continuum of care, assist women to develop individual birth plans that could enable them overcome obstacles to access the available delivery care units and widely promote the involvement of husbands in ANC consultation and discussion for skilled delivery care, equally prevent many more women from utilizing the available health units for delivery. Furthermore, women's reasons for attending ANC may base on the socio-cultural understanding and perception of what the care offers and not the known biomedical benefits.^{79 124} Such misconceptions can be addressed during ANC consultations, by providing women with information on the benefits skilled delivery care offers to both the women and their babies. The health care system in the district is unlikely to influence the demand side for skilled delivery services when major reasons for lack of utilization remain unrecognized or unknown.

Apparently, some women in this district attend postnatal care ostensibly not for their own health, but for check-up of their newborns and to fulfil some obligations such as

getting cards for free care for their babies, to obtain evidence for birth and school registration. The misunderstanding is strengthened by the attitude and practice of care providers who appear not aware of the new national guidelines for postnatal care. Furthermore, the lack of emphasis for postnatal care during ANC visits may be contributing to the low level of understanding by some women of the benefits immediate postnatal care offers to women and their newborns. Although postnatal care uptake is low countrywide^{29 62}, with just 13% of women receiving postnatal care within two days of delivery and over 83% of all women who deliver outside health units not seeking it²⁹, ANC counselling and health education on the importance of postnatal care and its schedule, coupled by the high level of ostensible reasons to seek postnatal care among women in this district, have potential to improve postnatal care seeking in this district. To achieve this, providers in this district needed to be constantly reminded of the benefits postnatal care offers to women and their babies, and to ensure that they constantly provide this information to pregnant women, other stakeholders such as TBAs, male partners of the ANC attendees and the communities.

4.6.2. ANC and delivery care services as missed opportunities to improve delivery care utilization in Ngorongoro

Some serious weaknesses in the antenatal and delivery care provided to women have been highlighted. Notable findings included: (1) insufficient counselling during ANC visits on the need for all women to receive skilled delivery and immediate postnatal care; (2) beliefs that only women with identified obstetrical risk factors should be advised about skilled delivery care; (3) lack of encouragement of men/family members to participate in counselling sessions on the importance of skilled delivery care during ANC and PMTCT visits; (4) lack of effective communication about routine and life saving procedures provided during labour, delivery and immediately postpartum; (5) the practice of forcing women reporting in labour to bathe and put on hospital uniforms; (6) women's lack of planning for where, how and when to seek delivery care (7) the attitude and practice of care providers that partly lead to the belief that delivery is a normal process and that delivery under care of skilled providers is a prerogative of women identified with antenatal risks during clinic visits and (8) the providers' perception that skilled birth attendance was not of high priority as PMTCT.

Lack or inadequate counselling and health education or promotion for skilled delivery for all women regardless of their perceived antenatal risk was mentioned in this study,

although the available national guidelines put emphasis on the topic.²⁸ While the pervasive lack of adequate counselling and health education during ANC consultations, and erratic implementation of the focused ANC package in the study district may be reflective of the general trend countrywide^{36 37 125}, urgent measures are required to address this problem, or else ANC will remain a missed opportunity to educate women attendees, husbands and elders about the importance of skilled birth attendance for all women. Subsequently, utilization of health units for delivery will remain low due to the failure of ANC to facilitate the process of changing normative beliefs about where women deliver. In this intervention, however, reasons for the low level of utilization of the available health units for delivery were explored and understood, and weaknesses for the lack of consistent counselling/health education on birth plans discussed with ANC care providers. Subsequently, ANC providers were trained in the concepts of focused ANC and birth plans formulation and implementation. Additionally, support supervision and performance evaluation by the research team throughout the study implementation ensured that health education and counselling on birth plans were implemented to all women in the intervention health units.

Family and community involvement in the dialogue for safe and skilled delivery is recommended and promoted in most developing countries as part of routine antenatal care.^{24 84 126} Men's involvement in PMTCT in Ngorongoro district provides an opportunity for dialogue not only on VCT for HIV but also for safe delivery at the available health units. Husbands hold the power of decision making in many issues including where their wives deliver, yet men invited by providers to attend antenatal care clinics and PMTCT sessions are not involved in any way in the dialogue on skilled delivery attendance. Women are likely to overcome various delays in utilizing the available health units for delivery if they are assisted to decide when, how, and where to seek care at times of need.⁷⁶ The failure of antenatal care providers in Ngorongoro to involve men in promoting skilled delivery attendance presents a significant barrier for women who wish to deliver under skilled care providers but do not have the ability to make the decision independently of their husbands. For effective and wider integration of men into routine care, however, women clinic attendees, their male partners and the community need to be informed and sensitized of this need. In the training of ANC care providers before the study commenced, inclusion of male partners/husbands in the dialogue for the formulation and subsequent implementation of birth plans by women was emphasized. ANC providers in the intervention health units were also provided

with key message guides with information on the importance of including men in ANC dialogues on birth plans and other MCH issues.

4.6.3. Study limitations

Some meanings of the original information might have been lost during transcription and thus distort the actual original meaning and validity of the study finding. However, the use of two bilingual people in the transcription minimized this problem. Furthermore, recruitment of service users exiting clinics could have biased responses due to patients' desire not to alienate providers. Women in the FGDs could have avoided giving opinions which differed from what was said by others. Likewise, care providers in FGDs might have avoided giving wrong answers or what would be perceived as not acceptable by other participants. The data collection methods were triangulated and the information collected, however, was largely corroborated by participants in subsequent FGDs, key informants and through participant observation indicating a strong consistency.

The views of pregnant women with experience with health units' delivery were underrepresented in FGDs, although efforts were made to ensure that the key informant interviews were with equal number of women or family members of women with experience with health units for delivery and those without. Furthermore women who did not utilize antenatal care and their family members were not purposely targeted, and most likely, are not incorporated. Ideally, understanding why some women prefer to utilize health units for delivery or why they did not seek antenatal care would have added more insights for the reasons for preferring or avoiding available health units for MCH care. Since most women brought their infants for immunization at postnatal care clinics and the fact that some of these women were included in the FGDs and key informant interviews, however, the views of women who did not use MCH care were likely captured.

Providers might have modified their practice to perform better in the presence of the researcher in order not to appear contrary to their professional requirements. However, the data collection methods were triangulated, and likely important information on the research topics was not missed.

4.6.4. Implication of the findings to the intervention design and implementation

Birth plans formulation and subsequent implementation depended on the findings from this study and their interpretation, and thus accommodated contextual factors relevant to the participating women and health units. ANC providers were trained on these issues in order to improve the quality of the dialogue with women during ANC consultations, and create greater motivation among women and their families to seek skilled delivery care.^{17 127} Specifically, three key lessons were learnt from the study findings that helped to refine the intervention tools and process. First, to ensure an effective implementation of the intervention, antenatal and delivery care providers were trained on the importance of discussing SBA and immediate postpartum care for all women and the need to explain to their clients the reasons for conducting various interventions like caesarean sections, digital vaginal examination for labour monitoring and repair of genital tears. In addition, providers were provided with key messages for clinic attendees that were discussed at all ANC consultations. The key messages, besides reminding providers of issues that were discussed during the birth plans formulation, they also contained important information on how various obstacles to skilled delivery care might be overcome, including the need for involving men and TBAs in the birth plans formulation and implementation. The aim was to address the attendees concerns and expectations for various care available at health units for antenatal, delivery and post delivery care. Second, providers in the intervention arm were encouraged to promote the involvement of male partners and TBAs in the birth plan formulation and implementation. Last, social and cultural norms were identified as obstacles to utilizing health units for delivery in this district. The involvement of TBAs and VHWs in routine ANC, including TBAs involvement in birth plans formulation, likely ensured that families/communities supported women who wished to deliver at the available health units to fulfil their wishes. Nevertheless, since TBAs played a more important role in pregnancy, labour, delivery and immediate post natal care among the Maasai than the Watemi women, their involvement was more encouraged in the former than the latter.

4.6.5. Conclusion

Women in the study district faced both demand and supply sides factors that prevented them from utilizing health units for delivery. Factors that prevent women from utilizing health units for delivery, emergence obstetric care and postnatal were understood and addressed for effective implementation of focused antenatal care, including the intended intervention on birth plans. Notably, some health system related factors like providers'

attitude and practice and demand side factors like lack of planning for delivery and emergence obstetric care and contextual socio-cultural factors and norms were addressed through birth plans formulation and implementation. Training of providers on the concepts and implementation of focused ANC, including for birth plan and good support supervision and close monitoring of their performance, were also essential for effective implementation of the intended intervention.

5: Informed and empowered? The effectiveness of the birth plan intervention in increasing skilled care at delivery and after delivery in Ngorongoro district, rural Tanzania

This section presents the results and discussion of the trial findings.

5.1: Results

The results section is broadly divided into two parts. First we assess the comparability of women in the intervention and control arms followed by assessment of the intervention effectiveness. This is followed by comparison of the elements of care provided to women in the two study arms and, lastly, the description of the birth plans provided to women in the intervention arm of the study.

5.1a: Number of women recruited and baseline characteristics

Initial assessment of all health units in the district for study eligibility, randomization, recruitment and follow-up is summarized in figure 3 below. Recruitment commenced on 1st December 2008 and ended on 31st March 2009 although the follow-up continued up to August 28th 2009. A total of 905 women were recruited into the study, 404 in the intervention arm and 501 in the control. All recruited women were successfully followed-up and completed the final postpartum interview at home or during exit from initial post natal clinic visit. Only two women declined to participate in the trial.

Table 5.1a.1 shows the baseline characteristics of the women in the trial. At the initial interview, most participants were interviewed during clinic exit. During the follow-up interview after delivery, however, most women were interviewed in their households. Both trial arms had more Maasai women than women from other ethnic groups. Similarly, more women in both study arms had Maasai husbands (partners). Nevertheless, there were more Watemi women in the control (26.6%) than in the intervention arm (15.1%).

Figure 3 : Flow diagram of participant recruitment

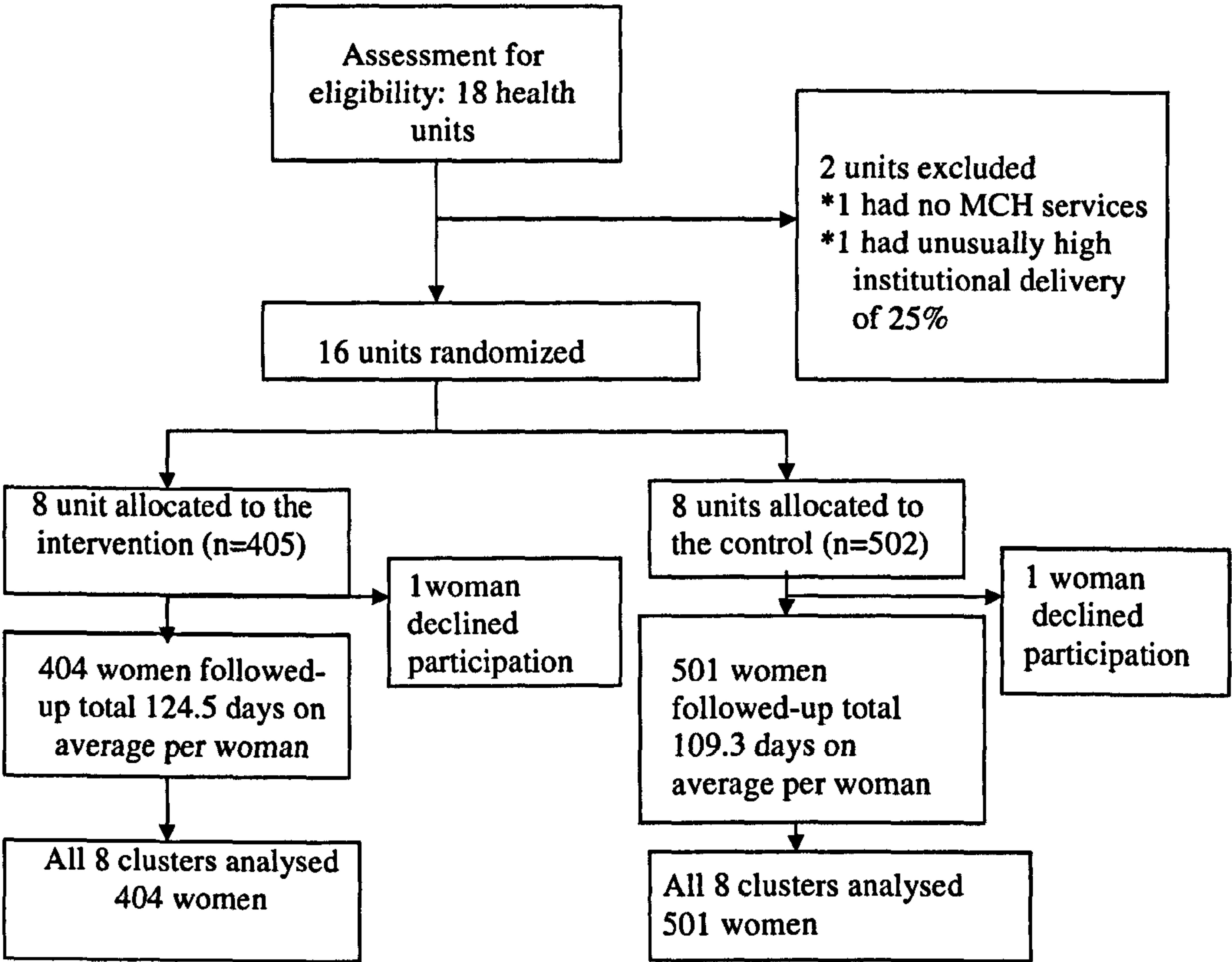


Table 5.1a.1: Baseline characteristics of women in the intervention and control arms of the trial

Baseline characteristic	Intervention N=404	Control N=501
Place of initial interview		
Clinic site	388[96.0]	483[96.4]
Home	16[4.0]	18[3.6]
Place of follow-up interview		
Clinic site	158[39.1]	204[40.7]
Home	246[60.9]	297[59.3]
Health unit's location (division)		
Ngorongoro	126[31.2]	60[12.0]
Salei	146[36.7]	193[38.5]
Loliondo	132[32.7]	248[49.5]
Woman's residence division		
Ngorongoro	126[31.2]	59[11.8]
Salei	138[34.2]	195[38.9]
Loliondo	140[34.6]	247[49.3]
Respondents' mean age in years $\pm$ SD	25.3 $\pm$ 6.0	24.8 $\pm$ 6.5
Woman' ethnic group		
Maasai	322[79.7]	348[69.5]
Mtemi	67[16.6]	130[26.0]
Others	15[3.7]	23[4.6]
Male partners' ethnic group		
Maasai	321[79.5]	345[68.9]
Mtemi	61[15.1]	133[26.6]
Others	22[5.4]	23[4.5]

Note: Unless otherwise stated, number indicates number of women' in the specific study arm and those in brackets are the respective percentages.

Table 5.1a.2: Baseline socio-demographic characteristics of women in the trial		
Baseline characteristics	Intervention=404	Control n=501
Marital status		
Married	317[78.5]	335[66.9]
Cohabiting	39[9.7]	123[24.6]
Single	37[9.2]	31[6.2]
Widowed	8[2.0]	9[1.8]
Divorced	3[0.7]	3[0.6]
Type of marriage		
Monogamous	164[40.6]	276[55.1]
Polygamous	192[47.5]	182[36.3]
Not married	48[11.9]	43[8.6]
Women's level of education		
No education	248[61.4]	284[56.7]
At most primary completed	133[32.9]	197[39.3]
Above primary	23[5.7]	20[4.0]
Partners' level of education		
No education	186[46.0]	225[44.9]
At most primary completed	173[42.8]	239[47.7]
Above primary	39[9.7]	25[5.0]
Do not know	6[1.5]	12[2.4]
Average number of wives partner had±SD	2.2±1.7(n=368)	1.6±2.3(n=474)
Occupation		
Respondents' occupation		
Pastoralist	245[60.6]	230[45.9]
Peasant farmer	76[18.8]	140[27.9]
Petty trader	42[10.4]	15[3.0]
Others	41[10.1]	116[23.2]
Male partners' occupation		
Pastoralist	303[75.0]	300[59.9]
Peasant farmer	71[17.6]	171[32.1]
Petty trader	9[2.2]	8[1.6]
Others	21[5.2]	22[4.4]
Households' wealth quartile		
Lowest	120[29.7]	106[21.2]
Second	82[20.3]	135[27.0]
Third	109[27.0]	103[20.6]
Highest	93[23.0]	157[31.3]

Note: Unless otherwise stated, numbers in brackets indicate % of women in the respective study arm

Polygamy is common in the study population and more participants in the intervention arm than in the control arm reported a polygamous relationship (47.5% vs 36.3% respectively) (table 5.1a.2).

Approximately 60% of all respondents in both the intervention and control arms lacked formal education, compared to less than 50% of their male partners. Of those who had formal education, most had primary education with no more than 6% reporting more than primary education in both study arms. The reported proportion of husbands (partners) with more than primary education was equally low, with 9.7% women in the intervention and 5.0% in the control reporting that they had husbands with education beyond primary level. Pastoralism was the commonest occupation for women and their husbands (partners) in both study arms of the study.

There were more households in the highest wealth quartile in the control arm of the trial than in the intervention (23.0% in the intervention vs 31.3% in the control). In contrast, more women in the intervention arm than in the control arm belonged to the low wealth quartile (Table 5.1a.2).

Table 5.1a.3 shows obstetric and related factors among the study participants. Antenatal care attendance was high in the five years preceding the index pregnancy and in antecedent pregnancy, although delivery at health units or assisted by skilled providers were less common. Women in both the intervention and control arms of the study initiated ANC late (5.4 months in the intervention vs 5.8 months in the control).

Women in both the intervention and control arms of the study lacked autonomy in deciding to seek health care (Table 5.1a.4). Permission is needed from someone to seek antenatal care, to seek care when the woman was sick, for pregnancy-related complications, for normal delivery and even for life-threatening complications, although with differing magnitude. In most cases, permission was primarily requested from husbands, indicating the importance of men in women's health care seeking decision making.

Table 5.1a.3: Baseline individual obstetric characteristics and related factors among women in the trial

Baseline characteristics	Intervention	Control
Number of pregnancy ever had		
First pregnancy	96[23.8]	128[25.5]
2-4 th pregnancy	215[53.2]	232[46.3]
>4 pregnancies	93[23.0]	141[28.1]
Total	404[100.0]	501[100.0]
Average number of children ever delivered (mean±SD)*	2.8±1.7 (n=304)	3.1±1.8 (n=372)
Attended ANC in the five years preceding the current pregnancy*	285[92.8] (n=307)	352[93.9] (n=375)
Attended ANC in the antecedent pregnancy	291[94.8] (n=307)	352[93.9] (n=375)
Ever delivered in a health unit*	47[15.5] (n=304)	81[21.8] (n=372)
Delivered under assistant of a trained birth attendant in last pregnancy before index (%)** ¹	42[13.8] (n=304)	60[16.1] (n=372)
Delivered at a health unit in antecedent pregnancy (%)**	39[12.8] (n=304)	53[14.3] (n=372)
Duration in years from antecedent delivery (mean±SD)**	3.1±1.2 (n=304)	2.7±1.2 (n=372)
Gestation age in months at recruitment (mean±SD)	6.9±1.0 (n=404)	6.8±0.8 (n=501)
Gestation age in months at initial ANC attendance (mean±SD)	5.4±1.2 (n=404)	5.8±1.2 (n=501)
Times had attended ANC at the time of recruitment (mean±SD)	1.9±0.8 (n=404)	1.7±0.8 (n=501)
Residence's distance in km from ANC clinic site (mean±SD)	5.3±6.7 (n=404)	4.8±4.3 (n=501)
Residence's distance in km from nearest health unit offering delivery services (mean±SD)***	5.5±7.8 (n=404)	5.6±7.5 (n=499)

NB: Antecedent pregnancy means pregnancy preceding index

*Applies to women pregnant at least for the second time and ** applied to women who had ever delivered before

**¹Some women deliver either on way to the source of care or in their houses with health units' providers called in by family members

***This was the nearest dispensary or hospital with delivery services.

Table 5.1a.4: Individual level analysis of the decision making for seeking antenatal and delivery care reported by women in the trial at initial interview

Baseline characteristics	Intervention (n=404)	Control (n=501)
Permission to attend ANC	203[50.3] (n=404)	220[43.9] (n=501)
Person to give permission husband*	190[93.9] n=203	208[94.5] (n=220)
Permission to seek care when sick	287[71.0] (n=404)	303[60.5] (n=501)
Person to give permission husband*	259[90.2] (n=287)	294[97.0] (n=303)
Permission to seek care for pregnancy-related complications	285[70.5] (n=404)	365[72.9] (n=501)
Person to give permission husband*	251[88.1] (n=285)	349[95.6] (n=365)
Permission to seek care for normal delivery	324[80.2] (n=404)	373[74.5] (n=501)
Person to give permission a husband*	288[88.9] (n=324)	353[94.6] (n=373)
Permission to seek care for life- threatening conditions	244[63.1] (n=387)	173[38.4] (n=451)

Note: Number indicates number of participants and number in brackets indicates % of participants. * Denominator is the number of people who needed permission in the respective category.

5.1b: Assessment of the intervention effectiveness and related factors

The delivery care utilization by women in the intervention and control health units varied widely. The levels ranged from 0-55.5% in the control to 8-71.9% in the intervention (Table 5.1b.1).

Table 5.1b.2 presents the results for the analysis of the endpoints (delivering at health units, attending postnatal care within the first month after delivery and women's and providers'; satisfaction with ANC care). In an unadjusted comparison, approximately 14% more women in the intervention arm than in the control arm sought delivery care at the available health units (95% CI -9.4-38.3 p=0.2138). After adjustment, utilization of health units for delivery increased to about 17% (95% CI 2.6-31.0 p=0.0248). Approximately 30% more women in the intervention than in the control sought post delivery care within one month after delivery. More women and providers in the intervention arm than in the control reported that they were satisfied with the ANC they received or provided. The level, however, was more for providers' satisfaction than for attendees' satisfaction.

Table 5.1b.3 shows antenatal, labour and delivery care characteristics of women in the study. Women in the intervention and control arms of the study were similar in most labour, delivery and neonatal characteristics. The difference in the proportions of women who experienced pregnancy or labour/delivery complications between the two study arms was not statistically significant. Likewise, there was no statistically significant difference in the proportions of women who reported the health status of their newborns as alive and well at second interview.

On average, women in the intervention arm of the study attended ANC more times after recruitment than their counterparts in the control (1.7 times 95% CI 1.5-1.9 vs 1.3 times 95%CI 1.2-1.5, $p=0.0030$). While 51.2% (207) of all women in the intervention arm of the study attended ANC four times or more, only 21.9% (137) in the control did so (information not shown in tables). There was no evidence that gestational age at delivery differed in between the two study arms. It was 9.1 ± 0.2 months in the intervention vs 9.1 ± 1 months in the control, $p=0.48$. On average women in the intervention arm sought initial postnatal care approximately two weeks earlier than their counterparts in the control arm. In fact, they attended within the first week on average, compared to approximately three weeks in the control units ([6.6 days, 95% CI 5.2-8.0] vs [20.9 days, 95% CI 17.2-25.5], $p < 0.0001$).

Table 5.1b.1: Health units’ delivery care utilization by health units among women in the intervention and control arms of the trial

Intervention unit	Number of women recruited	Health units’ delivery (%)		Control unit	Recruited	Health units’ delivery (%)	
		Unadjusted	Adjusted*			Unadjusted	Adjusted*
Arash	97	27.8	25.6	Digodigo	92	42.4	33.7
Oldonyosambu	64	68.8	64.9	Soitsambu	87	6.9	12.7
Nainokanoka	55	38.2	34.7	Sero	75	9.3	14.3
Piyaya	51	21.6	28.1	Olbalbal	59	0.0	12.0
NCAA	45	31.1	38.6	Malambo	56	10.7	15.3
Engaresero	35	11.4	30.9	Loliondo	53	32.1	24.0
Sakala	32	71.9	40.3	Samunge	47	55.3	39.9
Kakesio	25	8.0	20.9	Oloipir	32	6.3	9.5
	404**	34.9***	35.5***		505**	20.4***	20.2***

*Adjusted for wealth quartile and ethnic group

** Total number of women recruited in the study arm

*** Average percent of women who delivered at health units in the study arm. Levels of health units’ utilization for delivery for the unadjusted analysis are slightly higher than those in table 5.1b.2 due to approximation.

Table 5.1b.2: Assessment of the intervention effectiveness in the birth plan intervention in rural Tanzania

Outcome	Difference in proportions							
	Crude				Adjusted			
	Intervention n=8	Control n=8	% difference	P _T -value	P _R -value	% difference	P _T -value	P _R -value
*Delivery in a health unit ¹	34.8	20.3	14.5[-9.4-38.3]	0.2138	0.1722	16.8[2.6-31.0]	0.0248	0.0117
*Attended post delivery care within one month of delivery ²	62.1	32.1	30.0[11.3-48.7]	0.0040	0.0046	31.3[15.4-47.2]	0.0009	0.0046
**Women's satisfaction with ANC ²	96.8	84.7	12.1[-6.3-30.5]	0.1668	0.0461	12.6[-5.4-30.5]	0.1454	0.0460
*Providers' satisfaction with ANC ²	97.9	91.0	6.9[-3.2-17.1]	0.1547	0.2388	7.8[-0.7-16.3]	0.0688	0.0742

Note: Numbers indicate the differences in the outcomes of interest in the intervention and control arms of the study expressed as % and those in brackets are the respective 95% confidence intervals.

P_T-value and P_R-value are the t-test statistic and rank sum statistic p-values respectively.

1 & 2 denote primary and secondary outcomes respectively

*Adjusted for wealth quartile and ethnic group.

**Adjusted for women's ethnic group

The coefficient of variation (k) for the primary outcome for the intervention, control and combined are 0.24, 0.35 & 0.21 respectively.

The respective values for the intra-cluster correlation coefficient (ICC) are 0.03, 0.03, and 0.02.

Table 5.1b.3: Labour and delivery characteristics reported by women during postnatal interview in a birth plan intervention in rural northern Tanzania					
Characteristic	Intervention (n=8)	Control (n=8)	Difference in proportion	P-value	P-value*
Women on way to or in a health unit when labour started	18.7	18.5	0.2[-18.8-19.2]	0.98	0.71
Had a pregnancy complication	2.4	4.5	-2.0[-6.5-2.4]	0.34	0.56
Had labour or delivery complication	2.9	6.7	-3.8[-8.9-1.3]	0.13	0.29
Delivery a spontaneous vaginal	99.1	98.5	0.6[-1.2-2.5]	0.47	0.34
Delivered a live baby and alive and well at post delivery interview	96.1	95.8	0.3[-4.6-5.3]	0.89	0.75
Baby stillborn or a neonatal death	3.5	2.6	0.9[-3.0-5.0]	0.35	0.47

Note: Unless otherwise stated, numbers indicate the mean cluster-specific percentages.

P-value*: rank sum statistic p-value

5.1c: Description of the elements of care provided to women in the intervention and control arms after introducing the intervention

The provision of antenatal care components was compared between the two study arms to understand the extent to which the intervention led to a difference in emphasis in particular aspects of care. Screening and treatment of health problems (as indicated on the women's antenatal cards) did not differ significantly between the two study arms (Table 5.1c.1).

More women in the intervention units than in the control had discussions on danger signs in pregnancy, labour, delivery and after delivery and on identifying a place of delivery (Table 5.1c.2). There was strong evidence to suggest that women in the intervention study arm had more discussions on the elements of the birth plans than those in the control arm. Although a greater proportion of women in the intervention arm of the study reported that they had discussions on identifying a place for postpartum care than their counterparts in the control units immediately after recruitment into the study, there was no evidence to suggest that the difference was significant.

At the postnatal interview, women were also asked about the plans they made while pregnant. Women were more likely to report that they had made plans for a range of potential barriers when they were in the intervention arm than in the control. However reported plans to put aside money for transport did not differ significantly between the two arms of the study (Table 5.1c.3). The knowledge of a place to go in case of pregnancy-related emergency complication(s) was higher among women in the intervention arm than their counterparts in the control, but there was no evidence to suggest that the difference was substantial. This knowledge was measured by assessing whether a woman knew which basic and comprehensive emergency obstetric care level units to seek care from and was able to mention them by name.

There was no significant difference in proportion of women who were accompanied by their husbands to ANC between the two study arms. Only women who were accompanied to the ANC clinics by their male partners/husbands had opinion that such behaviour should be routinely promoted at ANC clinics, indicating a possible widespread belief that ANC is an exclusive women affair in the study population (Table 5.1c.3).

Table 5.1c.4 shows the ANC attendees' perception of the quality of antenatal care and related factors in the two arms of the study. Women in the control health units waited longer to get the services than their counterparts in the intervention arm. However, more women in the intervention health arm than in the control felt that ANC discussions were good or very good. Likewise, far more women in the intervention arm than in the control had enough time with their providers during ANC consultations.

Although more women in the intervention arm of the study than in the control reported that providers listened to them well, the ANC they received was good or very good when they were pregnant and even after they had delivered, and were given chances to ask questions for things they did not understand during ANC consultations, there was no evidence to suggest that the difference was significant. Similarly, there was no evidence to suggest that more women in the intervention arm of the study would recommend the ANC they received to someone else when they were pregnant and would still do so even after they had delivered than their counterparts in the control arm. Almost all women attended the same ANC clinics throughout their pregnancies.

Table 5.1c.1: Components of antenatal care provided to women and reported during postnatal interview

Routine care component at recruitment	Mean intervention	Mean control	Difference in proportion	p-value	p-value*
Previous history taken	94.0	74.2	19.8[-6.6-46.2]	0.1112	0.0156
Current medical or obstetric history	96.4	85.7	10.7[-6.7-28.1]	0.1776	0.1658
Abdominal examination	99.8	97.0	2.7[-2.4-7.9]	0.2343	0.4411
Auscultation to check for foetal wellbeing	99.8	99.1	0.6[-0.3-1.6]	0.1519	0.1601
Mother's weight taken	96.0	87.6	8.4[-7.6-24.4]	0.2396	0.6735
Blood pressure checked	60.2	59.2	1.1[-44.3-46.5]	0.9610	0.9164
Urine examination	25	7.2	18.7[-11.6-49.1]	0.1794	0.1400
Blood check	91.6	79.8	11.8[-17.9-41.6]	0.3936	0.2666
EDD details given	82.8	76.4	6.4[-21.3-34.2]	0.6260	0.4005
Given malaria prophylaxis	97.0	98.2	-1.2[-4.7-2.4]	0.4791	0.5107
Given drugs for anaemia prevention	75.8	93.6	-16.0[-51.5-19.5]	0.2569	0.6721
Received TT	96.0	96.5	2.0[-3.3-7.3]	0.8547	0.9151

Note: Numbers denotes the t-test statistic difference in proportions of the care components provided to women between the intervention and control arms of the study and those in brackets denote the respective 95% confidence intervals.

P-value*: rank sum statistic p-value

Table 5.1c.2: Birth plans components provided to women in the intervention and control arms reported at initial interview.

Care component reported	Intervention (n=8)	Control (n=8)	Difference in proportion	P-value	P-value*
Information on danger signs in pregnancy	97.6	80.3	17.2[2.7-31.8]	0.0148	0.0117
Information on the danger signs in labour, delivery and after	98.4	57.6	40.8[24.3-57.2]	0.0005	0.0006
Discussion on identifying a delivery place	98.7	46.6	52.1[29.4-74.8]	0.0010	0.0007
Discussion on transport arrangements	99.4	39.5	59.9[35.1-84.6]	0.0007	0.0006
Discussion on financial arrangement for transport and services	97.7	31.3	66.4[48.7-84.0]	<0.0001	0.0007
Discussion on company to the delivery site	99.0	28.1	70.9[54.0-87.8]	<0.0001	0.0006
Discussion on blood donor	97.5	22.3	75.2[64.5-86.0]	<0.0001	0.0007
Discussion on arrangement for someone to help with household chores	98.0	31.2	66.8[47.8-85.8]	0.0001	0.0006
Discussion on birth preferences	88.5	21.5	67.0[47.7-86.3]	<0.0001	0.0008
Dialogue on emergency care seeking	98.4	75.8	22.6[0.6-44.5]	0.0452	0.0045
Discussion that all pregnancies carry risk	97.9	63.7	34.2[5.2-63.3]	0.0270	0.0173
Discussion on identifying a place for postpartum care	92.8	73.0	19.8[-6.3-45.8]	0.1123	0.0550

Note: Number in each row denotes % of women in each arm that reported to have had the discussion with the provider on a particular care component and those in bracket are respective 95% confidence interval.

P-value*: rank sum statistic p-value

Table 5.1c.3: Discussions and plans made by women during ANC visits and reported during postpartum interview

Care component reported	Intervention (n=8)	Control (n=8)	Difference in proportions	P-value	P-value*
Made decision on where she wanted to deliver before labour started	95.0	71.9	23.1[-1.7-48.8]	0.0657	0.0116
Made plans to deliver at a health facility	74.3	42.8	31.6[-6.3-69.5]	0.0954	0.0458
Made transport plans	69.8	35.2	34.6[-2.1-71.3]	0.0630	0.0357
Made financial arrangement for transport	65.1	31.0	33.9[-2.8-79.7]	0.0676	0.0460
Put aside money for transport	47.6	30.9	16.7[-17.3-50.7]	0.3101	0.4008
Made plans to be accompanied to the delivery site	90.2	50.9	39.2[26.0-52.4]	<0.0001	0.0016
Accompanied to the delivery site	88.3	46.1	42.2[25.7-58.7]	0.0001	0.0015
Accompanied in labour during delivery	89.4	50.3	39.1[24.7-53.4]	<0.0001	0.0016
Blood donor identified	59.6	14.1	45.5[14.7-76.3]	0.0069	0.0046
Plans for someone to help with household chores	85.0	41.0	44.0[25.3-62.7]	0.0002	0.0033
Knew a primary care unit to go to in case of emergency	96.2	84.8	11.5[-5.8-28.7]	0.1761	0.0727
Knew a hospital to seek care from in case of an emergency	96.0	86.3	9.9[-6.7-26.6]	0.2209	0.2275
Ever accompanied by the male partner to the ANC clinic	32.4	15.1	17.3[-6.4-41.0]	0.1390	0.0587
Thought male involvement in ANC visits should be promoted routinely	32.4	15.1	17.3[-6.4-41.0]	0.1390	0.0587

Note: Number in each row denotes % of women and that in brackets the respective 95% confidence interval in each arm.

P-value: rank sum test p-value

Table 5.1c.4: Perceived quality of antenatal care reported by women during postnatal interview

Perceived quality or care satisfaction	Intervention (n=8)	Control (n=8)	Difference in proportion	P-value	P-value*
Received ANC all times she sought it	92.4	94.9	-2.5[-12.6-7.5]	0.5969	0.8737
Waiting too long before care was provided	16.0	39.6	-23.6[-44.9-2.3]	0.0324	0.0274
Thought that providers listened to them well	97.6	87.5	10.1[-5.3-25.5]	0.1815	0.5749
Thought ANC was of good or very good quality during antenatal attendance	87.7	91.2	-3.6[-22.1-14.9]	0.6855	0.8715
Still had opinion that the ANC she received was of good or of very good quality after delivery	92.1	73.8	18.3[-1.5-38.2]	0.1329	0.1452
Given chance to ask questions during ANC clinic visits	96.8	80.2	16.6[-5.0-38.1]	0.1218	0.0592
Thought that ANC discussions were good or very good	93.9	74.4	19.5[1.7-37.3]	0.0343	0.0352
Woman had enough time for ANC consultations	96.9	53.4	43.5[23.3-63.7]	0.0004	0.0006
Would recommend clinic to someone else when she was pregnant	99.4	99.0	0.4[-1.3-2.1]	0.6303	0.8903
Would still recommend clinic to someone else after delivery	97.0	90.9	6.2[-4.6-17.0]	0.2406	0.0752
Attended the same ANC clinic throughout pregnancy	99.4	99.6	-0.2[-1.4-1.1]	0.7647	0.6440

Note: Number indicate % of women who responded and those in brackets are the respective 95% confidence intervals.

P-value*: rank sum p-values

5.1d: Description of the birth plans made by women in the intervention arm and recorded by providers

Tables 5.1d.1, 2 &3 give a summary of the analysis of the birth plans formulated by the women in the intervention arm that were recorded by providers. Overall, about 80% of all plans were completed, although with some variations. While only 41.6% of the women had plans to deliver at the available health units before they were recruited into the study, approximately 90.4% indicated that they had such plans at the last ANC clinic visit. The planned place of delivery was more likely to be the health unit the woman sought ANC from (56.2%) than a health unit further away (34.2%).

Of the 178 (44%) women who needed transport to reach the nearest health units they planned to deliver in, 136 (76.4%) saved money to pay for transport (Table 5.1d.1). Far more women reported that they made plans for transport in case they had emergency complications that required them to be taken to health units for management than to reach the health units they had identified to deliver in (390 women, 96.5% table 5.1d.2 vs 136 of 178 women, 76.4% table 5.1d.17a). Interestingly, a third of all women would bypass the units they sought ANC from to go and seek care at a higher level health unit further away in case of emergency (Table 5.1d.2). Most women were to be accompanied by family members to the delivery sites. For women who made plans to be assisted with household chores when they were away for delivery, the assistance was more likely to be from family members.

Although 96.8% of all women in the intervention arm had discussions with their providers on some or all of the danger signs in pregnancy, in labour and delivery and after delivery as were described in the providers' information sheet for danger signs (Table 5.1d.3), in 20% of women, all the danger signs were either not discussed or partly discussed.

While approximately 60% of all women had birth preferences and mentioned birthing position as their main preference, over one third of all women (36.4%) had no preference of a position to birth in. Overall, approximately 93% (376) would either prefer to be delivered in the supine position or did not mind their birthing positions. Preference for birth attendants was also low. Eight two percent of all women had no preference for attendants, although approximately 15% preferred a female attendant at birth (Table 5.1d.3).

Table 5.1d.1: Plans for delivery site and cost for transport and services made by women in the intervention arm

Discussion or plan made and recorded	Intervention (404 participants, 8 units)
Planned delivery place before recruitment	
Home	230[56.9]
Health unit	168[41.6]
Did not know	6[1.5]
Total	404[100.0]
Planned site for normal delivery after discussion with provider	
Health unit away from where she attended for ANC	138[34.2]
Health unit she sought ANC at	227[56.2]
Home	32[7.9]
Made no decision	7[1.7]
Total	404[100.0]
Discussion on the delivery attendant (identified and known)	386[95.5]
Discussion on transport plans	391[96.8]
Identified type of transport to the delivery site	
Yes because needed one	178[44.1]
No because did not need any	226[55.9]
Kept money for transport cost (n=178]	136[76.4]
Discussion on service cost	
Yes	393[97.3]
No	11[2.7]
Saved money for service costs	
*No because services were free	383[94.6]
**Yes because it was required	11[2.7]
Not discussed	11[2.7]

Note: Number indicate number of women and those in brackets are the respective percentages.

*Delivery care was free at all units in the district at the time of the study implementation except at one religious organization health unit in the control arm where a fee of approximately 2.3 USD was required. Apparently, providers had made most women aware of this policy change.

**Women who planned to deliver at the religious organization unit in the district and at another religious hospital in the nearby district where deliveries were not free.

Table 5.1d.2: Birth plans for support and blood donors made by women in the intervention arm

Discussion or plan made and recorded	Intervention (404 participants, 8 units)
Plans for someone to accompany her to the delivery site	379[93.8]
Relationship with the person to accompany them	
Family member	374[92.6]
No one identified	15[3.7]
Not discussed	13[3.2]
Friend	5[1.2]
Did not need anyone	3[0.8]
Plans for transport in case of an emergency and kept money in case transport was required	390[96.5]
Plans of where to go in case of an emergency	
Health unit away from where she sought ANC	137[33.9]
Health unit where she sought ANC	243[62.6]
Plans for someone to be contacted in case of an emergency	388[96.0]
Relationship with someone to be contacted in case of an emergency	
Husband	332[82.2]
Other relatives	55[13.6]
None identified	16[4.0]
Others	1[0.2]
Plans for possible blood donors	331[81.9]
Plans for someone to assist with household chores	379[93.3]
Relationship with someone identified to assist with household chores	
Family member	377[93.3]
Not identified despite the discussion	17[4.2]
Not discussed	8[2.0]
Identified someone other than a family member	2[0.5]

Note: Numbers indicate number of respondents and those in brackets are the respective %. Numbers in brackets may not add up to 100% due to approximation.

Table 5.1d.3: Discussion on maternal and neonatal dangers signs, postnatal care and birth preference between providers and women in the intervention arm

Discussion or plan made and recorded	Intervention (404 participants, 8 units)
Discussion on maternal and neonatal danger signs	
All discussed	323[80.0]
Just some discussed	68[16.8]
Not discussed	13[3.2]
Plans for post delivery check-up (identified the health unit)	386[95.5]
Planned place for the initial post delivery check-up	
Health unit where she sought ANC	376[93.1]
Not discussed	15[3.7]
Health unit away from where she sought ANC	10[2.5]
TBA at home	3[0.7]
Had any birth preference	245[60.6]
*Mentioned birthing position as the birth preference	
Yes	245[60.6]
No	147[36.4]
Not discussed	12[3.0]
Birthing position preferred	
Supine	229[56.7]
No preference	147[36.4]
Squatting or lying on her sides	16[4.0]
Not discussed	12[3.0]
*Mentioned birth attendant as the preference	
Yes	60[14.9]
No	332[82.2]
Not discussed	12[3.0]
Mentioned sex of the attendant	
Preferred female attendant	60[14.9]

Note: Numbers indicate number of respondents and those in brackets are the respective %. Numbers in brackets may not add up to 100% due to approximation.

*It was possible that one could mention both preferences

Table 5.1d.4: Factors associated with delivery at health units among women who made plans to deliver at health units during ANC consultations in the intervention arm (n=388)

Factor	Institutional delivery	Chi-square	p-value
Marital status			
Married	110 [28.4]	1.2	0.7334
Single	37[3.6]		
Cohabiting	37[3.6]		
Widowed	3[0.7]		
Divorced	2[0.5]		
Woman's ethnicity			
Maasai	85[21.9]	54.0	<0.0001
Mtemi	46[11.9]		
Others	12[3.9]		
Wealth quartile of the woman's family			
Lowest	58[14.9]	24.9	0.0239
Second	38[9.8]		
Third	31[8.0]		
Highest	16[4.1]		
Number of pregnancies ever had			
1 st pregnancy	31[8.0]	0.9	0.5061
2 nd -4 th	77[19.8]		
5 th and above	35[9.0]		
Times attended ANC after recruitment			
None	4[1.0]	4.1	0.3133
1	53[13.7]		
2	67[17.2]		
≥3	19[4.9]		
Distance in km to the nearest health units with delivery care services			
0-5	112[28.9]	18.36	0.0453
6-10	25[6.4]		
>10	6[1.5]		

Note: Chi-square is the Pearson's' chi-square. Numbers indicate women who delivered in health units and those in brackets are the respective percentages. *388 women had made plans to deliver in health units.

Women of Maasai ethnic group were more likely to deliver at health units than women from other ethnic groups. Delivery in health units decreased as wealth quartiles increased (from lowest to highest). Women who made plans to deliver in health units and lived within five kilometres from health units were most likely to deliver in health units than those who lived far away. Further analysis of the relationship between distance from the nearest health unit with delivery services and wealth quartile indicates that far more women in the lowest quartile lived within five kilometres from a health unit that provided delivery services than women from wealthier quartiles (not shown in the table). Of the 262 women who lived within five kilometres from such health units, 108 (41.2%) were from the lowest wealth quartile vs 22.9% in the 2nd quartile and 17.9% in the third and highest quartiles.

5.2: Discussion

The section discusses the intervention effectiveness for the primary and secondary outcomes, trends for seeking antenatal and delivery care, birth plans formulation and implementation, study limitations and ends by a section on conclusions and recommendations based on the study findings.

5.2.1. Intervention effectiveness to increase skilled care at delivery and after delivery

Delivery at the health units increased by approximately 15%, and the postnatal care utilization within one month of delivery was 30% higher in the intervention than in the control arm of the study. The increase in health units utilization achieved in this study is lower than that reported in two previous multiple intervention studies in Burkina Faso. The two studies that were mentioned in the systematic literature review in chapter two of this thesis improved utilization of skilled delivery care by 19% and 28%.^{6 93} There are marked differences between the Burkina Faso projects and this study in that they employed multiple interventions at the community and health units levels, improved health units' infrastructure and took longer. The utilization of delivery care services were obtained from women's reports and it is not clear if the reports were confirmed from health unit records. An intervention in Dinajpur, North-western Bangladesh improved skilled care utilization by 18% over a four year period.²⁰ Like the studies in Burkina Faso, this study also employed multiple interventions. Another intervention in Nepal showed no improvement in skilled delivery care, but improved postpartum care uptake within six weeks by 17%.⁵ Many more non birth plans behavioural interventions to improve maternal and neonatal health have largely been conducted at the community level, with significant improvement in neonatal health and less or no reported improvement in maternal outcomes^{90-92 128}. Although available evidence support their effectiveness¹²⁹, most of these studies have been conducted in Asia^{90-92 128 130}, and similar evidence from Africa¹³¹, as well as evidence from interventions at primary health care settings with no significant additional input of health-system strengthening is scarce.^{131 132}

Although available evidence suggests that appropriate interventions at primary health care level in developing countries have the potential to reduce maternal and newborn deaths by 20-30% and 20-21% respectively,¹³³ implementation of intervention in health systems in these countries can be challenging. Arguably, care providers at most public-sector facilities in low resourced countries are commonly poorly motivated because of

underpayment, overburdened due to scarcity of qualified personnel, and poorly supervised. As a result, arguments have been made that such workers may not be able to deliver care similar to what can be achieved in research settings.¹³¹ However, evidence from this study and others from sub-Saharan African countries^{6 93} suggest that safe motherhood interventions are feasible in these settings, and might be effective in increasing women's utilization of health units for delivery and postpartum care. In the Tanzanian context, evidence from a model-based analysis through discrete choice experiment (DCE) by Kruk et al (2009) in rural western Tanzania, suggests that the most important attributes likely to improve women's preference for health facility delivery (from the current 43% to 88%) were respectful providers and availability of drugs and medical equipment.¹³⁴ Providers' conduct and attitude, therefore, are important elements to improve the utilization of health care services for maternal health, and should be addressed to improve the low level of health care utilization for delivery. This assertion is strengthened by evidence from many developing countries, including Tanzania which indicates that women's utilization of ANC is associated with a higher likelihood of institutional delivery, skilled delivery attendance, and seeking advice for pregnancy and delivery complications.^{10 29 67-69 135 136}

Initially, two theories provided a comprehensive framework to explain the theoretical background for the formulation of the birth plans: the theory of reasoned action⁹⁷ and the health belief model.¹¹⁴ Using the theory of reasoned action, for example, the person's judgement that performing the behaviour is good or bad and the social pressures to perform or not to perform the behaviour are important for an individual's intention to perform the behaviour. The health belief model, on the other hand, perceives the susceptibility and severity of the problem versus the benefits and barriers attached to the problem as facilitators or obstacles towards the intended behaviour. The formative phase of the study identified various obstacles and facilitators for utilizing (or not utilizing) the available health units for ANC, delivery and post delivery care. Obstacles for delivery and post delivery care were addressed during the birth plans formulation so that many more women overcome them to utilize the available health units for delivery. Provider-woman dialogue during ANC visits provided an opportunity for women to understand the benefits of delivery and post delivery care, and providers and family members, including the women's husbands, helped to encourage women to utilize the available care for delivery and after delivery. Similarly, the dialogue might have helped women to understand the protection delivery under care of skilled providers

offered, and to overcome various barriers that prevented them from utilizing health units for delivery.

More women in the intervention and control arms of this study sought postnatal care within one month after delivery than they delivered under skilled providers, indicating that constraints for postnatal care might be easier to overcome than those for skilled delivery care. Several reasons can be deduced from the findings of this study to explain this discrepancy. Postnatal care was mostly sought from the nearest health units, and, therefore, was available nearer to women's homes than delivery care. This augured well with less opportunity risks of leaving the family and household alone and unattended for some days, and did not involve financial cost. Additionally, postnatal care attendance carried other incentives to women and their families: allowed babies to be registered and to get cards, which guaranteed free health care to the babies. Women's widely-held trust in the efficacy of childhood immunization on children's health was, possibly, another motivation. Importantly still, was the belief among women in the two ethnic groups that attending clinics (ANC and postnatal) was empowering, and, therefore, was likely more attractive than delivery care at health facilities. Nevertheless, theories by Fishbein, (2000) and Glass & McAtee (2006) can be used to explain this discrepant pattern further. Fishbein, 2000, suggests that one behaviour is likely to be substantively unique from another and the behavioural change is most likely to occur if one has a strong intention to perform it, has the necessary skills and abilities to effect the behaviour, and is in an environment free of constraints likely to prevent the behaviour from being effected.¹³⁷ He further argues that, no single behavioural intervention can effect multiple changes, and that interventions need to be outcome specific. Glass & McAtee (2006), argue that human actions or behaviours are influenced by opportunities and constraints (structured contingencies) within the social and physical environment, by biological phenomenon, and are dynamic throughout one's entire lifetime.¹³⁸ Possibly, the motivations for seeking prenatal, delivery and postnatal care are not of unitary construct, rather follow diverse, but occasional convergent perceptions of the risks, benefits or societal expectations of norms or traditions which help to shape how plans are made, and decisions executed by pregnant mothers with the help of their significant others.^{137 97 114} Likewise, the intervention might have mitigated some constraints, and opened better opportunities for women to seek care. If constraints for postnatal care were easier to overcome than those for delivery at the available health units, women would use the former more than the latter. However, women's utilization

of health units for delivery might be constrained by factors beyond her control. If labour starts suddenly and precipitously, for example, a woman far from any health units might have no time to reach any health unit for delivery.

5.2.2. ANC care satisfaction

Providers in the intervention arm spent more time with ANC attendees than their counterparts in the control arm of the study, yet their level of care satisfaction was not statistically significant. The same applied for women. ANC satisfaction among women was measured based on their perception of the care they received and, thus, depended on their subjective perception of the care in their respective arm of the study (whether in the intervention or control arm. Most women might have no idea of any alternative and better care than what they received at their local primary care units, and, thus, a potential of giving affirmative responses towards better care, and, subsequently, better satisfaction. Even among providers, no technical criteria were used to assess their satisfaction, but their subjective perception of the care they provided to women. Two more additional explanations can be deduced for the high level of satisfaction among women in the two arms of the study. The level of ANC satisfaction among women in both arms of the study was already high, and, therefore, making it less likely to find any statistical significant difference in the level of satisfaction in the two study arms. The flexibility in the time for ANC services provision and the fact that most women trickled in clinics, the latter giving providers enough time for ANC consultations made women to feel that they were not rushed during ANC consultations. This had a potential to satisfy more women, the quality of care notwithstanding. Implicitly, the increase in time spent for care seeking, however, does not appear to affect care satisfaction for care users and providers. In a WHO randomized multicentre trial in Argentina, Cuba, Saudi Arabia and Thailand⁶⁵, women in the intervention and control arms of the study were equally satisfied with the information provided by care providers about their health, and with tests during pregnancy and treatments they might have needed, although some concerns were pointed out.²⁵

Yet again, this study highlights the gap between the quality of care as evaluated on the technical perspective from what may possibly matter most in care utilization to care users.^{139 140} Although this study did not primarily intend to assess the quality of ANC in the study district, it revealed that health units lacked a number of essential elements to

provide quality ANC. Nevertheless, care users were satisfied with the care they received from these health units. Notably, 60.2% of the women in the intervention arm and 59.2% in the control arm of the study reported that they were checked for blood pressure. The respective levels of those who reported that their urine was tested were 25.0% and 7.2%. These two tests are important yet basic for any pregnant woman and one would expect women to be dissatisfied with the care they received if they had not received them. On the contrary, most women in both the intervention and control arms of the study were satisfied with the care they received.

5.2.3. Trend for seeking antenatal and delivery care

Patterns of antenatal and delivery care in this study need to be highlighted. Far more women attend ANC than deliver at the available health units, and still some women do not complete the recommended four visits for focused ANC in Tanzania. Just over half of women in the intervention arm of the study attended the required four antenatal visits or more and only 21.9% in the control arm did so. The level of utilizing health units for delivery was relatively low (20% and 34% in the control and intervention arms respectively). In both the intervention and control arms of the study, more than 90% of all women who had previously been pregnant had attended ANC in the antecedent pregnancy, although only approximately 14% had delivered in health units. Such a discrepant pattern has been described in many parts of East Africa, including Tanzania, although with wide variations.^{29 58 59 62 71 74 141 142}

The mean gestation age at initial ANC attendance was 5.3 and 5.8 months for the intervention and control arms of the study respectively, and on average, they had attended ANC at most twice before recruitment into the study. Countrywide, the median gestation age at first visit is 5.4 overall, and 5.5 for rural Tanzania.²⁹ Although the trends parallel the national average, they have both implementation and policy ramifications. The relatively late booking for ANC (late second trimester), for example, may not allow detection and management of early pregnancy-related complications, and, thus, prevention of adverse pregnancy outcomes. In addition, women and providers are unlikely to get enough time for effective dialogue for various topics recommended in the national focused ANC guidelines²⁸, including for safe delivery. Unless such discrepancies are addressed to allow focused ANC to be implemented effectively, ANC attendance will continue to be a missed opportunity to improve maternal and perinatal health.¹⁷

5.2.4. Birth plan formulation vs implementation

Few discrepant findings are worth mentioning. Approximately 41% and 90% of all women in the intervention arm had planned to deliver at the available health units before and after they were recruited into the study respectively, yet just 34% did so. The possibility that some women failed to implement the birth plans they had formulated for reasons beyond their control despite their wish to deliver in health units cannot be ruled out, however. Additionally, some women might have changed their plans for delivering at the available health units after their last visit to the ANC clinics. Unfortunately, the study design lacked a mechanism to reliably document why women failed to implement the birth plans they had formulated so that they deliver in health units before and during follow-up interviews. Similarly, the study did not document changes in the women's delivery preference after the last ANC visit. Ironically, while approximately 90% of all women in the intervention arm had reported that they had made plans to deliver at the health units, only 74% reported that they had such plans at the postnatal interview. Furthermore, plans for blood donors were reported by 81.9% of women during the birth plan formulation by care providers, 98% during ANC exit interview and 56.6% during postnatal interview. Plans for someone to assist with household chores were also reported by 93.3%, 98% and 85% of women during the mentioned times.

Generally, more women reported less plans at postnatal interview than they did with care providers and during ANC exist interviews. There are two possible explanations for this discrepancy. In the first case, it could be that some women were not sincere with the plans they reported to the interviewers, and had mentioned the formulation of the plans in order not to alienate the care providers. In the second case, women had possibly forgotten what they intended during pregnancy, although the average time interval from initial interview at recruitment to the second interview for women in this study arm was just 4.2 months. To reliably document recall bias among study women required administering the questionnaire to currently pregnant and recently delivered women before the study commenced. If the intervention has not introduced the possibility of recall bias, the level of birth plans reported in the two groups of women in the absence of the intervention would be equal.⁷ Unfortunately no such measures were made in this study. Additionally, even though the questionnaire was thoroughly pre-tested and piloted for the local context, women's responses to the questions very much depended on how the specific questions were administered by the interviewers. The possibility that the questions might have not been understood by some women, albeit very unlikely,

cannot be ruled out. However, this would have introduced the same bias at initial and subsequent interview after delivery unless it was limited to either initial or postnatal interview.

The findings of this study highlight the weaknesses of using women's reported antenatal plans to seek skilled delivery care in birth preparedness studies as a proxy for intended use. Far more women who make such plans during pregnancy end up not utilizing the available delivery care services at health units⁶; an indication of the difficulties women face to overcome delays for accessing normal delivery and emergence obstetric care services. In a birth plan study in Burkina Faso, Moran et al (2006)⁶, reported that women who planned to give birth with the assistance of a skilled provider were 53% less likely than those who had no plans to actually use the skilled provider at delivery. Similarly, women with knowledge of at least five danger signs and those reporting transport plans were no more likely to birth under the assistance of skilled providers than those with less knowledge and no transport plans respectively. Discrepancies between women's reports and health units records have been documented by Filippi et al in Benin¹⁴³ and Bryant et al, (1989) in Canada.¹⁴⁴ The intervention was not at the level of pregnant women in the Burkina Faso study, but rather of stakeholders in maternal and neonatal health: community, health workers and policy makers. The packaging of the study, therefore, involved intervention at various levels to reduce the delays women faced in accessing appropriate care. However, the evaluation involved pregnant and recently delivered (delivered with 12 months) women's knowledge of birth preparedness and complication readiness.

The present study was unique in that the intervention was at health facility level, and the same women were followed-up in pregnancy through delivery to the postnatal period which allowed their experiences to be documented over time. Yet discrepancies of the elements of care provided to women during ANC could not be remembered few months after delivery. This finding must be viewed in the study context, however. The recall of antenatal events may very much depend on how much weight women put on them or even how long women have been exposed to the elements of care. Birth plans, although part of focused ANC in Tanzania, providers in the study district were not previously motivated to implement them, and thus, most elements of birth plans might have been relatively new to most women. How women recall new elements of care that do not involve taking of biological specimens or medications in this setting is not known.

Unfortunately, this study lacked mechanisms to document this. Additionally, the level of literacy in the study population was rather low, with approximately 60% of women in both the intervention and control arms of the study having no formal education. Although there may be no clear relationship between one's level of literacy and recall of care events, higher literacy is associated with increased maternity care utilization¹⁴⁵, and possibly, may affect recall of elements of care received. Since the intervention components were not part of the routine care promoted by care providers during women's antenatal clinic visits, and that the introduction of birth plans was rather a new phenomenon in antenatal care, a recall bias of such events was, therefore, likely to occur.

Of the factors associated with delivering in health units among women who made plans to deliver in health units, the finding that women in the lowest wealth quartile were most likely to deliver in health units than women in wealthier quartiles is in contrast with the results from the most recent Tanzania DHS (2004-05)²⁹ and the trend in most developing countries.¹⁴⁵ The relationship, however, was confounded by the distance from health units, with more women in the lowest wealth category far nearer to health units with delivery services than those in other categories. Most people in the study district are semi nomadic pastoralist and largely traditional. Likely, the household possessions used to generate the wealth quartiles depended more on whether they had cattle or not. Less wealthy families might have adopted modernity, including residing near places with social services like health care, more sedentary lifestyles instead of semi nomadic pastoralism or even acquired different health seeking behaviours that favour delivering at health units. Additionally, whether residing near health units and being poor in terms of household possessions had positive additive influence on women's likelihood of delivering in health units cannot be deduced from this analysis. The level of delivering in health differed along ethnicity, thus confirming the results from the formative research.¹⁴⁶ However, further extrapolation of findings from this analysis is limited for two reasons. The analysis was restricted to a sub-sample of women in the study, thus the study might have lacked power for subgroup analysis. No detailed multivariate analysis was performed to explore further the association of various factors on women's likelihood of delivering in health units. Such simple analysis might not be as informative and only aimed to show factors that were associated with delivering at health units among women who had reported that they planned to deliver in health units during birth plans formulation with care providers.

The findings apply specifically to these women and may not apply to all women in the study district, those who made no plans to deliver in health units or those in the control arm

5.2.5. Birth plans implementation in the study district: the broader view

The successful implementation of the intervention required organizational and structural factors in place. Notably, the excellent 100% follow-up of women initially recruited required a collaboration of the health units, interviewer, VHWs, TBAs and care providers who knew the study area and participants very well.¹⁴⁷ The motivation shown by providers in this study may be attributed to the good support supervision and participants' appreciation of ANC. However, the achieved 34% utilization of health units for delivery was below the 46% national average. Many obstacles identified during the formative phase might have been difficult to surmount despite the birth plan intervention. Importantly, male partners' participation in ANC was low (32.4% intervention vs 15.1% control), and still many women in both the intervention and control arms of the study did not perceive it as necessary. Effective implementation of focused ANC in this and similar settings requires community promotion of males' increased participation in ANC. Additionally, women still lacked autonomy to leave their households without their husbands' permission, and the men's gate keeping role needs to be addressed to support improved uptake of maternity care services. Women's preference for delivery at units with perceived better care (most with comprehensive emergency obstetric care), which were on average farther than where women resided, instead of nearby health units might be another deterrent for delivering at health units, especially for women from remote areas. Reluctance by women to seek delivery care at hospitals in urban or semi-urban areas far from their homes has been reported in Tanzania.^{59 74} Traditions and norms that view home delivery as equally safe, and the high opportunity risk for delivering at the available health units far from women's homes that were reported in this study do not ease women's difficulties to access delivery care services, the birth plans notwithstanding.

The high follow-up rate of 100% (rare in many settings) that was achieved in this study was similar to the one obtained in a previous study, in the district in which approximately 96% follow-up was achieved.⁴⁰ To minimize the loss to follow-up, each participant was assigned a unique identification number that was strictly documented such that in case a participant failed to turn up at a postnatal clinic, the information was

used to track her. The network of village health workers (VHWs) and TBAs who worked alongside the health units' clinic personnel was vital for the successful follow-up of most women in their homes when they failed to honour their scheduled initial postnatal attendance appointment. VHWs and TBAs lived in the same villages as the research participants and knew where the latter lived before and after delivery. In addition, the almost near universal utilization of TBAs by Maasai women (80% of the district population) ensured that women's residences at the follow-up stage were known.

5.2.6. Study limitations

The study has several limitations that need to be highlighted. The nature of the planned intervention and the research setting made it difficult to effectively blind the care providers to the allocation of the health units to any of the study arm and by extension women who were recruited. However, the primary outcome of delivering in a health facility under care of skilled providers and the secondary outcome of seeking postnatal care within one month of delivery were enquired from the participating women and confirmed from clinic records, and were, therefore, relatively objective outcomes.

Most women were interviewed during clinic exit at recruitment (96%) while less than half in both the control and intervention arms of the study were interviewed at home. Interviewing women exiting clinic, even though outside the clinic environment, can make women reluctant to appear to alienate providers who had just served them and may thus, introduce bias in the responses. Nevertheless, the proportion of women who were interviewed at the clinics and at home, both at the initial interview and after delivery, did not differ between the two arms of the study. If reporting bias occurred, therefore, it did so equally in the two arms.

Like any other randomized trial, contamination was a possibility. Generally, women in the study district do not change clinics and their mobility is limited due to their socio-cultural norms and geographical set-up.⁴⁰ Indeed, only four women in this study changed clinics, and all within their allocated study arms. Likewise, no provider was transferred from the intervention to any of the control units during the study implementation or vice versa. Nevertheless, since providers were never blinded and they had mobile phone access, they could have shared the gained skills during intervention implementations. Additionally, it was ethically imperative that all women

receive reasonably good care as per available national guidelines. To ensure this, providers in each study arm had a brief review session on the focused antenatal care concepts during which the need to adhere to the available antenatal care guidelines was emphasized. Subsequently, providers in the control units could have performed relatively better than they would have done in the absence of the revision session as the intervention elements were part of the routine ANC that was not widely implemented. The possibility of reducing the difference in the outcome of interest between the two arms, therefore, cannot be ruled out.

Ngorongoro district has poorly developed road network, is sparsely populated, and at some places, is quite mountainous. Subsequently, distance from one village to another can be enormous. Furthermore, ANC clinics were open daily on working days, Monday to Friday, and women would trickle in for care any time. Thus, each health unit was allocated two data collectors to ensure that no eligible woman attendee was missed on any working day. Such a large number of data collectors might have introduced significant inter-interviewer bias that was correlated with their respective health units' reported elements of care. To minimize this possibility, however, efforts were made to train data collectors so that they understand the questions well before data collection commenced. Regular fortnightly support supervision visits were also provided throughout the data collection period to ensure that data collectors with some difficulties in using the questionnaires were helped to improve on their skills. Filled questionnaires were also reviewed and where missing information was found, data collectors were requested to go to the women's homes to re-collect the information.

Providers in both the intervention and control clinics were equally satisfied with the care they provided to women. The latter assertion, however, should not be generalized, as relatively fewer women sought care per clinic day and trickled in to clinics, thus giving the providers adequate time to serve them individually. In situations where many women seek care daily at a time, individual provider-attendee dialogues on some important pregnancy, delivery and post delivery issues may not be feasible because of the limited time unless more providers are available to match the number of attendees. Unfortunately, few health systems in sub-Saharan Africa have enough MCH personnel to adequately address inadequacies in care provision.

All health units lacked figures for the proportion of women who sought ANC in them and had delivery care at health units. Instead, health units had figures for only women who delivered there regardless of where they attended ANC. Subsequently, the baseline levels of health care utilization for delivery in health units that were used to randomly assign health units into the two study arms were derived from available health unit data from a previous year. Findings from this study, however, indicate that some women would bypass health units they sought ANC from to seek care at other health units, including the two hospitals, especially when they had pregnancy-related complications or even for normal delivery. The baseline figures, likely underestimated the baseline levels of the proportion of women who delivered at health units. Imbalances in the primary outcome of interest in favour of one study arm can affect the endpoint estimate for the primary outcome, and thus give false impression of intervention effectiveness (or lack thereof). However, health units were stratified basing on the level of the delivery care utilization in the previous year before they were randomly assigned to the intervention or control arm of the study. Imbalances (if any) in baseline delivery at health units, therefore, were likely distributed equally between the two study arms.

The effectiveness observed in this study may possibly not be achieved in routine antenatal care settings. Notably, the research might have stimulated change of attitudes, practices and behaviour among providers which may not be observed in routine practice. The supportive supervision that was provided in this study (fortnightly) is in contrast with the monthly or three monthly routine supervisions for most programmes in the district. However, reinforcing providers' counselling, health education and promotion skills during routine supervision visits is vital for the skills to be maximally utilized by care providers at ANC clinics. Furthermore, maternal birth plans can be incorporated into routinely collected data so that providers feel obliged to have birth plan dialogues with antenatal women.

Analysis of the intervention effectiveness was constrained by the small number of clusters in this study. Such few clusters did not allow for subgroup analysis and, therefore, estimation of effect modification. It also restricted the choice of the type of analysis to employ to assess the effectiveness of the intervention. Subsequently, analysis of the results was based at cluster level summaries and not at individual level.

5.2.7. Conclusion and recommendations

A health facility based antenatal birth plans intervention with minimal or no additional input in the health system infrastructure in a poor and rural area of low level of delivery and postnatal care utilization improved care utilization without affecting the level of care satisfaction among providers and women attendees. Promotion of birth plans implementation during routine ANC should be strengthened in this and similar settings in order to improve delivery and post delivery care utilization. However, a well functioning network of other maternity care stakeholders (TBAs, VHWs and family members) and good support supervision are important for the intervention implementation and effectiveness.

6: Process evaluation of the antenatal care provided in the intervention and control arms

As explained in section 3.4.3 the process evaluation aimed to understand how birth plans were implemented in the intervention arm and how normal care was provided in the control arm. Factors that favoured the effective implementation of birth plans and normal care were highlighted. Specifically, the process evaluation assessed the times providers spent to provide various steps of ANC care in both the intervention and control arms and the quality of the interactions between providers and women using antenatal care services. In addition, the evaluation documented the time spent by providers during the initial postnatal care visit. This chapter is divided into two main sections on the results and discussion of the findings.

6.1. Results

The results from this assessment are presented in five main headings of description of the evaluation and the antenatal care services provided to women in the two study arms, time spent for antenatal care (both initial and subsequent visits), evaluation of the quality of the interactions between providers and women, availability of items to support quality ANC services and assessment of the implementation of the intervention.

6.1.1 Baseline description of the evaluation and ANC in the study arms

ANC and postnatal care services were available in all clinics during all official working days (Monday to Friday) and hours (8 hours a day on average); the duration of working hours did not differ between the two arms of the study (8.3hours, 95% CI 7.7-8.8 for the intervention arm vs. 7.9 hours, 95% CI 6.7-9.0 for the control arm $p=0.5030$). In most clinics, however, providers worked more than eight hours a day allowing women who visited the clinics after the official hours to obtain services. Others opened late because women started trickling in late. As a result, these clinics closed after the official hours (normal working hours from 7.30am-3.30pm). Clinics attendees were usually a mixture of antenatal and post natal care seeking women who either came for initial check-up for themselves and their newborns, or had brought their infants for routine clinic check-up. Most resided in the villages the health units were situated or occasionally, in nearby villages. Only few women resided in distant villages and would have walked for several hours to reach the MCH services.

Besides the MCH duties, care providers at health units were also responsible for other nursing care duties in their respective health units. Women were usually seen individually except when they attended a small number of outreach clinics. In these cases, before the individual consultations, group sessions for general health education were conducted. Often, the health information provided to women in these sessions was on VCT and on other interventions such as malaria prophylaxis, de-worming for anaemia control and tetanus immunization.

Some women were accompanied to the ANC clinics by their TBAs and often, the TBAs relationship with providers appeared largely cordial. For example, TBAs were allowed to witness and participate in most stages of ANC consultations including during examination and, in cases where TBAs were not sure of issues related to their clients' pregnancy, they sought clarifications from providers. Dates of subsequent visits were commonly communicated to both the TBAs and the individual women. In addition, village health workers (VHWs) worked alongside most ANC care providers in most health units in both the intervention and control clinics. Besides assisting the providers in basic clinic activities like weighing of pregnant women and infants, VHWs also acted as occasional interpreters to providers who needed such assistance. VHWs are men and women from the communities around the health units who had been trained as basic health educators by the health units, NGOs or the district health management team. In recent years, VHWs have been increasingly used by the district and various NGOs for HIV/AIDS home-based care and support.

Table 6.1.1 shows further characteristics of the antenatal care services available in the health units participating in the trial. Overall, there was no evidence to suggest any marked difference in the average number of pregnant women seen on any typical clinic day between the two arms of the study. Hospitals, the only places where comprehensive emergency obstetric care could be obtained in the district, were a long way from most basic obstetric care health units and by extension from women's residences. On average, women in the intervention arm of the study needed to travel longer distances to reach the nearest hospital than their counterparts in the control arm, although there was no evidence to support that this difference was appreciable.

Table 6.1.1: Characteristics of ANC care provided by the health units involved in the trial

Care characteristic	Intervention	Min	Max	Control	Min	Max	Mean difference	95% CI of the difference	P value
Number of service providers on a typical clinic day	1.4(0.5)	1	2	1.5(0.8)	1	3	-0.1	-0.8-0.6	0.7061
Number of pregnant women seen at the clinic on a typical clinic day	3.5(1.5)	2	6	5.0(2.8)	2	10	-1.5	-3.9-0.9	0.2072
Time in years providers had been providing MCH care	13.4(7.7)	1	27	15.5(5.3)	7	21	-2.1	-9.2-5.0	0.5312
Time in years providers had been working at the health unit	10.8(8.1)	3	27	10.0(6.6)	2	20	0.8	-7.2-8.7	0.8427
Distance in km from the nearest hospital providing comprehensive emergency obstetric care	51.6(30.4)	7	105	44.3(25.0)	8	80	7.4	-22.6-37.3	0.6045

Note: Numbers in bracket are the respective standard deviations

Min denotes minimum and max denotes maximum

6.1.2: Assessment for the time spent for the various steps of antenatal and initial post natal care

Table 6.1.2 shows the ANC and post natal care consultations assessed for estimating time for initial and revisit ANC and for post natal consultations. On average, fewer consultations were assessed for the revisit ANC and initial postnatal care than for initial ANC visit.

The time providers and women spent for the initial ANC consultations in the two arms of the study is summarized in table 6.1.3. Providers in the intervention units spent at least twice as much total time per consultation than their counterparts in the control units. This was explained mostly by marked differences in times for counselling (including for birth plan formulation) and for examination. Although there was some evidence that providers in the intervention units spent slightly more time taking the history of their clients than those in the control arm, there was no evidence to suggest that the time for drug administration and immunization differed considerably between the two arms of the study.

Among health units within the same study arm, there were notable variations in the total durations of ANC consultations and also for health education and counselling. The minimum and maximum durations of ANC consultation were 33 and 47 minutes respectively in the intervention arm; they were 12 and 32 minutes in the control arm. The minimum and maximum time for health education and counselling in the intervention arm were 19 and 32 minutes respectively. It took between five and eighteen minutes to counsel a woman in the control arm.

Providers in all intervention health units consistently counselled ANC attendees on the importance of delivering at the available health units during the birth plan formulations. In contrast, staff in just one control health unit encouraged women to deliver under the care of skilled providers at the available facilities, although inconsistently. This point was mentioned just briefly to some women who were assessed in this health unit. Providers in both the intervention and control health units, however, consistently discussed with women on VCT for HIV and all women had their blood checked and were informed of the results. At the time of the study, all units in the district used the opt-out approach, and most women attending ANC initially knew of this requirement.

The focussed ANC guidelines recommend that women make plans for postpartum care during the third visit (at 28-32 weeks gestation).²⁸ During the review of the focused ANC by providers during the training workshop, a consensus was reached among providers, the district MCH team and the researcher that all women in the two arms of the study regardless of their gestation age be counselled for postnatal care because a significant number initiated ANC late. The focused ANC guidelines give similar advice for women who initiate care late in order to ensure that such women do not miss any component of care. Providers in the intervention arm were told to discuss the importance of postnatal care as part of the birth plans formulation with women and people accompanying them during all ANC consultations (see key message information to providers: appendix 5). During care assessment, however, counselling for postnatal care differed significantly between the two study arms. While the importance of postnatal care was consistently emphasized by care providers during the initial ANC consultations in five out of the eight units in the intervention arm, and inconsistently emphasized in the remaining three units, only women in one health unit in the control arm were provided with such information. Even then, the information was just mentioned briefly in some consultations, indicating a consistent failure to provide this vital information to women by providers in this study arm.

Table 6.1.4 shows the durations of ANC consultations during subsequent visits in the two arms of the study. Again, women in the intervention arm benefited from approximately twice longer ANC consultations, including familiarisation or history taking, health education and counselling, and examination. However, there was no evidence to suggest that the time spent by women for drug administration or immunization differed considerably between the two arms of the study.

Counselling/health education for postnatal care was also analyzed among women who were attending subsequent visits for ANC. Similarly, all providers in the intervention health units consistently promoted the importance of postnatal care, but it was only promoted in one unit in the control arm. Nevertheless, providers in all health units in the intervention and control arms of the study had discussion with ANC attendees on some aspects of prevention of maternal to child transmission of HIV except in one health unit in the control arm where no woman was counselled.

Providers in the intervention arm spent longer times with women during their initial postnatal care visits than their counterparts in the control arm, but there was no evidence to suggest that the times between the two study arms differed substantially [mean time spent $\pm$ SD = 11.9 $\pm$ 5.6 minutes (minimum 1 & maximum 20 minutes) for the intervention arm vs 8.1 $\pm$ 3.6 minutes (minimum 5 & maximum 15 minutes) for the control arm. 95% CI of the difference -1.2-8.7, p=0.13] (information not shown in tables).

Table 6.1.2: Consultations assessed for estimating duration of initial and subsequent ANC visits and for post natal consultations					
Time spent	Intervention (n=8)	Control (n=8)	Mean difference	95 % CI of the mean difference	p-value
Total initial consultations assessed	36	37			
Average initial consultations assessed per health unit*	4.3(1.0)	4.6(0.7)	-0.4	-1.3-0.6	0.4193
Total number of revisit consultations assessed	18	17			
Average number of subsequent ANC consultations assessed per clinic for all elements of care except for drug administration **	2.3(0.7)	2.1(0.6)	0.1	-0.6-0.8	0.7166
Total revisit consultation observed for assessing the time for drug administration	11	9			
Average subsequent ANC consultations observed for assessing the time for drug administration	1.4(0.5)	1.1(0.4)	0.3	-0.2-0.7	0.2782

Note: Numbers in brackets are the respective standard deviations. The 95% CI is for the mean difference between the two arms of the study.

* Average number of consultation observed for all elements of care were the same for initial ANC

** Average number on consultation observed for familiarization or history taking, counselling or health education and examination were the same.

Table 6.1.3: Durations in minutes of various components of the initial antenatal consultation in the intervention and control arms

ANC component	Intervention (n=8)*				Control (n=8)**				Mean difference	95% CI of the mean difference	p-value
	Mean	Min	Max		Mean	Min	Max				
Average duration of history taking	4.4(1.3)	3	7		3.1(1.1)	2	5		1.3	-0.1-2.6	0.0596
Average duration of health education and counselling	24.5(4.5)	19	32		10.5(4.0)	5	18		14.0	9.4-18.6	<0.0001
Average duration of examination	5.0(1.8)	3	8		2.5(0.8)	2	4		2.5	1.0-4.0	0.0047
Average duration of drug administration	6.1(2.7)	3	10		5.3(0.7)	4	6		0.9	-1.2-3.0	0.4006
Average total duration of consultation	40.1(5.0)	33	47		19.9(6.5)	12	32		20.3	14.1-26.4	<0.0001

Note: The numbers indicate time in minutes and those in brackets indicate respective standard deviations. The p-values are from the t-test statistic for the mean difference in time spent for the specific step of care between the two arms of the study.

Min denotes minimum and max denotes Maximum

* 36 consultations assessed

** 37 consultations assesses

Table 6.1.4: Durations in minutes of various ANC components in subsequent antenatal consultations in the intervention and control arms

Time spent	Intervention (n=8)*			Control (n=8)**			Mean difference	95% CI of mean difference	p-value
	Mean	Min	Max	Mean	Min	Max			
Average duration of history taking	2.9(1.2)	2	5	1.5(0.5)	1	2	1.4	0.3-2.4	0.0176
Average duration of health education and counselling	13.8(3.8)	6	17	4.5(3.3)	0	10	9.3	5.4-13.1	0.0001
Average duration of examination	4.0(2.0)	2	8	2.0(1.3)	1	5	2.0	0.2-3.8	0.03355
Average duration of drug administration	2.7(0.5)	2	3	2.8(0.9)	1	4	-0.6	-0.8-0.7	0.8619
Average total duration of consultation	23.3(4.6)	15	31	10.3(4.1)	6	17	12.8	8.0-17.6	0.0001

Note: Numbers indicate time in minutes and those in brackets indicate respective standard deviations.

The p-values are from the t-test statistic for the mean difference in time spent for the specific step of care between the two arms of the study. Min denotes minimum and Max denotes maximum.

* 18 consultations assessed

** 17 consultations assessed

6.1.3: Evaluation of the quality of the interactions between providers and women

One of our hypotheses was that the intervention may lead to changes in the quality of the interactions between providers and women. In order to verify this, we assessed the quality of interactions by documenting the amount of women's participation during the ANC consultations, the degree of respect and empathy shown by providers to the attendees, the language used in communication between the providers and their clients and whether women and their newborns were routinely examined during the initial postnatal care visits.

Women were generally able to participate actively in various activities at the clinics. All providers in the intervention and control arms of the study listened to their clients well, allowed the clients to ask questions and asked their clients' questions to ascertain whether the information they gave was well understood. They were, thus, categorized as respectful and compassionate. Providers in all units in both the intervention and control arms of the study spoke the local language and needed interpreters only occasionally.

Providers were also asked if they routinely examined postnatal clinic attendees and their newborns during the initial visits to their units. All providers in the two study arms of the study reported the practice of routinely examining women during their initial visit to the clinics. In stark contrast, providers in half of the intervention units and in none of the control arm units reported that they examined newborns routinely during the initial postnatal clinic other than for weight measurement. This happened even for babies who were delivered at home. Corroboratively, the investigator observed women being examined during their initial postnatal clinic attendance, but hardly any of the newborns were equally examined.

In order to gain an in-depth understanding of what transpired between the providers and women attendee during the examination part of the consultation, five consultations from each study arm were purposely selected and reviewed. Apparently, more time was spent on explaining the examination findings to the women and people who accompanied them than the examination itself. Some women were accompanied by TBAs, male partners, other family members, and occasionally, female friends or neighbours. Most women in the intervention would request the providers to explain the findings to someone who had accompanied them besides themselves.

6.1.4: Assessment of the availability of items to support quality ANC services

Information on the availability of a range of items to support quality counselling, and physical examination and the availability of essential supplies such as drugs; equipments; and other facilities that are essential for providing good quality ANC was also collected (Table 6.1.5 below). Health units in the two arms of the study lacked some services for routine antenatal care. For example, only five health units in each arm had a well functioning blood pressure machine, and Aldomet, a widely used first line drug for treating non severe pregnancy induced hypertension in the country was only available in one health unit. Although described as rare occurrence by both care providers at health units and district health office, most health units lacked iron tablets.

Table 6.1.5: Availability of items to support quality ANC services in the two arms of the trial

Essential	Intervention (n=8)	Control (n=8)
Privacy during ANC consultations*	8	8
Well functioning blood pressure measuring machine	5	5
Foetalscope	8	8
Iron tablets	3	3
Folic acid tablets	6	8
Antihelminth drug for de-worming women	8	8
At least one broad spectrum antibiotic	8	8
Aldomet tablets	1	0
Antimalarial for intermittent presumptive malaria treatment	8	8
At least one drug for the treatment of Chylamydia, Gonorrhoea or Syphilis	8	8

Note: *A room that ensured visual and auditory privacy during ANC individual counselling/health education or examination.

Numbers indicate number of health units in the respective study arm which had the specified items.

6.1.5: External assessment of the implementation of birth plans

The extent to which the various building blocks of birth plans were discussed during initial ANC consultations in both intervention and control arms were also assessed (Table 6.1.6). The aim of this external assessment was twofold: to understand which

aspects of birth plans were particularly easy or difficult to implement, and by this explain the effectiveness results of the trial; to highlight if care elements in the intervention arm were also discussed at provider-attendees dialogues in the control health units. In addition, the assessment triangulated the data collection methods for better understanding of the trial implementation and effectiveness assessment. Overall, the intervention appears very well implemented in the intervention group, except for aspects of postnatal care. Most birth preparedness topics did not feature in the provider-attendees dialogue in the control health units, suggesting that in practice it was not part of routine ANC provided to women in this arm of the study.

As required by the intervention protocol, providers in the intervention health units reviewed the birth plans they had previously formulated with each individual woman during subsequent visits. This was done to check whether the plans were still as agreed previously or whether alterations were necessary because the woman had a change of view on some aspects. In addition, plans that had not been completed were discussed. Providers in both the intervention and control arms of the study consistently discussed with their clients on the meaning of the initial HIV test results and the effects of HIV/AIDS. In the control units, however, the discussions did not include skilled delivery attendance. The better counselling/health education performance by providers in the intervention arm of the study were limited to the intervention protocol elements only. Counselling on other topics recommended in the national focussed ANC guidelines was rarely implemented in both arms of the study (see Figure 3 below for the recommended topics).²⁸

Table 6.1.6: External assessment of the implementation of birth plans elements at initial ANC consultations in intervention and control arms

Intervention component	Intervention (n=8)	Control (n=8)
Discussion on the planned delivery site and importance of delivering at the available health units	8	1
Discussion on transport arrangement for normal delivery and for emergency	8	0
Discussion on emergency preparedness and complication readiness	8	0
Discussion on plans for saving money for service costs	8	0
Discussion on birth preference		
Information on danger signs in pregnancy, labour and delivery and post delivery	8	3
Discussion on someone to assist with household chores	8	0
Discussion on plans for someone to accompany the woman to the delivery site	8	0
Discussion for plans for possible blood donor(s)	8	0
*Consistent discussion on the importance of post natal care	5	0
*Inconsistent discussion on the importance of post natal care	3	1
Discussion on possible male partner involvement in the women’s ANC consultations	8	0
Information on the meaning of the expected date of delivery (EDD)	8	2
Information on clean and safe delivery	8	1
Information on good neonatal practices (newborn feeding, keeping newborn warm, cord care)	8	1

Note: Numbers indicate the number of health units in each study arm which the specified care element. *Consistent discussion meant that all women attending care initially and at subsequent visits underwent the discussion and inconsistent discussion was when only some underwent the discussion.

Figure 4: Focused antenatal care checklist for client education and counselling in Tanzania*

List name	Focused antenatal care checklist			
	1 st visit < 16 weeks	2 nd visit 20-24 weeks	3 rd visit 28-32 weeks	4 th visit 36 weeks
Process of pregnancy and its complications	✓	✓	✓	✓
Diet and nutrition	✓	✓	✓	✓
Rest and exercise in pregnancy	✓	✓	✓	✓
Personal hygiene	✓			
Danger signs in pregnancy	✓	✓	✓	✓
Use of drugs in pregnancy	✓	✓	✓	✓
Effects of STI/HIV/AIDS	✓	✓	✓	✓
Voluntary counselling and testing for HIV	✓			
Care of the breast and breast feeding	✓			
Symptoms/signs of labour			✓	✓
Plans of delivery (emergency preparedness, place of delivery, transportation, financial arrangements)	✓	✓	✓	✓
Plans for post partum care			✓	✓
Family planning			✓	✓
Harmful habits (e.g smoking, drug abuse, alcoholism)	✓	✓	✓	✓
Schedule for return visit	✓	✓	✓	✓

* From a Tanzanian ministry of health document titled “Focused Antenatal care, Malaria and Syphilis in Pregnancy. Orientation package for Service Providers” . Reproductive and Child Health Section (RCHS) Dar es salaam, Tanzania, 2002 pg 174.²⁸

6.2. Discussion

6.2.1. Intervention implementation: general overview

Overall, the intervention appears to have been implemented as per pre-defined protocol in the intervention group, and elements of the intervention were not routinely and consistently provided to women in the control arm. Any improvement in the primary outcome, therefore, can be attributed to the intervention. The intervention improved the providers-attendees interaction leading to the effective implementation of the trial. Although the findings from this study suggest that birth plan implementation is feasible in the current clinic settings, weaknesses in routine focussed ANC currently provided to women in the district need to be addressed. Notably, the limited time for the various steps of ANC consultation in the control arm; the fact that health education, advice and counselling may not be emphasized even after providers are trained in the focused ANC concept; and the lack of emphasis on the importance of early post natal care are missed opportunities to realize the full potential of focused antenatal care. In addition, the inability of providers to examine all newborns attending initial care is worrisome, as some serious but easily manageable neonatal conditions could have been missed through this practice.

6.2.2. Assessment of the intervention and routine ANC implementation

The average durations of the initial ANC consultation were 40 minutes in the intervention arm and 20 minutes in the control arm. The average visit duration in the intervention arm is similar to what is recommended in the new WHO ANC model⁸⁴ but slightly shorter than the 46 minutes reported by von Both et al, 2006 in Southern Tanzania³⁷. Providers and women in the intervention health units spent approximately 23 minutes for each of the following consultations vs 10.5 minutes in the control units. The duration in the intervention units compares favourably with the estimated 20 minutes in the WHO new model.

There were marked variations among study units in the two study arms in the time spent for both initial and revisit ANC consultation as well as for counselling and health education. Prevailing local factors at each health unit such as provider's competency with counselling on the various topics, attitude towards implementing the various topics, the level of literacy of the attendees and workload might have determined the time providers spent and possibly the quality of care women received. Earlier providers' admission that they viewed counselling/health education on PMTCT as more important

than skilled delivery attendance, and comments that Maasai women were unlikely to accept to deliver outside the home environment unless it is sanctioned by traditional leaders were indicative of provider's opinions towards skilled delivery care utilization by women in this district, and, possibly, might have influenced providers' attitude and practice in the control arm not to consistently promote skilled delivery care to antenatal women. In contrast, providers in the intervention arm were closely supervised and supported to provide the elements of the intervention, and, therefore, might have been more motivated than their counterparts in the control arm.

Some issues in this study are worth special attention for several reasons. Contrary to the recommendations in the Tanzanian national essential health intervention package¹⁴⁸ and the focused antenatal care guidelines,²⁸ women in this study were not counselled on many topics stipulated in the guidelines. Information and communication is an essential and basic element of ANC provision⁸¹, and women are satisfied with nurses taking enough time to explain or discuss health issues^{65 149}, yet evidence from previous studies suggests that health education and counselling is the least likely ANC consultation step to be implemented effectively in sub-Saharan Africa.^{37 80} Providers in the control arm of the study underwent one half day training in focused ANC concepts and implementation before the introduction of the intervention. This was in addition to the training they had previously received from various sources, including NGOs owning some health units and the government. Admittedly, according to both care providers and the district MCH coordinator, previous providers' training was not followed-up by systematic or support supervision to ensure that the skills gained are utilized. Possibly, providers lacked the motivation thereafter to implement their newly acquired competency. Supportive supervision and evaluation of the providers' skills and performances are essential for effective implementation of the new approach to ANC.¹⁵⁰ Inadequate skills to counsel women could be another explanation. Although providers may possess good knowledge of the health education and counselling topics, their competency and level of training in adult education techniques in health education and counselling during their midwifery or nursing training have previously been questioned²³. However, it is unlikely that providers possessed skills for counselling for HIV/AIDS and not for other topics in the national focused ANC guidelines.

Lack of time for clinic activities by lone MCH providers in busy facilities might explain the practice of skipping some counselling and health education topics during ANC

consultations. Arguably, the number of providers needs to be increased to cope with the high clinics' demand for more time for care provision. Having a MCH provider exclusively for ANC clinic services may be an option in the long term, but reorganizing health units' activities in such a way that MCH providers have more time and resources to run the ANC clinics may be the only pragmatic solution in the interim. Nevertheless, the number of women seen on each clinic day was generally low in this study, and lack of time cannot explain the pervasive skipping of most counselling and health education topics. Improved supervision and performance evaluation by health managers could help to understand this disconnection, and subsequently, suggest ways for improvement.¹⁵⁰ Probably, the better performance of providers in the intervention arm was largely due to the availability of well-defined goals in the form of birth plans that all providers were required to implement, and the regular supportive supervision they had from the research team. Including health education and counselling in midwifery and nursing training curricula would be a long term solution to equip prospective midwives and nurses with the necessary skills. Continuous education activities for providers will be another alternative to ensure that new skills are acquired and existing skills are maintained.

ANC attendance has traditionally been perceived as a woman's issue by all those involved, requiring little male involvement in the clinic setting. Focused ANC, on the other hand, acknowledges the role of gate keepers played by men in maternity care and actively encourages male partner involvement in ANC. Yet, dialogue on partner's involvement in ANC consultation did not feature prominently in the ANC consultation discussions in either the intervention or control health units. The finding is worrisome, as even knowledgeable women are likely to face difficulties in making informed decisions to seek professional care for delivery or when they develop life-threatening obstetric complications without the consent of their male partners who may be less conversant with the importance of seeking care in such situations. Evidence from the previous chapter suggests that even in the intervention health unit where male involvement was emphasized, just a third of males attended ANC with their partners and approximately two-thirds of women did not think it was necessary for men to attend, indicating a pervasive negative view to include males in what is perceived as a traditionally feminine matter.

Previous studies suggest that women's negative experience with care services, including abuse by care providers and fear of the health units' environment might prevent some women from seeking delivery care at health units^{58 59 124}, including failure to heed referral advice.⁷⁴ Ngorongoro offers an example of how communities and other stakeholders can be involved in ANC services. While the limited role of TBAs in reducing maternal mortality and possibly severe morbidity is well-documented, TBAs still play an important role in delivery care in many countries in Sub-Saharan Africa.¹⁵¹ The findings from this study, for example, suggest that approximately seven in ten women deliver under care of TBAs. Allowing TBAs to accompany pregnant women at ANC clinics helps to allay the apprehension that some pregnant women may have when seeking services and to build a sense of trust among providers, women and TBAs⁵⁸ and, thus, prevent rivalry among MCH care providers. This may facilitate a mutual understanding for the common goal of improving maternal and perinatal health. Equally encouraging is the participation of VHWs in some clinic activities and their role as lay health educators in their respective communities. Nevertheless, the benefits of such relationships will only be realized if the role of each group of providers is well-defined. For example, TBAs may be assisted with knowledge and resources to ensure clean deliveries to women who deliver at home as efforts are made to scale-up skilled delivery care in the country. In particular, the report that TBAs do not wear gloves when they assist women during delivery is worrying, as they are at risk of disease transmission. Also, TBAs could be asked to help convince families and communities of the need to seek immediate postnatal care when women deliver at home.

6.2.3. Assessment of the quality of ANC

This study revealed that some materials, drugs and services essential to functional maternity services were not always available. For example, only five out of eight of all health units in both the control and intervention arms had well-functioning blood pressure machines and iron; in addition, Aldomet tablets were in short supply. All health units with non-functioning blood pressure machines belonged to the government, and reportedly, the problem had been reported to the district health authority and plans were underway to replace them. Surprisingly, some units had stayed without functioning blood pressure machines for two months. Women with high blood pressure were likely to have been missed during ANC consultations occurring in that period, and

even when they were identified, the primary level health units could not give any first line drug to these women before they were transferred to the hospitals.

Systematic failure to keep essential drugs such as Aldomet or any parenteral hypertensive available in primary care level units indicates that most health units in this district are far from providing the core elements of basic emergency obstetric care. Although reliable data for the country is scarce, the finding in this study may be indicative of the countrywide low level of quality and availability of emergency obstetric care. In a study by Olsen et al (2005) on the availability, distribution and use of emergency obstetric care in six districts in northern Tanzania, only 5% of the 111 primary care health units surveyed provided all the core elements of basic emergency obstetric care, and one district had no dispensary or health centre that provided the six core elements.¹⁵²

The provider-attendees interaction in this study was largely good. Providers showed a high level of respect and compassion to their clients: they listened to them, gave them opportunities to ask questions about issues they did not understand and asked questions to ascertain if attendees understood some health education and counselling messages. Although similar findings have been reported in an urban setting in Tanzania,¹⁵³ most providers in this study were not native to the district, yet they were able to speak the local languages and needed interpreters only rarely. Furthermore, clinics opening hours were often flexible to accommodate the needs of the users. Such practices are likely to attract more users.

The almost universal failure to examine all newborns during the initial postnatal care attendance is worrisome. Providers in the intervention units rightly told all women the importance of postnatal care and indeed many more women in this arm of the study sought care within the first week of delivery on average, yet only mothers were often examined during the initial visits. Commonly, women seek initial postnatal care not only for their own benefits (postpartum care), but also for the benefits of their newborns (postnatal care)^{154 155}, and thus, both maternal and neonatal well-being should be a priority of care providers at initial and subsequent postnatal clinic visits.

6.2.4. Study limitations

The evaluation process of the trial implementation and routine ANC had limitations. Providers in both the intervention and control clinics knew that they were being assessed and could have modified their practice in the evaluator's presence. Specifically, providers in most intervention units had discussions on postnatal care with women during evaluation, but analysis of the initial data from reports by women attendees at initial interview suggests that the practice did not differ between the two arms of the study at the initial stage. In a study on the quality of ANC in Tanzania, Boller et al (2003) found that providers modified their conduct in the presence of a researcher by providing free ANC services to women who were usually told to pay for some ANC services.¹⁵³ In contrast, in an anthropological study in West central Tanzania, providers at one hospital abused women even in the presence of a passive research observer.⁵⁹ Similarly, in a study by Mathole et al (2005) in Zimbabwe, unfriendly interaction between caregivers and patients in which caregivers shouted at the waiting patients and even situations where patients were pushed away for not following health units' rules were observed by researchers.¹⁵⁶ All units in both the intervention and control clinics were similarly evaluated and, therefore, the influence of the observer on providers' conduct (if any) was distributed equally to the intervention and control arms. Furthermore, the observation of the other components of care such as providers' attitude to clinic attendee was conducted by people well known to the providers, and likely, reduced this effect. Nevertheless, Donabedian (2005), argues that measuring the effect of observation on practice remains an unresolved problem, and that habits of practice are difficult to hide to a keen observer.¹⁵⁷

Since the researcher was not blinded to the health units' allocation to the two study arms (whether in the intervention or control), his interpretation of the recorded findings might have been influenced by the knowledge of the arm of the study to which the health units were allocated, thereby introducing bias. To reduce this risk, the recorded materials were also reviewed by an experienced MCH nurse who was not aware of the health units' allocation to the two study arms, and the final interpretation of the recorded material depended on the consensus of the two.

The evaluation was not primarily designed to assess the quality of care other than the provider-attendees interaction and the availability of essential drugs and equipments and, therefore, cannot provide information on the quality of ANC in this setting in its

entirety. Evaluation of the steps of ANC consultations, for example, relied on the recorded provider-attendees interaction because the observation of providers examining women was judged to be too intrusive. The non verbal interaction was not primarily observed. Furthermore, evaluators did not assess the technical part of women's examination by providers, and, thus, the quality of this step cannot be commented on reliably. Triangulation of the data collection methods, however, allowed for some shortfalls in care provision to be highlighted. Notably, the review of purposely selected initial ANC consultations showed that most examination time was spent on explaining to women and people accompanying them the examination findings.

Ngorongoro is a remote and predominantly pastoralist district and care seeking behaviour is likely to differ from other districts in Tanzania. For example, care attendees trickling in to ANC clinics, and, thus, allowing providers to provide largely individualized care, may not be possible in other settings where the number of attendees is likely to be higher, and consequently, put more pressure on lone providers.

6.3. Conclusion

Despite some weaknesses in the health care system in the study district, the intervention was implemented as per protocol and, therefore, the results are reflective of the intervention. The results of this evaluation suggest that the implementation of birth plans during ANC consultations in the study and similar settings is feasible and acceptable to providers and women, although both technical and attitudinal improvements among providers may be required.

7. General discussion

7.1. Key Findings

The study was concerned with the design and testing of a birth plan intervention at health facility level to increase the utilization of delivery and postnatal care services in a rural district in northern Tanzania. It involved three chronological phases: formative research, randomized implementation and testing, and process evaluation.

Obstacles preventing women from utilizing the available delivery and postnatal care services were initially identified during the formative phase of the study. Identified factors for the low utilization of the available health care services for delivery in the district hinged on factors of the health system, and on the demand side. Notably, lack of qualified staff and infrastructure for delivery care in some units, providers' attitude on the need for skilled delivery care for all women, difficult geography and long distances to reach health units with delivery care services, and delivery care services not meeting the expectation of some women were mentioned as factors preventing the utilization of health facilities for delivery. Additionally, most women did not know the meaning of the expected date of delivery that was usually indicated on every woman's ANC card, and understood this as the date they would deliver. As a consequence, women would wait until around this date to seek delivery care, and those who developed labour earlier ended up delivering at home. Traditions and norms that home delivery is safe, women's lack of autonomy, obstetric procedures such as digital vaginal examination, genital tear repairs and c/sections which were perceived as unnecessary by some women, and occasional abuse of labouring women by providers in labour rooms at health units were also mentioned as possible deterrents. Antenatal dialogue on planning for birth and emergency complications was reported as not practiced by care providers, although ANC attendees and community members thought this had potential to improve the utilization of health units for delivery.

Identified weaknesses were addressed with care providers, data collection and intervention implementation tools like birth plans were improved by accommodating contextual factors. Providers were trained to effectively implement the intervention, including the need to promote skilled delivery care to all women and address misunderstandings on why some procedures are necessary to a woman in labour, during delivery and after delivery. Training tools were also developed to enable providers to establish effective dialogues on birth plan with individual women.

The intervention was packaged to be facility-based with ANC attendees, with the involvement of other maternal health stakeholders such as TBAs, VHWs and family members to test the effectiveness of antenatal birth plans in increasing skilled care for delivery and after delivery. Since antenatal birth plans are provided during routine ANC consultations, the level of intervention was necessary to produce evidence (or lack thereof) for the effectiveness of birth plans. Unlike many previous interventions to improve maternal and neonatal survival, the intervention lacked the wider community involvement, yet skilled delivery care improved by approximately 17% and postnatal care services utilization within a month of delivery by 30%. The findings suggest that improvement in the quality of ANC, especially on the provider-attendees interaction that fosters respect and trust, has the potential to increase the utilization of delivery and postnatal care at health units in this area. Nevertheless, the uptake of health facility delivery care of 34% in the intervention arm of the study is still lower than the national average of 47%.²⁹ Yet given the local environment amidst poor roads, predominantly semi-nomadic lifestyle and largely traditional communities that favour norms and traditions of home delivery, the improvement in utilizing health units for delivery is encouraging, and more could be achieved elsewhere with a better supportive environment for skilled delivery care.

Although records from care providers during birth plans formulation indicated that more than 90% of women in the intervention arm of the study made plans to deliver at the available health units, just 34% managed to do so, indicating that some obstacles may not be surmounted, birth plans formulation notwithstanding. Interestingly still, more than 90% of all women in the intervention reported to have made plans to deliver at health units during antenatal interview, yet less women reported so during postnatal interview, indicating a high level of reporting bias when postnatal women reports are the sole source of information of what plans were made during pregnancy. This occurred despite the fact that only about four months had elapsed from birth plan formulation to the second interview during which women were asked about what plans they had made while pregnant.

The intervention was largely implemented as per protocol. Overall, provider-attendee time for counselling, health education and promotion, including dialogue on birth plans increased in the intervention arm, although the increase was not reciprocated for

improved counselling, health education and promotion for other topics recommended in the focused ANC guidelines. Time for examination also increased for women in the intervention arm, but a review of randomly selected consultations revealed that significant time was spent to explain the examination findings to women and their accompanied TBAs, partners or relatives. Women did not want to hear the information alone, and where they were accompanied by someone else, they would insist that the person be informed too. The finding demonstrates the importance of encouraging women to be accompanied during ANC visits so that pregnancy-related counselling and health education messages on safe delivery are understood by women and their significant others.

Parallel to the national trend, most women initiate ANC after the fifth month of pregnancy, and many women still do not complete the recommended four ANC visits in the entire pregnancy. Dialogue on birth plans is an essential component of the national ANC guidelines, yet counselling, health education and promotion on preparing for birth was not widely practiced by care providers at ANC clinics. Instead, more efforts were focused on PMTCT for HIV, and apparently, providers receive better supportive supervision for the latter, and were more motivated to advise women on HIV/AIDS related issues than skilled delivery attendance. Providers' attitudes and practices on encouraging women to seek delivery care at the available health units is largely indifferent, and at times contribute to the wide belief that delivering in health units is only necessary for women identified with antenatal risks as this is the group often advised to seek such care. There is a need for PMTCT services to be well-integrated in routine ANC so that various ANC programs complement one another instead of the current situation where providers feel more obliged to implement some programs than others.

7.2. Study strengths

Some key strengths of this study are the 100% rate of follow-up of research participants which was achieved through a high level of collaborative efforts from all MNCH stakeholders in the district: providers at health units, in-charges of all health units involved in the study, women participants, TBAs, VHWs and the district health management team. Secondly, the intervention was implemented at the health facility level with minimal or no additional improvements in health units' infrastructure and number of personnel. Implicitly, the successful implementation of this study suggests

that even with limited resources, there is room for improvement of the quality of care available in Ngorongoro, and possibly, in similar settings in Tanzania. Thirdly, data collection methods were triangulated to complement methodological approaches to understand how the intervention was implemented and its impact. The study was also fairly unique in design and concept as a lot more could be achieved from interventions at facility level as opposed to community level.

7.3. Study limitations

The limitations of this study can broadly be divided into two categories: contextual and methodological.

7.3.1. Contextual

Ngorongoro is a rural, remote, sparsely populated and predominantly pastoralist district in northern Tanzania. The area is also largely protected as a wildlife zone, with both game parks and wildlife protected areas making peoples' mobility limited by geography and law. Subsequently, economic activities for most people are limited to pastoralism and tourism. Additionally, the majority of the population in the district are semi-nomadic pastoralists and still largely traditional with a poorly developed road network. Health seeking behaviour in such communities likely differs from other ethnic groups. The results of this study, therefore, may not be applicable to other communities with different social-cultural, geographical and economic background in Tanzania or elsewhere.

7.3.2. Methodological

Only 16 clusters (8 in each arm of the study) were available for this study. Such small number of clusters put restriction on the type of analysis available to estimate the intervention effectiveness to cluster level summaries, and did not allow for subgroup analysis. Additionally, estimation of effect modification could not be performed.

The primary and secondary outcome of interest in this study did not include other maternal outcomes such as maternal mortality and morbidity as well as perinatal or neonatal outcomes. Skilled delivery attendance is beneficial to both mothers and their babies, and inclusion of such outcomes would have strengthened the study. However, measuring maternal mortality with accuracy is difficult as it requires large sample sizes, substantial time and resources.¹⁵¹ Inclusion of these outcomes, therefore, would have

required more time and resources beyond the scope of my PhD study timeline and available resources. The choice of the secondary outcome of seeking postnatal care within one month of delivery corresponds to the recommendations for the optimal timing of postnatal visit made by the Tanzanian national guidelines for postnatal care. However, in retrospect, a health check one month post delivery might not be as beneficial as a check-up occurring within the first two days after birth, when most maternal deaths occur^{34 151} and delivery-related neonatal complications can be identified and managed appropriately.³⁴ Nevertheless, most women in Ngorongoro still sought postnatal care six weeks after delivery and beyond, and changing this practice within a short time in view of the short study timelines (six months) would have not provided enough time to change the routine practice among providers to advise women to seek care earlier and for women attendees to adopt the new advice.

Only perceived quality of care was assessed in detail and less so the technical component, and thus, largely relied on women's expectations from the health services and their opinions on the services offered. This may not reflect the technical quality of care as might have been objectively verified by an independent or neutral evaluator. Health units in both the intervention and control arm units lacked essential elements for quality care like blood pressure measuring machines and urine of many women was not checked, yet women were highly satisfied with the care they received. Nevertheless, for antenatal and delivery care to attract many users and, thus, be effectively utilized as health services, they must meet the expectations, accepted social and cultural norms of the recipient community. The choice of the perceived component of the quality of care was, therefore, appropriate in the study context.

The effectiveness of the intervention was assessed three to five months from women's recruitment. Few interventions have assessed the effectiveness of antenatal birth plans intervention to increase skilled attendance at delivery and postpartum in routine antenatal care setting^{21 132} and, as a result, information on the appropriate time from intervention to effectiveness evaluation is scarce. In theory, the longer the providers are exposed to the health education, counselling or health promotion, the higher is the likelihood that they perform better. Behavioural antenatal interventions for various postpartum outcomes in routine postnatal schedule, however, have been tried with contrasting results.¹⁵⁸⁻¹⁶² Nevertheless, it may be possible that different results for the primary outcome of interest would have been obtained if providers in the intervention

had been subjected to the intervention longer, thus allowing for the effectiveness evaluation of the primary outcome to be done relatively later. Habicht et al, (1999)¹⁶³, suggest a time of not less than 3-5 years for an intervention to show any impact, while Ronsmans, (2001)¹⁶⁴, suggests that longer periods may be necessary for increasing women's use of emergency obstetric care.

Birth preparedness and complication readiness programs are based on the premise that preparing for birth and being ready for complications reduces the three main delays in receiving maternal and neonatal care: delays in seeking care, delays in reaching care and delays in receiving care.² Life-threatening delays, however, are many and only interventions that involve all levels: the individual woman, her family and community, care providers, health facilities and policy makers are likely to address all the three delays adequately.² Nevertheless, the results of this study on the improvement of the proportional utilization of health units for delivery and for postnatal care within one month of delivery are encouraging, and might be an important initial step to improve women's utilization of health facilities for delivery and the well-being of their newborns.

A cost-effectiveness analysis was not planned for this study. As a result, cost effectiveness of the intervention is not reported. Information on the cost of implementing health programs is important for prioritizing resource allocation, especially in developing countries where resources are often limited. This issue will be addressed in subsequent work in Tanzania with reasonably larger sample size in more than one district to document further the intervention effectiveness.

Although the primary outcome of delivering in health units and the secondary outcome of seeking postnatal care within one month of delivery were objectively verified from health units records, many women delivered at home and other equally important pregnancy-related information such as the mode of delivery and whether the baby was stillborn or a neonatal death were obtained from women reports. In addition, TBAs and providers at health units corroborated the results. Although women's report of the mode of delivery has been found in other settings to be fairly reliable¹⁶⁵, to our knowledge, no such information existed for the study population or Tanzania. There is no reason to believe that a woman, her TBA or care providers would report that she had a stillbirth or neonatal birth when in fact the baby was alive. Furthermore, the finding of no maternal

death or C/S is surprising. All women were interviewed postpartum, but some before the six weeks. Some women might have died thereafter. Also, it might have happened that some women underwent C/S and the hospitals did not record them. It is unlikely, however, that TBAs would not know of such women, and interviewers who were also from the same villages as the women would not know either in these socially knit rural populations.

7.4. Implication for focused ANC implementation policy and future research

Findings from this study highlight important issues with policy implication regarding focused ANC implementation in the study district, in other parts of Tanzania or elsewhere. Previous training of ANC providers on counselling, health education and promotion on various topics stipulated in the focused ANC guidelines was not reflected in their attitude and routine practice in the district facilities. Notably, supervision and evaluation of the providers' counselling skills appear inexistent for birth plans, and as a result, counselling for safe delivery was not widely practiced. Unless measures are taken at district and national level to address shortcomings in ANC counselling, health education and promotion, ANC attendance will remain a missed opportunity to improve maternal survival in this and similar settings in Tanzania and other parts of sub-Saharan Africa. The noted widespread lack of emphasis on counselling, health education and promotion on various important maternal and neonatal survival-related topics in Tanzania^{36 37}, and indeed in the entire sub-Saharan Africa¹⁷ is worrisome. Providers might be overburdened by clinic workloads such that only priority activities are implemented, but providers' skills in counselling and health education skills might be inadequate. As mentioned previously, improving midwifery training to include counselling and health education and continuous education to all practising midwives may equip providers with the necessary skills. Training and employing more midwives will address the heavy workloads at ANC clinics, but the reasons for the widespread lack of emphasis on health education and counselling women for important pregnancy-related issues remains largely unknown.¹⁷ More studies are needed on this topic in order to understand the reasons behind this, and to effectively address all the shortfalls in counselling, health education and promotion in sub-Saharan African countries.

The potential of ANC as a strategy to reduce maternal and neonatal deaths will remain untapped if focused antenatal care continues to be implemented erratically in many developing countries. The focused ANC package was introduced in Tanzania in 2002,²⁸

although widespread adaptation in some districts commenced some years later. Antenatal care is assumed to commence before 16 weeks gestation²⁸, but over 80% of all women initiate ANC beyond this time, with the median gestation age at initial ANC attendance at around 5.4 months.²⁹ For uncomplicated pregnancy, women are advised to attend ANC four times, initially before 16 weeks (preferably in the first trimester), followed by subsequent visits at 20-24 weeks, 28-32 weeks and the fourth visit at 36 weeks.²⁸ As already highlighted in the previous chapters, initiation of ANC in the study district parallels the national average. In practice, women who initiate ANC late are unlikely to complete the recommended four ANC visits for effective ANC^{28 84} and, therefore, less likely to benefit fully from the ANC package, including health education and counselling on important topics. Furthermore, evidence from some parts of Tanzania suggests that pregnant mothers are hardly examined or asked about their well-being, indicating that physical wellbeing and support for parenting is not part of the routine care provided to women.¹⁶⁶ There is a need, therefore, for a wider assessment to understand why most women prefer to initiate ANC late and providers fail to implement all the elements of focused ANC so that appropriate solutions are taken. Providers need to be aware of the benefits of the recommended care package, and more importantly, possess the required skills and resources to implement the care package fully. Additionally, evidence from this and a previous study in Tanzania³⁷ suggests that focused ANC consultations take longer than in the previous care, and this poses a challenge to many providers in busy clinics who are struggling to cope with a large number of clinic attendees. Although group counselling may be an option for some topics, other subjects such as plans for delivery are likely to differ from one woman to another. Women's lack of decision making and the fact that some issues may be perceived as too private to be shared in group discussions complicates the situation further, compelling providers to approach couples individually rather than in groups if quality ANC is the priority. But clinics in public health units in most poor countries lack essential structures for quality maternal health care, are understaffed, and have poorly motivated personnel.¹³¹ To improve the quality of care women receive in these clinics requires significant improvement in the health systems which are far ranging (such as better paid staff, availability of rooms for quality care, including visual and auditory privacy, equipments and drugs), a challenge in most countries with weak health care systems, including Tanzania.

The implications of current providers' practices during ANC consultations for the wider implementation of ANC as an integrated package to improve maternal, neonatal and child health in this setting, as well as more generally in Tanzania and elsewhere is worrying. The study found that information, health education and counselling on HIV/AIDS took precedence over all other activities and, apparently, more or less in isolation or in total disregard of other equally important topics highlighted in the focused ANC guidelines for Tanzania. Many programs are currently integrated into ANC in most developing countries and, as a result, ANC has become an important link to vertical programs such as STIs control, malaria prophylaxis and treatment, tetanus elimination and HIV/AIDS screening. However, the results from this study suggest that the integration of such programs into other equally important routine ANC activities, including counselling for skilled delivery attendance is weak. The integration of PMTCT into routine ANC needs to be reviewed and strategies developed to ensure that PMTCT functions as an integral part of routine ANC services. Equally, important will be designing ANC strategies that attract more male participation in routine ANC activities so that they understand the need for skilled delivery care and supporting women during pregnancy, delivery and postpartum for better maternal and neonatal outcome. PMTCT provides an opportunity for increased male involvement. But evidence from this study suggests that few men accompany women during ANC consultations, and women still feel that ANC attendance is an exclusively women's affair.

Providers might lose the initial excitement of implementing the birth plans and go back to the routine practice. The sustainability of the study efforts will only be possible if the district MCH team and the care providers at health units maintain the close relationship to ensure that formulation and implementation of birth plans are part of the routine care to all women. Unfortunately, routine supportive supervision on birth plans implementation and providers performance is nonexistent, and the routine schedule of visiting health units once every after three months may not provide enough time to assess birth plans implementation and providers' performances. Subsequently, sustaining the achievement recorded in this study will require strengthening of the capacity of the district MCH team in terms of capacity to provide supportive supervision and evaluate performance of all MCH providers regularly.

The intervention was of a small scale in a health facility setting. Large scale RCT interventions in similar or other settings in Africa are needed to provide robust evidence for the effectiveness of birth plans as a safe motherhood strategy. Specifically in the context of this study, the study findings will be disseminated in the study district and countrywide in order to build a consensus on effective implementation of the birth plans. A broader dissemination will also be done through publications of the study findings in various journals and through appropriate international MCH forums. Based on the experience of this study, a larger cluster RCT proposal will be developed to include more clusters in two or more districts to test the effectiveness of the intervention further. More maternal outcomes than in this study as well as neonatal outcomes will be included.

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RESEARCH ARTICLE

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High ANC coverage and low skilled attendance in a rural Tanzanian district: a case for implementing a birth plan intervention

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Abstract

Background: In Tanzania, more than 90% of all pregnant women attend antenatal care at least once and approximately 62% four times or more, yet less than five in ten receive skilled delivery care at available health units. We conducted a qualitative study in Ngorongoro district, Northern Tanzania, in order to gain an understanding of the health systems and socio-cultural factors underlying this divergent pattern of high use of antenatal services and low use of skilled delivery care. Specifically, the study examined beliefs and behaviors related to antenatal, labor, delivery and postnatal care among the Maasai and Watemi ethnic groups. The perspectives of health care providers and traditional birth attendants on childbirth and the factors determining where women deliver were also investigated.

Methods: Twelve key informant interviews and fifteen focus group discussions were held with Maasai and Watemi women, traditional birth attendants, health care providers, and community members. Principles of the grounded theory approach were used to elicit and assess the various perspectives of each group of participants interviewed.

Results: The Maasai and Watemi women's preferences for a home birth and lack of planning for delivery are reinforced by the failure of health care providers to consistently communicate the importance of skilled delivery and immediate post-partum care for all women during routine antenatal visits. Husbands typically serve as gatekeepers of women's reproductive health in the two groups - including decisions about where they will deliver - yet they are rarely encouraged to attend antenatal sessions. While husbands are encouraged to participate in programs to prevent maternal-to-child transmission of HIV, messages about the importance of skilled delivery care for all women are not given emphasis.

Conclusions: Increasing coverage of skilled delivery care and achieving the full implementation of Tanzania's Focused Antenatal Care Package in Ngorongoro depends upon improved training and monitoring of health care providers, and greater family participation in antenatal care visits.

Background

Three core health sector strategies are identified within the maternal health community as critical for reducing maternal and early neonatal deaths. These include comprehensive reproductive health care; skilled care for all pregnant women, especially during delivery; and emergency obstetric care for all women and infants with life-threatening complications [1]. Political commitment to maternal and newborn health has historically been low,

however, and most women in developing countries do not receive these recommended aspects of care. Maternal mortality remains high in the developing world and contrasts sharply with the low levels of maternal mortality in developed countries. Comparison of the lifetime risk of maternal death in industrialized countries (1 in 8000) versus in Sub-Saharan Africa (1 in 22) and Asia (1 in 59) presents a particularly stark picture of persisting global disparities in maternal health [2]. Addressing these inequities by increasing women's access to reproductive health services-including skilled and emergency care at delivery-must be a global priority, particularly if

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the world is to achieve Millennium Development Goal 5 (MDG 5) (improve maternal health).

Antenatal care (ANC) visits constitute one of the few times women in many resource-poor settings seek care for their own health [3], and, represent an important opportunity to help women best prepare for birth, as well as inform them about pregnancy-related complications, and the advantages of skilled delivery care [4,5]. Several studies show that women who attend ANC are more likely to seek skilled delivery care [6-9]. Nevertheless, at least 20% of all women who attend ANC four times or more in sub-Saharan African and in Asian countries do not seek skilled delivery attendance [8]. Efforts to understand the complex factors underlying this discrepant pattern between high utilization of antenatal care and low use of skilled birth attendance in these two regions where over 85% of all maternal deaths occur must be undertaken [10,11]. These efforts should include investigation into how antenatal care services can be used to promote skilled delivery care and effective management of obstetric complications.

Three delays contribute to the high maternal mortality in developing countries: delay in seeking care, delay in reaching care and delay in receiving care [12]). Overcoming these delays requires interventions at both the supply and demand sides of health provision [13]. Birth preparedness and complication readiness are promoted to reduce these delays so that women with pregnancy-related life threatening complication receive appropriate care promptly [14]. Although the risk-based approach in ANC has not been proven reliable in predicting women likely to develop life threatening conditions, pregnant women are motivated to decrease the risk to their unborn babies [15].

Tanzania is a sub-Saharan African country characterized by very high maternal mortality (MMR is 578 per 100,000 live births), high coverage of ANC (over 90% attend at least one ANC visit and approximately 62% attend four or more visits), and low coverage of skilled delivery and immediate postpartum care (43% and 13% respectively) [16]. At the time of this study (2007 and 2008), antenatal, delivery and post-natal care in Tanzania were free or highly subsidized. Tanzania's Focused Antenatal Care Package based on the World Health Organization's (WHO) new ANC model was introduced in 2002 [17]. Recent evidence showing that the orientation package is available in only one third of health units indicates slow progress in the implementation of the new package [18]. An important element of this package is counselling on birth preparedness and complication readiness. However, an observational time-motion study in Tanzania found that the average time spent on counselling during ANC visits falls far short of estimated time requirements to cover essential topics

[19]. Thus, it appears ANC is currently underutilized as an opportunity to encourage health seeking of skilled delivery care.

A key aim of this exploratory study was to gain an understanding of the socio-cultural and health systems factors influencing women's decisions to seek antenatal, skilled delivery and immediate post-partum care in Ngorongoro, a rural district in Northern Tanzania. Examining the barriers and facilitating factors women experience to accessing these reproductive health services is an important first step towards identifying appropriate interventions to introduce in the study area to increase use of skilled delivery and immediate post-partum care. Maternal health conditions in Ngorongoro reflect the national pattern. The MMR among antenatal attendees is estimated at 642 maternal deaths per 100,000 live births (CI 329;955) [Johnson et al, 2005 unpublished-with permission]. Antenatal clinic attendance in Ngorongoro is over 90% while only 7% of women receive skilled delivery care. Coverage of postnatal care six to eight weeks after delivery is almost universal but receipt of immediate postnatal care is rare. The Focused Antenatal Care Package has not been widely implemented.

Methods

Study site

The study was conducted from October 2007 to May 2008 in Ngorongoro, one of six districts in the Arusha region, Northern Tanzania. Ngorongoro has 21 health units (two hospitals, 19 dispensaries) [Ngorongoro district annual health report, 2005-with permission]. All except six (the two hospitals and four dispensaries) are government owned. The two hospitals offer comprehensive emergency obstetric care while the dispensaries offer basic emergency obstetric care. The hospitals operate an extensive network of mobile health clinics to deliver services to remote areas. In addition, they have maternal waiting wings where women from remote villages can stay prior to labour onset. Since very few women deliver at these hospitals, these wings are rarely used. The dispensaries are connected to the hospitals and district health headquarters by radio communication, although mobile phones are replacing the radio linkages. In emergencies, patients are transported to the hospitals by ambulances or plane for free or at nominal cost. Nine health units were selected for the study (both hospitals and seven randomly selected dispensaries). Study participants were selected from these units and their catchment areas. Antenatal, delivery, postnatal and care for children under-five years of age were free at all selected units except one dispensary where women paid approximately 2US\$ for delivery care.

Ngorongoro includes three administrative divisions - Ngorongoro, Loliondo, and Salei - composed of wards with approximately 6 villages each. Ngorongoro and Loliondo are populated predominately by Maasai (80% of the total district population) and the Watemi ethnic group (18% of the total district population) occupy part of Salei. The Maasai are primarily pastoralists and the Watemi are small scale agriculturalists. According to the 2002 Tanzania National Census, the population of Ngorongoro was 129,776 of which 29,499 were women in the reproductive age group [20]. Using the national crude birth rate of 44.8 per 1,000 population for rural Tanzania [16] and the district population estimate of at least 140,625 in 2006 (personal communication with district planning department), about 6,300 deliveries occur in the district each year.

Sample Selection

Study participants were purposively selected to ensure adequate representation of the Maasai and Watemi ethnic groups and all key stakeholders in maternal health in Ngorongoro district. This sampling strategy enabled us to explore women's decision making process about where to deliver, and the perspectives on pregnancy and childbirth of health care providers and Maasai and Watemi community members. Examining the perspective of health care providers was of particular importance because the culture of biomedicine has been recognized as key to the transmission of stigma, the incorporation of racial bias in institutions, and the entrenchment of health disparities across minority groups [21].

The Maasai and Watemi in Ngorongoro are tightly knit communities and speaking about sensitive issues with strangers may not elicit detailed responses (MM personal experience). Thus, people acquainted with one another were recruited for the FGDs as recommended under such circumstances [22].

Users of antenatal, delivery, and post-delivery care were invited to participate in focus group discussions (FGD) during unannounced visits to the MCH clinics. Six were women who had previously delivered in health units. Lists of all practicing Maasai TBAs in the surrounding catchment areas were obtained from the health units. The 36 total TBAs invited to participate in the FGDs were divided into three groups (one group of 8 corresponding to the areas served by the dispensaries, and two groups of 12 and 16 serving the two hospitals). Watemi TBAs play a very limited role in antenatal, labour and delivery care and were purposely excluded. MM (principle investigator and previously was a practicing obstetrician in the area) obtained lists of all elected elders from the ward offices. A maximum of 16 Elders from the wards in each of the three divisions were invited to participate in the FGDs.

The key informant interview participants included 2 women with previous experience with antenatal and delivery care services in the district who were recruited during a hospital outreach visit, their husbands, 2 women admitted to the hospitals (one for pregnancy related complications and another for delivery related complications), 2 traditional leaders, the district MCH coordinator, one prominent Maasai TBA, and senior Elder males from the two ethnic communities (2). All key informants were interviewed once except the TBA and the district MCH coordinator who were interviewed twice to clarify discrepancies that surfaced during data collection.

Data collection

Data were collected through focus group discussions (FGDs), key informant interviews, and participant observation. MM observed and participated in the provision of care provided at antenatal clinics (six clinic days observed) and in the labour and delivery rooms of the two hospitals and one dispensary (four deliveries observed). All observations were recorded on the same day in a field diary.

15 FGDs were conducted involving a total of 160 participants: three FGDs with care providers at the health units (total of 18 providers); six FGDs with women seeking antenatal, delivery and post-delivery care at these health units (total of 66 women); three FGDs with TBAs (total of 36 TBAs); and three FGDs with Elders (total 40 men). All care providers except three were trained to the level of nurse midwife and 17 of the 18 were women.

A group of 6-16 participants formed a single focus group. FGDs were conducted by trained Maasai and Watemi facilitators in the Ma, Kitemi, or Kiswahili languages. The discussions were audio-taped using a digital voice recorder and a trained sociologist noted all non-verbal communications. Separate FGDs for men and women were held under a tree at sites chosen by the participants, emulating communal gatherings in the two ethnic groups. Holding discussions outside the health units also enabled participants to speak more freely about their perceptions of available professional care. FGDs with care providers were held at health units.

MM conducted the key informant interviews in Ma, Kitemi or Kiswahili. Semi-structured interview guides were used for both FGDs and key informant interviews and were initially pre-tested for cultural relevance in the communities surrounding the participating health units. This approach allowed us to guide the discussions around key topics related to pregnancy and childbirth without imposing a set of beliefs on participants. The main topics covered included reasons for seeking antenatal, delivery and post natal care; the decision-

making process for accessing antenatal, skilled delivery and postnatal care; perceptions of the quality of antenatal, delivery and postnatal care at available health units; perspectives on planning for birth and emergencies; and the factors underlying the pattern of almost universal coverage of antenatal care services but low utilization of skilled delivery care. Relevant issues surrounding the uptake of Focused Antenatal Care and Prevention of Mother-To-Child Transmission (PMTCT) programs in the district were also explored.

Data analysis

All FGDs and key informant interviews were transcribed and translated into English by two investigators fluent in Ma, English, Kitemi, and Kiswahili. Where there was no consensus, the investigators reviewed the transcriptions and original recordings until agreement was reached. The transcripts were entered into Microsoft Word and coded using principles of the grounded theory approach [23]. Specifically, the coding process involved identifying major themes in each of the transcripts. During data analysis, identified themes were compared across the transcripts to determine differences and similarities in the perspectives of the study participants on childbirth and the factors influencing women's decisions to seek skilled delivery care. The focus group discussions provided us with information on normative views on childbirth and care seeking behaviours operative in the two ethnic communities and among health care providers. The key informant interviews complemented this information by allowing us to explore in more detail individual experiences with reproductive health care services in Ngorongoro.

The process of triangulation was used to validate the findings and involved comparing the identified themes from the FGDs and key informant interview transcripts with the participant observations [24]. Discrepant findings between the observations and the transcripts were addressed by follow-up informal discussions with care providers.

Ethical approval was obtained from the Institutional Review Boards of the World Health Organization, London School of Hygiene and Tropical Medicine, and the National Institute for Medical Research in Tanzania. Permission was also granted from Arusha region and Ngorongoro district administrative and health authorities, staff at participating health units, and traditional leaders in Ngorongoro district. Informed consent was obtained from all participants.

Results

The results are organized into four dimensions of obstetric care: antenatal, labour and delivery, emergency, and postnatal care. Within each category, major themes related to the factors influencing women's ability to

access care and community perceptions of the quality of available care are presented. Health care provider perspectives on these issues and key findings on PMTCT programs are also shown.

Antenatal Care

Perceptions of the need for professional care and quality of available care

Antenatal care is highly regarded in both communities, the quality of available care is considered good and most women feel obligated to attend. Regular ANC attendance is believed to guarantee healthier pregnancies and uneventful deliveries, and women who miss visits are considered at risk of poor pregnancy outcomes. Reasons given for high ANC attendance include: perceived health benefits to women and their unborn babies from receiving periodic examinations, vaccinations, and treatment for detected diseases; reassurance of the pregnant woman's wellbeing; referral of women with problems to hospitals for needed care; receipt of antenatal clinic attendance cards that guarantee free health care; and assistance with transport to reach health units for delivery.

Care providers interviewed reported that the ANC services they deliver meet the needs of most of their patients, and that they fully inform women of the benefits the care offers. Providers noted that effective treatment of diseases such as syphilis and the provision of preventive drugs for anaemia and malaria convinces women of the value of ANC, and fosters a sense of trust which encourages them to return for additional visits. Occasional drug and vaccine stock-outs, language barriers preventing effective communication with patients, poor communication with the district health headquarters, and the remoteness of women's residences from health units were mentioned as factors impeding their ability to consistently deliver quality ANC services.

"Most women come to ANC clinics because they have confidence in the benefits of the services. For example, women know the benefits of various vaccinations and will demand them even when it is not appropriate to receive them. It is not uncommon to see a woman complaining why she has not been vaccinated against tetanus even when her gestational age does not qualify her. They also like the drugs given during antenatal clinic visits." [Service Provider FGD]

"Benefits of ANC are well-recognized in our community. For example, a woman who has been losing pregnancies may come to the clinic seeking assistance and after screening, a provider discovers that she has syphilis. If treatment is provided and she manages to carry successful subsequent pregnancies, she will believe in the services. Such women are many in Maasailand." [Service Provider FGD]

ANC and women's Empowerment

The women interviewed described ANC visits as beneficial for their health, and a rare opportunity to leave their households and exert control over their pregnancies. Although Maasai and Watemi women usually require permission from husbands to leave their households, they do not typically need permission from their husbands to attend ANC clinics. Only women married to older and relatively less educated husbands reported needing such permission.

"This clinic has given us power. We meet and discuss many issues and our husbands are supportive. For example, recently the examination house was damaged and we met here on a non-clinic day and decided to contribute money to repair it. It was repaired in one week and now it is OK. If we have a serious problem we send the village health worker to the village elders' meeting and her opinions are honoured." [Mtemi mother FGD]

"No; we do not need permission from anyone. Most men are motivated to assist us to attend clinics. They want us all to attend." [Maasai pregnant woman FGD]

TBAs

The role of TBAs differs between the two ethnic groups. TBAs are an integral part of a Maasai woman's care during pregnancy, labour, and delivery. Maasai TBAs commonly accompany women to antenatal clinics, examine women at home, and refer them to health units for care if they identify a potential problem. TBAs in the Watemi community are only used in emergency situations when quick transport to health units is not possible during labour and delivery.

Health care providers expressed concerns that Maasai TBAs may dissuade women from delivering at health units for the following reasons: 1) Maasai women's faith in TBAs to refer them to health clinics when necessary if complications occur during labour or delivery, 2) Maasai women's practice of seeking TBA approval before heeding referrals, and 3) admission by some TBAs that they would lose status and the gifts they receive from attending deliveries if all women opt to deliver at health units. All key informants, TBAs and Elders interviewed explained that decision on place of delivery depends primarily on family (especially the husband's) preferences. They noted that TBAs are willing to encourage all women to deliver at health units.

Labour and Delivery Care

Most women in Ngorongoro deliver at home assisted by TBAs (Maasai) or other female relatives and

neighbours (Watemi). As soon as labour begins, women contact their TBA or female relatives who stay with them through labour and up to five days post-partum.

"We are always there in labour up to a few days after delivery to take care of both the mothers and the babies and we decide on what they should eat and do" [Maasai TBA-Key Informant]

Delivery care at health units is usually sought as a last resort after serious complications have developed. Barriers identified as detracting from women's ability to access skilled delivery and emergency obstetric care include: 1) distance from health units 2) lack of reliable and affordable transport 3) lack of advanced planning for accessing delivery care units 4) widely held beliefs that pregnancies labelled as 'normal' during ANC visits will result in successful deliveries at home 5) failure of providers to convey information about the importance of skilled delivery care for all women, and 6) women's low social status and inability to independently make labour and delivery decisions. These factors are discussed in more detail below.

Barriers to access skilled delivery care - planning in advance, transportation and cost issues

The women, husbands, TBAs, and Elders interviewed agreed that the largest obstacle to receiving skilled and emergency obstetric care is failure to plan in advance for transport. Planning in advance for delivery is not part of traditional practice in the two communities where home delivery is the norm. For most Maasai and other women living in remote villages, transport to health units for delivery or emergency obstetrical care is unreliable and unaffordable. Transport costs are not as prohibitive for Watemi women who have more financial security.

"Home delivery occurs because we do not plan for transport to the nearby health units in advance. I believe if we can plan in advance, we will be able to travel to health units before the onset of labour pain (uchungu)." [Recently delivered Mtemi FGD]

"Transport costs are not much unless you hire a car in case of emergency. The usual cost is five thousand shillings (~4USD). This is less than the price of a tin of beans (5 L tin). We all have farms and delivery at health units is free." [Mtemi woman FGD]

The interviews showed that most community members are aware that obstetric and child care services are free or highly subsidized. Thus, perceived costs of

services are not likely a major barrier to seeking skilled delivery care in the study area.

"It is well known that health unit delivery at Wasso hospital is free and at Digodigo health centre we pay a token of three thousand shillings (~USD 2.5) for everything. Money is not a problem anymore; thanks to our government." [Mtemi woman FGD]

The discussions with community members and observations of care provided at the ANC clinics showed that health care providers are not consistently counselling women on the importance of making transport arrangements and planning in advance for delivery. One specific communication problem mentioned was providers' failure to inform women about the meaning of the expected date of delivery. Women in the two communities are interpreting the date listed on their antenatal cards as their actual delivery date and are waiting until this time to make delivery plans. As a result, women who start labour before their expected delivery date often end up delivering at home even if they expressed interest in delivering in health care facilities.

Barriers to seeking skilled delivery care - Social roles

The Elders and TBAs explained that children in both ethnic groups are cared for by other relatives or neighbours in the mother's absence, and co-wives are expected to assist each other when necessary. These supportive practices, however, do not offset women's perceptions of the opportunity costs of delivering at health units. The need to resume household responsibilities soon after delivery was mentioned as a key reason women opt to deliver at home.

"We [women] work too hard to care for our families even when we are pregnant to think of leaving our houses unattended to seek delivery care at health units." [pregnant Mtemi FGD]

"You know what, Watemi women are the workforces for their husbands. We look after cattle and farms. It can happen that you start labour when you're away from home taking care of your husband's cattle and end up delivering in the bush. When you come back home with the baby, this is seen as normal and there is usually nobody to assist you with household chores unless someone from your home comes to assist." [pregnant Mtemi FGD]

Husbands typically decide on place of delivery in both ethnic communities, although the expressed preferences of Watemi women are beginning to be respected. Most Maasai women will only leave their households during labour after being granted permission by their husbands

or developing a serious complication.

"It is our decision as women. Men may have a say but finally our preferences are respected." [Mtemi FGD]

"How can you leave your household and you go to a health unit to deliver without your husband's consent? He is the one who pays for the costs." [Maasai FGD]

Health care providers interviewed noted that Maasai and Watemi families will not readily accept the need for skilled delivery care without the approval of traditional leaders.

"...traditional leaders are very powerful in this district such that whatever they say is automatically binding. Unless they are involved in convincing the community that health unit delivery is good, we will not succeed in having more women come to deliver at health units." [Service provider]

The normal and the natural: Who should deliver in health units?

Perceptions about the 'naturalness' and safety of home delivery is an obstacle to convincing women in the two ethnic groups of the importance of skilled delivery care in all cases. Although the women, TBAs and Elders from both communities expressed awareness of the potential risks of delivering at home, they stressed that delivering at health units is beneficial only for women with known complications. Women with "normal" pregnancies – defined by the women participants as those with no problems or risk factors identified at ANC visits – are expected to be able to deliver without incident at home.

"Most women do not have problems so they prefer to deliver at home. The few women with problems try to deliver at health units." [Maasai pregnant woman FGD]

"Most women deliver at home because we are Maasai. Our mothers did so before us. We're just doing what others did." [Maasai pregnant woman FGD]

Providers interviewed agreed that most women attend ANC visits for reassurance that their pregnancies are "normal" so that they can deliver at home. Providers reinforce this pattern of behaviour by advising only pregnant women with identified risks to deliver at health units. The information that all pregnancies carry risks and that labour complications are often unpredictable is inconsistently communicated to women during routine

ANC. The providers interviewed cited heavy workloads as the main reason for insufficient dialogue on the importance of skilled delivery care.

"If health unit delivery was that much important, why is it that our providers fail to tell us so? We attend ANC well but they do not tell us. I'm eight months pregnant and I've attended ANC three times so far. Nobody has talked to me to deliver at any health unit." [Pregnant Maasai FGD]

"If indeed we're risking our lives with home delivery, I've a complaint to make; why is it that our providers fail to tell us this information? We hardly have time for thorough discussion on such issues. TBAs, on the other hand tell us to go to health units when problems have already developed. It may be too late for some." [Recently delivered Maasai FGD]

A minority of women in the focus group discussions commented that problems experienced during labour and delivery among women with normal pregnancy histories would occur equally to those delivering at home or at health units. They claimed that only 'God' can protect women from a maternal death. These sentiments are rooted in traditional beliefs in both communities about pregnancy complications and maternal death as punishment for past transgressions:

"In the past, serious and life threatening delivery complications were blamed on women's marital infidelities before or during pregnancy and complications were thought to be curses from elders and thus divine punishments upon women. Unless such women confessed to adulterous relationships to their delivery attendants, it was believed that they would die together with their attendants. All women who died during childbirth were believed to have committed adultery and brought shame to their families. To make sure that such secrets were not confided to other people, more and more women delivered with assistance from their own mothers to whom they would make confessions, and even when both had to die, it was seen as more preferable than dying with TBAs who were often of no blood relationship to the pregnant women, and thus confining TBAs to a lesser role. Over the years, the role of mothers have declined too because many women who develop problems and send to hospitals survive, the curses notwithstanding." [Mtemi elder FGD]

Communication barriers to seeking skilled delivery care
Community members interpret instances when health care providers at dispensaries fail to manage difficult

cases as proof that such units are not suitable places to seek delivery care. Consequently, some participants mentioned that they would advise women to bypass nearby dispensaries and go directly to hospitals.

"You know we do not trust our dispensary because they [providers] often fail to manage some conditions and refer them to the district hospital. Most of us would like to deliver at the district hospital where all conditions can be managed." [pregnant Mtemi FGD]

The majority of women interviewed expressed concerns about specific routine and life saving procedures conducted by health care providers during labour, delivery and immediately postpartum. Maasai women perceive digital vaginal examinations performed at health units as painful, likely to damage the baby, and a cause of labour retraction. Some Watemi women and men described digital examinations performed by male providers as dehumanizing. In contrast, Maasai women felt that TBAs perform digital vaginal examinations gently and only when the baby's head is crowning. Maasai and Watemi participants explained that caesarean sections performed with no explanation provided in advance evoke fear in pregnant women that they will undergo unnecessary caesarean sections if they deliver in health units. Episiotomies and repairs of genital tears sustained during delivery also deter Maasai and Watemi women from seeking skilled delivery care. Genital tears are viewed in the two communities as inevitable complications of childbirth that do not require medical intervention. Health care providers interviewed blamed Maasai and Watemi women's low education level as the underlying cause of their misperceptions about routine labour and delivery procedures.

Squatting is the traditional labour position in the two ethnic groups. Skilled providers are only trained to assist women in the orthodox supine position. Study participants agreed that labour position is not a crucial factor in the decision making process about where women deliver. Some women felt that they should accept whatever position the provider decides is best. This view reflects the scope for deference to authority figures Maasai and Watemi women are expected to show:

"It is bad for an expectant mother to be so demanding. How you deliver and who assists you does not matter but your safety and good care. Since not all providers are of our ethnic group, it is bad to impose our norms on others. We need to show respect to the providers as much as they respect us. If you have any birthing preferences and your provider suggests that she may not be comfortable with your choice, you must listen and abide. Even when we deliver at

home, attendants may not like us to impose our choices on them. You must discuss and understand the best position to them in order to get the best out of their skills." [Recently delivered Mtemi FGD]

Health care providers interviewed noted instances when they observed colleagues verbally abuse, and force Watemi and Maasai women in labour to bathe and put on hospital uniforms. MM also observed Maasai and Watemi women being told to bathe and put on uniforms by labour ward staff at the two hospitals.

Perceptions of the quality of care

The health care providers and other reproductive health stakeholders interviewed all stated that TBAs and relatives are able to provide better emotional support and continuity of care in comparison to the type of care that is made available at the health units.

"Not all units have qualified staff at the level of a midwife or above. It may be that clients feel safer with TBAs than such providers." [Key informant]

TBAs and relatives are viewed by the Maasai and Watemi women as affordable (e.g., no transportation costs required), and able to meet their service expectations. These expectations include continual support and advice during pregnancy, delivery, and in the postpartum period, the provision of body massage throughout labour and delivery, and knowledge of a variety of delivery positions. The women do not think these services can be provided at health units where the sterile environment and languages used are foreign to them, and the few staff available have many other responsibilities in addition to labour monitoring. Nevertheless, women and Elder participants described health care providers at the clinics as well trained, competent, and compassionate. Most of the women interviewed who had previously delivered at health units hoped to have this opportunity in future pregnancies and would recommend delivering in health units to others. Of the women who had subsequent home births after delivering in health units, all expressed disappointment over being denied the opportunity to repeat this experience by their husbands.

"I delivered my second child at Wasso hospital and the care was very good. I'm sure most women here have the same opinion [most women nod to show that they agree with her]. My husband sent me there because I had some problems. I was weak and my lower abdomen was painful. I tell you I'll never forget the courteous welcome and care I got. I vowed that my subsequent deliveries will all be at this

hospital. My husband did not allow me to go there for delivery in my third pregnancy because I had no problem. I felt disappointed." [pregnant Maasai woman FGD]

"Most people know the good care provided at our health units especially at our two hospitals in the district. They have saved the lives of many women who would have died had it not been for the good care they received at these health units. We pray that they maintain the same level of care". [Maasai elder-Key informant]

"Any sane person will never question the quality of care provided at the dispensary in our village and at the district hospital. They have saved many lives and our community is proud of having them. Most families and women speak highly of the care they provide". [Mtemi elder-Key informant]

TBAs interviewed described health care providers as highly trained and capable of managing normal deliveries as well as life threatening conditions arising during labour, delivery or the postpartum period. They listed health care providers' failure to encourage women with 'normal' pregnancies to deliver at health units as the key reason for the low utilization of skilled delivery care in the study area.

Emergency Obstetric Care

In general, Maasai and Watemi women are able to leave their households to seek care at health units during emergencies without needing their husbands' permission. Maasai women in Loliondo, however, must receive permission from their husbands to seek skilled delivery care even under life threatening situations. In addition, advanced planning for possible blood donation in case women require a blood transfusion during and immediately after childbirth is not currently practiced nor encouraged during ANC visits.

Postnatal Care

In 2004, the national guidelines for postnatal care were revised from advising women to seek care at six weeks postpartum to within one week, and at four and six weeks post delivery. Some health care providers interviewed were unaware of this policy change. Care providers rarely promote the importance of immediate post delivery care during routine ANC visits at the participating clinics (MM observation).

"Providers tell us to come for after delivery care after one and a half or two months after delivery and not otherwise. Unless your baby is unwell, why should one attend earlier than this?" [Mtemi pregnant woman-key informant]

"The earliest time a woman should start to attend after delivery care at a clinic is one and a half months. If she fails, she must not do so later than two months. This is what providers tell us to teach women". [Maasai TBA- key informant]

The women participants explained that they attend post-natal clinics to be examined and treated for any post-delivery problems, to have their babies examined and vaccinated, and to receive under-five growth monitoring cards. The latter are required for obtaining birth certificates, free child health care, and to enrol children in primary schools. Watemi women and Elders interviewed stressed that not attending post-delivery clinics can be disastrous for both mother and baby as serious and life-threatening conditions can occur suddenly and unexpectedly after delivery. Maasai women believe that post-natal care is beneficial exclusively for the baby when a woman delivers normally.

PMTCT

PMTCT services had been introduced at scale into routine antenatal care for less than one year at the time of the study. According to all participants, PMTCT services are widely supported in the Maasai and Watemi communities. PMTCT services such as HIV testing, counselling, and treatment are also prioritized in the study clinics and husbands are encouraged to participate in PMTCT sessions. Messages about the importance of skilled birth attendance are not relayed to couples during PMTCT counselling sessions.

Providers view maternal-to-child transmission of HIV as easily preventable through adequate counselling and the provision of antiretroviral therapy. PMTCT providers are expected to regularly submit performance reports to the funding organizations for HIV/AIDS care in Ngorongoro. In contrast, providers described maternal deaths as rare and not always preventable events often following unexpected complications. Supervision related to counselling on skilled delivery care falls under the auspices of the district supervision team and is much less rigorous.

Suggested solutions for the low utilization of health units for delivery

Participants in FGDs and key informant interview made suggestions on how factors preventing women from utilizing health units in the district can be overcome. Notably, planning in advance for transport costs or moving near health units around the time of delivery, and change of providers' attitude and practices so that delivery under the assistance of care providers is consistently and widely promoted to all women during ANC visits were suggested. Men's involvement in ANC was

mentioned as an opportunity to involve families and the wide community in maternal health issues. The need for maternal health stakeholders in the district to sensitize the community on maternal health issues so that there is a dialogue on norms and traditions for the low utilization of the available health units for delivery was also emphasized.

Discussion

This study examines the perspectives of health care providers, Maasai and Watemi women, community members, and TBAs on antenatal, delivery, and post-natal care in Ngorongoro, Northern Tanzania. Examining and comparing these perspectives is an essential first step to identifying appropriate strategies for increasing women's utilization of skilled delivery and immediate postnatal care in the study setting. Understanding the factors influencing women's decision making process on where to deliver is also essential for determining how to improve antenatal care provider interactions with women and their families so that women are more likely to seek skilled delivery care, and have positive pregnancy experiences and birth outcomes.

The results show that for antenatal care to operate as a key intervention linking women to skilled delivery and immediate post-natal care in the study setting, health care providers need training on how to implement all aspects of the Focused Antenatal Care package and Tanzania's postnatal care policy. Specific areas identified that need to be addressed include: (1) insufficient counselling during ANC visits on the need for all women to receive skilled delivery and immediate post-natal care, (2) beliefs that only women with identified obstetric risk factors should be advised about skilled delivery care, (3) lack of encouragement of men/family members to participate in counselling sessions on the importance of skilled delivery care during ANC and PMTCT visits (4) lack of effective communication about routine and life saving procedures provided during labour, delivery and immediately postpartum (5) practices requiring women arriving in labour to bathe and put on hospital uniforms, and (6) lack of clear communication to community members on the referral structure and scope of services delivered at each level of care. Comprehensive training on these issues could improve the quality of the dialogue between women and health care providers at ANC clinics, and create greater motivation among women and their families to seek skilled delivery care in Ngorongoro [25,26].

Our findings are consistent with other research in Tanzania showing that time allotted for health education and counselling during ANC is minimal, with some women not receiving any counselling from their providers [20]. A recent study in a rural district in Tanzania

suggests that only 25% of women at ANC clinics are informed of the danger signs in pregnancy and during delivery, and around 40% are informed of the danger signs after delivery [27]. Lack of adequate counselling and health education during routine antenatal care represents a missed opportunity to educate women, family members, and Elders about the importance of skilled delivery care for all women.

Fear of certain medical procedures during labour and delivery have been described in other Tanzanian and African settings as a major deterrent to women's willingness to seek skilled delivery care [28,29]. Concerns mentioned by community members about caesarean deliveries and repair of genital tears need to be more sensitively handled by providers to allay women's fears about such procedures and to explain why they are performed (e.g., repair of major cervical tears to prevent severe post partum haemorrhage).

Because pregnancy and childbirth are events charged with social meaning and often involve significant family and community participation, inclusion of family members in discussions about skilled delivery care during routine ANC is a strategy promoted in many developing countries [17,30-32]. Our study found that husbands and Elders in the Maasai and Watemi communities play key gate keeping roles in women's reproductive health, and are principally responsible for deciding where women deliver. However, husbands are not encouraged to participate in routine ANC and do not receive messages about safe delivery during PMTCT sessions.

Provider attitudes have been described in other African settings as an obstacle to increasing the utilization of skilled delivery care [33-35]. Observed and reported practices in the study setting such as requiring labouring women to bathe and put on hospital uniforms likely detracts from women's willingness to utilize skilled birth attendants. Recent evidence from Western Tanzania shows that improvements in provider attitudes towards their women patients and the availability of drugs and medical equipment resulted in a two-fold increase (from 43% to 88%) in women's preference to use the available health units for delivery [36].

The explanations given by providers for placing greater importance on PMTCT programs than on promotion of skilled delivery care during routine ANC have health systems implications. PMTCT programs in Tanzania are largely supported by international donors, are well monitored, and providers are highly motivated to comply with all reporting requirements. In contrast, monitoring of ANC and skilled delivery care is weak. Future studies should explore the role of supervision and support on effective implementation of the Focused Antenatal Care package in Ngorongoro and the performance of skilled birth attendants. Other studies should

examine how the PMTCT component on the promotion of skilled delivery care can be better implemented.

Although MCH services at all study units except one were free, women experience many barriers to accessing skilled delivery care including distance from health units, transport difficulties, lack of autonomy to decide where they want to deliver, perceptions that home delivery is safe for 'normal' pregnancies, and traditional beliefs about the advantages of home births. Health care providers need to be aware of these issues and discuss them with women during ANC visits, particularly when they are counselling women on preparing for childbirth.

Our study has some limitations worth mentioning. Some of the original meanings might have been lost during translation and transcription. The use of two bilingual people during the translation and transcription processes minimized this problem. Recruitment of service users exiting clinics could have biased responses due to their desire not to alienate providers. Observation of care providers during ANC consultations and in labour rooms could have modified their behaviours, introducing bias in the observational results. To minimize the introduction of bias, the data collection methods were triangulated, and the information collected was found to be generally consistent across the methods. The number of participants with experience delivering in the health units was small (6), and their perceptions are likely to be underrepresented in our findings. The views of pregnant women who did not utilize antenatal care and their family members were not purposely targeted. Understanding why these women did not seek antenatal care could have added more insights into the reasons women in the study area do not utilize available health units for MCH care.

Conclusions

We undertook this study as a first step towards understanding the factors underlying the divergent pattern between high ANC utilization rates and low usage of SBA in Ngorongoro, Tanzania. We used qualitative methods to examine the perspectives of health care providers, Maasai and Watemi women, community members, and other reproductive health stakeholders on antenatal, skilled delivery and postnatal care. Our findings show that ANC as currently provided in the study clinics represents a missed opportunity to effectively inform all pregnant women about the importance of receiving skilled delivery and immediate postnatal care. The quality of ANC services in Ngorongoro can be improved through training health care providers on implementing all components of the Focused Antenatal Care Model, Tanzania's postnatal policies, and on how to better communicate with their women clients, including their families. Further studies should be undertaken

to validate our findings, including investigation into how community members came to view ANC services as essential to a healthy pregnancy, and the types of strategies needed to simultaneously improve the quality of available antenatal and skilled delivery care as well as demand for such services.

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Authors' contributions

MM designed the study, collected and analyzed the data, drafted the initial manuscript and reviewed subsequent drafts. VF, OMRC and SC participated in designing the study and reviewing the initial and final manuscripts. JR participated designing the study, developing the data collection tools, data analysis and reviewing the draft manuscripts at all stages. All authors approved the final version of the manuscript.

Competing interests

The authors declare that they have no competing interests.

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APPENDICES

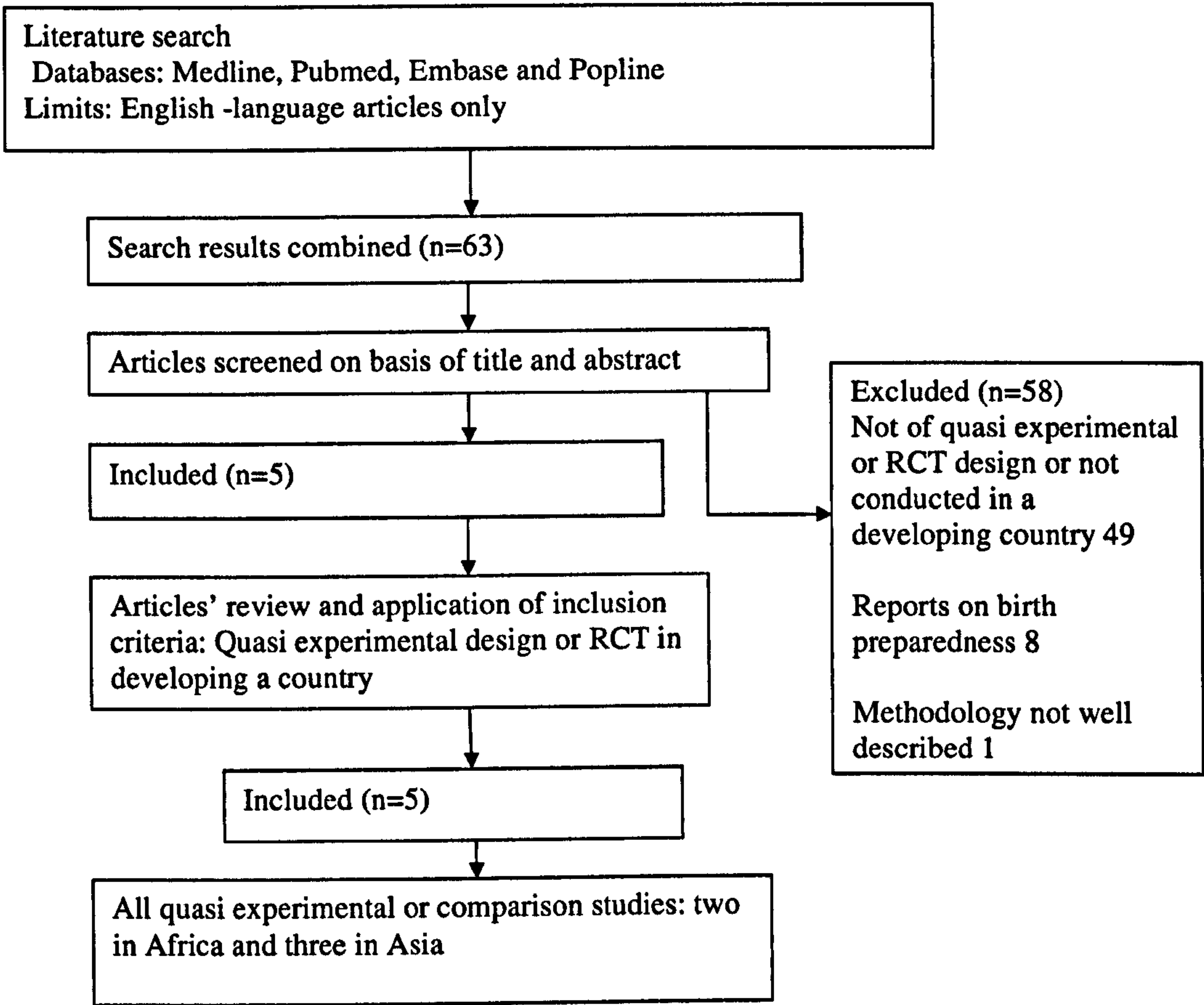
Appendix 1: Budget

Budget for a Randomized Community Trial on the Effectiveness of Antenatal birth plans in increasing skilled attendance at delivery and after delivery in Ngorongoro District, Northern Tanzania.

Budget item	Local institution salary scale	% of full time committed	1 st year	2 nd year	Total
Personnel					
A: Scientific staff					
Data collection supervisor	800	100% X 9 months	5600	1600	7200
B: Technical staff					
18 interviewer	200	100%x 9 months	25200	720	32400
36 care providers (18 from each study arm	200	Intervention clinics 50% X 6 months Control clinics 25% X 6 months	16200	0	16200
2 Data entry clerks	200	100% X 6 months	2800	800	3600
C: Other staff					
36 Village health workers	100	20% X two months	1440	0	1440
Sub-total			50880	9960	60840
Supplies					
Laser printer			500	0	500
STATA software			500	0	500
NVIVO software			450	0	450
Digital voice recorder			300	0	300
External computer hard drive			120	0	120
Sub-total			1870	0	1870
Major equipment					
Laptop computer			1500	0	1500
Travel of project personnel					
Transport for interviewers, FGD & key informant participants and data collection supervision			7200	1200	8400
Travel UK-Tanzania			7200	2400	9600
Sub-total			14400	3600	18000

Other costs	1 st year	2 nd year	Total
Stationery (questionnaires printing, manuals, pictorial birth plans etc	1600	200	1800
Questionnaire translation	150	0	150
Training workshop- interviewers	1080	0	1080
Training workshop- providers	2160	0	2160
Communication Tanzania	1200	0	1200
Communication LSHTM	1200	0	1200
FGD facilitation	600	0	600
Dissemination workshops and free access publishing	0	9800	9800
London management costs	240	0	240
Library/Literature review	300	0	300
Sub-total	9130	10000	19130
GRAND TOTAL			
\$USD	77780	23560	101,340
£GB	38890	11780	50670

Appendix 2: Flow diagram of birth plans intervention studies selected for systematic review



Appendix 3: Detailed outline of the data to be collected

Variable to be collected	How	By who	Where	Why
Qualitative data 1.Provider related	Key informant interviews/ FGDs	Principal investigator Trained FGD facilitator & sociologists	Health units/clinic sites,	Obtain an in-depth understanding of antenatal, delivery and post delivery care ,reasons for the high utilization of ANC but low utilization of health units for delivery and refine intervention protocol and questionnaires Understand how the intervention could be implemented in the study setting
Availability of care (personnel, needed equipments & supplies and hours of service	Key informant interviews FGDs	Principal investigator Trained facilitators	Health units/clinic sites	As above
Attitude towards clients	Participant observation of care provided at ANC clinics and labour rooms, key informant interviews and FGDs	:Trained FGD facilitators and principal investigator	Clinic exits, ANC clinics, labour rooms, other FGD sites and key informant interview sites	As above
Cost of accessing skilled delivery care	As above	As above	As above	As above
2.Client related	Key informant interview FGDs	Principal investigator Trained FGDs facilitators	Selected convenient site(s) in villages e.g. village offices Clinic exits, schools etc	Obtain an in-depth understanding of antenatal, delivery and post delivery care and refine intervention protocol and questionnaires Understand how the intervention could be implemented in the study setting
Traditions and norms attached to ANC, delivery and emergency obstetric care Reasons for seeking ANC, choices of delivery sites and home delivery preference than health units/hospitals	As above	As above	As above	As above
Attitudes towards health units/hospital delivery	As above	As above	As above	As above
Barriers to health units/hospitals delivery and how to surmount them	As above	As above	As above	As above
Role of antenatal care in promoting delivery at health units/hospitals	As above	As above	As above	As above
Quantitative data 1. Socio-demographic characteristics (marital status, level of education, occupation and household assets, housing conditions, source of drinking water	Structured questionnaire interview	Trained data collectors	Selected clinic exit sites or at home	Collect information on baseline characteristics & covariates known to influence use of skilled delivery attendance and hence potential confounders.

and source of energy for cooking as a proxy for wealth index				
2. Obstetric history Past pregnancies and deliveries, previous antenatal history, previous places of delivery, previous assistance at delivery and antecedent delivery outcome	Structured questionnaire interview	Trained data collectors	Selected clinic exit sites or at home	Collect information on baseline characteristics and covariates known to influence use of skilled delivery attendance and hence potential confounders.
3. Antenatal data Gestation age at initial ANC attendance, details of the components of ANC (history taking, examination, health education & counselling and drug administration details) and perception of the quality of care (ANC & delivery care) at health units.	Structured questionnaire interview	Trained data collectors	Selected clinic exit sites or at home	Obtain baseline information for the contents of antenatal care in the intervention and control groups.
4. Barrier to delivery care utilization Distance from health units, availability of transport to health units, cost for transport and delivery and women's autonomy to seek care.	Structured questionnaire interview	Trained data collectors	Selected clinic exit sites or at home	Collect information on baseline characteristics & on covariates known to influence the use of skilled delivery attendance and hence potential confounders.
5. Provider's and women's satisfaction with care	Structured questionnaire interview	Trained data collectors	Selected clinic exit sites or at home	Secondary study outcome
6. Labour and delivery details	Structured questionnaire interview	Trained data collectors	Selected clinic exit sites or at home	Primary study outcome
7. Post partum care attendance details	Structured questionnaire interview	Trained data collectors	Selected clinic exit sites or at home	Secondary study outcome
8. Reasons for the choice of place of delivery	Structured questionnaire interview	Trained data collectors	Selected clinic exit sites or at home	Determine factors determining the choice of place of delivery
9. Pregnancy, labour & delivery preparedness Details of what plans were completed and abided to. Knowledge of danger signs in pregnancy, labour, delivery and post delivery	Structured questionnaire interview	Trained data collectors	Selected clinic exit sites or at home	Answer part of the 1 st objective of determining the proportion of women who can complete and abide by birth plans

Appendix 4: Consent forms

The effectiveness of antenatal birth plans in increasing skilled care at delivery and after delivery in rural Tanzania

A: statement sheet

Dr Moke Magoma P.O. Box 12870 Arusha, Tanzania Phone +255 754 284 691 and London School of Hygiene and Tropical Medicine, Keppel street, London, WC1E 7HT England.

Co-investigators Dr Veronique Filippi, Professor Simon Cousens and Dr Oona Campbell, London School of Hygiene and Tropical Medicine, Keppel street, London, WC1E 7HT England. Tel: +44

Funded by WHO/RHR

What is the purpose of this research study?

The purpose of this study is to understand how women who wish to deliver at health units in the district can be assisted to do so. Delivery at health units with providers with appropriate skills and equipments ensures that labour and delivery related complications can be managed promptly and effectively as they develop in order to prevent their serious consequences including deaths.

What will be involved if I agree to take part?

An interviewer will approach you as you leave the clinic in order to ask you some questions about the care you have received and some personal information related to your life and previous pregnancies if you had any. You will be asked these questions in privacy and whatever you say will be kept confidential. You will again be asked some more questions one month after delivery during the routine check up visit. We hope to learn from you by asking you the questions.

What benefits does this study offer?

The information you provide will help your providers to save you better in future by improving the care they provide to you and to other women in this area. For example, some women may prefer to deliver at health units but for various reasons fail to do so. Information obtained from this study will help your care providers to help such women so that they realize their wishes.

Is there any risk involved in participating in this study?

Some questions you will be asked may be sensitive and need some intimate personal details. You are free to tell the interviewer that you do not feel comfortable to answer any question you are uncomfortable with so that you proceed with those you are comfortable with. We understand that some of you may fail to honour your scheduled after delivery clinic visits due to various reasons. We request that we visit such women in their respective home. If you would not prefer to be visited at home, feel free to tell the interviewer and your preference will be respected.

Will the information obtained in the study be confidential?

All the information will be treated confidential and care will be taken not to allow your identification from details collected in this study. For example, we will not record your name and address on the questionnaire so that no one can link the information you provide to you. No any other person will access the information you provide other than the researchers. We will destroy all questionnaires at the end of the study.

Can I withdraw from the study at any time?

Yes, participation in this study is voluntary so that you can refuse to join and withdraw at any time or as already mentioned choose not to answer certain questions. You will receive the same care from the health units whether you join or not. Equally, you will receive the same care whether you complete the study or not.

B: certificate of consent (English version)

We would like to recruit you into a study on understanding how pregnant women attending care at health units in this area can be helped to deliver at health units if they so wish.

We will do this by interviewing you as you leave this clinic today and again one month after delivery during your routine check up. The interview will take about half an hour. We will be talking about pregnancy care and choices about childbirth and delivery in your area. We understand that this has not been part of your usual care. The information to be collected will be that related to your life (age, level of education, marital status and occupation), history of your previous and present pregnancies and factors known to prevent women from accessing skilled delivery care at health units. We will do this by asking you some questions in private and the information you provide will be kept confidential. Participation is voluntary. If you refuse to take part in this study, this will in no way affect the care you receive at this or other clinics and you are free to withdraw from the study at any time without giving any reason.

Some of the questions will touch on some private and possibly sensitive issues in your life or relationship which may make you uncomfortable. You are free not to answer such questions and tell the interviewer to go to questions which you are willing to answer.

We aim to understand barriers which prevent women from utilizing the health units for delivery and how they can be helped to utilize them if they so wish. Since most serious and life threatening labour and delivery complications occur suddenly and unexpectedly, delivery under care of someone trained to recognize and manage such complications is important if we are to avoid most women's and baby's deaths.. We understand that this has not been part of your usual care but we aim at seeing if we can make it part of the routine care. However, we cannot do this till we have collected enough information. Your participation will help us make recommendations to improve the health services provided to you and other pregnant women in this area.

No compensation will be provided for participating in this study.

The care you will receive will be the same as that provided to all other women at this clinic

If you have any questions about this study, you may get answers by asking your Village Health Worker

(name _____), or by contacting the following person:

Moke T.N. Magoma, MD

P.O.BOX 12870 Phone +255 754 284691 OR London School of Hygiene and Tropical Medicine

Arusha Tanzania

E-mail: drmagomasn@yahoo.com

50 Bedford Square WC1B 3DP

London UK. Phone +44 7899717767

E-mail: moke.magoma@lshtm.ac.uk

If you have any concerns about your rights in this study you may contact your village health worker for clarification and if not satisfied the district medical officer Phone number +255 27 535015 or the district commissioner's office phone number +255 27 535017.

Thank you very much for your time

Do you have any questions? (Answer all questions.)

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions that I have asked have been answered to my satisfaction. I consent voluntarily to participate as a subject in this study and understand that I have the right to withdraw from the study at any time without in any way affecting my further medical care.

Signature of the participant) Date.. ..

Signature of the provider on behalf of participant..... Date

**Signature of the witness not related to the research
team or health unit... Date**

C: Certificate of consent-Swahili version

**UTAFITI WA MPANGO WA UZAZI SALAMA KWA MAMA WAJAWAZITO
WILAYA YA NGORONGORO, TANZANIA**

**Dr Moke Magoma, Dr Veronique Filippi, Professor Simon Cousens and Dr Oona
Campbell Chuo cha London cha Utabibu wa Magonjwa ya Nchi za Joto**

**Tungependa kukualika kushiriki katika utafiti wa kuangalia jinsi ya kuboresha huduma
wapatazo akina mama wajawazito wanaohudhuria kliniki na wanaopenda kujifungulia
katika Zahanati, Vituo vya Afya na Hospitali katika eneo hili.**

**Kama ukikubali, tungependa kukudodosa utakapokuwa unaondoka kliniki leo na
utakapokuja tena kliniki ya akina mama waliojifungua mwezi mmoja baada ya
kujifungua. Mazungumzo yetu yatachukua muda wa nusu saa hivi. Tutaongea kuhusu
ujauzito na huduma zilizopo hapa kwa akina mama wajawazito na wanaojifungua.
Tunajua kuwa kwa kawaida hili alifanyiki katika kiliniki hii. Tutapenda kujua habari
zako juu ya ujauzito huu na mwingine kama uliwahi kuwa nao na habari zako binafsi
kama umri, elimu yako, kama umeolewa au hapana na kazi yako na sababu mbalimbali
zinazoweza kuwafanya akina mama wanaopenda kujifungulia katika zahanati, vituo vya
afya na hospitali wasiweze kufanya hivyo. Tutakuuliza maswali ukiwa peke yako
wakati ukitoka kliniki kwenda nyumbani. Mazungumzo haya yatakuwa ni ya siri kati
yako na atakayekudodosa na ni ya hiari. Kama ukikataa kushiriki, utaendelea kupata
huduma katika kiliniki hii au nyingine yeyote kama kawaida. Baada ya kuamua
kushiriki, waweza kujitoa katika utafiti huu kwa utashi wako muda wowote bila kutoa
sababu yeyote.**

**Tunajua kuwa baadhi ya maswali tutakayokuuliza yatahusu habari zako binafsi na
pengine nyeti katika mahusiano yako na watu wengine, kwa hiyo zaweza kukufanya
ujisikie vibaya. Tafadhali una hiari ya kutotoa majibu kwa maswali unayoona hutaki
kuyajibu.**

**Nia yetu ni kujua vikwazo mbalimbali vinavyowapata akina mama wanaoamua
kujifungulia kwenye zahanati, vituo vya afya na hospitali katika eneo hili na jinsi
wanavyoweza kusaidiwa kupata huduma hii kwa sababu matatizo mengi yanayoweza
kuhatarisha maisha ya mama utokea ghafla na katika kipindi kifupi. Ni pale tu mama
atakapokuwa mahali ambapo tatizo lake litagunduliwa mapema na kupatiwa huduma
sahihi ndipo maisha yake na pengine ya mtoto yataokolewa. Tunajua kuwa
tunayoyasema si sehemu ya huduma yako ya kawaida hapa kliniki, lakini tungependa
kuyafanya yawe sehemu katika siku za usoni. Ili kufanya hivi tunahitaji ushahidi wa
kutosha na ushiriki wako katika utafiti huu utatusaidia kushauri jinsi ya kuboresha
huduma zitolewazo katika kliniki hii.**

Hakuna malipo yeyote utakayopata kwa kushiriki kwako.

Huduma utakayopata hapa kliniki itafanana na apatayo mama yeyote mjamzito hapa.

**Kama una swali lolote kuhusiana na utafiti huu tafadhali muulize mhudumu wa afya
kijijini kwako aitwaye.....au Dr Moke Magoma wa anuani zifuatazo:**

**P.O.BOX 12870 Simu namba +255 754 284691 AU London School of Hygiene &
Tropical Medicine**

Arusha Tanzania
E-mail: drmagomasn@yahoo.com
+44 7899717767

50 Bedford Square WC1B 3DP
LONDON, UK. Simu namba

E-mail:

moke.magoma@lshtm.ac.uk

Kama una wasiwasi wowote kuhusu haki yako ya ushiriki katika utafiti huu muulize m hudumu wa afya wa kijiji chako na kama haujaridhika Mganga mkuu wa wilaya simu namba +255 27 535015 au Mkuu wa Wilaya simu namba +255 27 535017. Ahsante .

Je una swali lolote? (tafadhali jibu maswali yote)

Nimesoma taarifa hapo juu (au nimesikia taarifa kama nilivyosomewa). Nimepewa nafasi ya kuuliza maswali na nimeridhika na majibu niliyopewa. Nakubali kwa hiari yangu kushiriki katika utafiti huu na najua nina hiari ya kujiondoa wakati wowote bila kuathiri huduma ya afya nitakayopewa.

Sahihi yangu

Tarehe

Sahihi ya m hudumu wa afya kwa niaba yangu

Tarehe

Sahihi ya shahidi (asiwe kati ya wanaofanya utafiti au mtoa huduma).....

Tarehe

D: Consent Form IV (oral informed consent to participate in the study-qualitative data)

We are inviting you to participate in a discussion on the effectiveness of antenatal preparedness for delivery and emergencies (birth plans) and how it can be used to increase the utilization of health units for delivery and after delivery care. The discussion will take approximately one hour and thirty minutes. We will be talking about pregnancy care and choices about childbirth and delivery in your area. We know that health unit delivery is not practiced by the majority of women in this area, as most deliver at home. We are aiming at understanding barriers which prevent women from utilizing the health units for delivery and how they can be helped to utilize them if they so wish. However, we cannot do this till we have collected enough information from you. We would like you to help us learn more on these factors from your own experience and your own words. Your participation will help us make recommendations to improve the health services provided to pregnant women in this area. The information to be collected will be factors known to prevent women from accessing skilled delivery care at health units and norms and traditions attached to health seeking behaviour during pregnancy, labour, delivery and after delivery. We will do this by asking you some questions in a group of not more than twelve people and request you to give your opinion (answer). We request that all people in a group give their opinions freely. There is no wrong or right answer. During the discussion, we request that we take notes as well as tape record the discussion as notes taking may not be as thorough in capturing all the important issues discussed. This information will be kept confidential. You are completely free to participate in the discussion. And, if you choose not to join the discussion, it will in not affect your present or future access to or quality of health services.

Thank you very much for your time

Do you have any questions? (Answer all questions.)

If you have any questions about this study, you may get answers by asking your Village Health Worker

(name _____), or by contacting the following person:

Moke T.N. Magoma, MD

P.O.BOX 12870 Phone +255 754 284691

Arusha Tanzania

E-mail: drmagomasn@yahoo.com

OR

London School of Hygiene and Tropical Medicine
50 Bedford Square
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E-mail: moke.magoma@lshtm.ac.uk

If you have any concerns about your rights in this study you may contact your village health worker for clarification and if not satisfied the district medical officer Phone number +255 27 535015 or the district commissioner's office phone number +255 27 535017.

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions that have asked have been answered to my satisfaction. I consent voluntarily to participate in the discussion, or to be interviewed and understand that I have the right to withdraw from the discussion/interview at any time without in any way affecting my further medical care.

Consent given (signature or thumbprint) Date
..... dd/mm/yy

E: Consent Form IV (oral informed consent to participate in the study-qualitative data) Kiswahili version

We are inviting you to participate in a discussion on the effectiveness of antenatal preparedness for delivery and emergencies (birth plans) and how it can be used to increase the utilization of health units for delivery and after delivery care. The discussion will take approximately one hour and thirty minutes. We will be talking about pregnancy care and choices about childbirth and delivery in your area. We know that health unit delivery is not practiced by the majority of women in this area, as most deliver at home. We are aiming at understanding barriers which prevent women from utilizing the health units for delivery and how they can be helped to utilize them if they so wish. However, we cannot do this till we have collected enough information from you. We would like you to help us learn more on these factors from your own experience and your own words. Your participation will help us make recommendations to improve the health services provided to pregnant women in this area. The information to be collected will be factors known to prevent women from accessing skilled delivery care at health units and norms and traditions attached to health seeking behaviour during pregnancy, labour, delivery and after delivery. We will do this by asking you some questions in a group of not more than twelve people and request you to give your opinion (answer). We request that all people in a group give their opinions freely. There is no wrong or right answer. During the discussion, we request that we take notes as well as tape record the discussion as notes taking may not be as thorough in capturing all the important issues discussed. This information will be kept confidential. You are completely free to participate in the discussion. And, if you choose not to join the discussion, it will in not affect your present or future access to or quality of health services.

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**Consent given (signature or thumbprint) Date
dd/mm/yy**

Appendix 5: Key messages guide for individualized birth plan

Introduction

Most maternal deaths in our country and indeed worldwide occur around delivery (during delivery and within 48 hours after delivery). The majority of these deaths are preventable if women get appropriate care from skilled providers working in enabling environments that allows prompt and effective managements of life threatening complication as they occur. Unfortunately, many women still die in our country due to lack of this important intervention. For example, approximately 578 women die per every 100,000 live births in our country while between 600 and 1000 women per 100,000 live births die in our district from maternal causes every year. In most parts of our district, far more women die from maternal causes than they die from HIV!

Access to skilled delivery attendance at health units remains very low in our district. While only 7% of all women deliver at the available health units in our district, almost five in ten women in Arusha region and in Tanzania do so. Interestingly, more than 90% of all pregnant women attend antenatal care in our district, in Arusha region and in Tanzania. Far more women in our district, therefore, attend antenatal care than they delivery in the available health units. Antenatal care alone without skilled delivery care will not reduce maternal mortality. The aim of this study is to increase the number of women who deliver in our health units under care of skilled providers in order to reduce maternal deaths from unsafe deliveries.

Contact time with the participant

The care you provide to women is broadly divided into four parts: history taking, examination, health promotion/education and counselling including on skilled delivery attendance and drug administration. Each section is important if women under your care are to realize the full potential and benefits of the care you provide.

Health promotion/education and counselling including on SBA

Although pregnancy and childbirth are times of joy to many families, to some, the time can be very difficult and traumatic. Prompt and effective management of life threatening conditions is often not possible due to various delays: delay in recognizing serious and life threatening conditions as soon as they set in and delays in seeking and getting appropriate care when needed.

Life threatening complications, if not managed effectively can result into disability or even death. Unfortunately, most of these conditions occur suddenly and unexpectedly to most women regardless of the conditions of their pregnancies. For example, most women who die from life threatening conditions have no identifiable problems during pregnancy. Home delivery, therefore, although may appear convenient to some women, it does not guarantee prompt and effective management of these condition. Consequently, all pregnant women must be advised to deliver at places with competent providers and facilities to manage these problems so that serious complications are managed immediately to prevent most deaths. In our district, this is only possible at health units.

It is imperative that women are assisted to overcome various obstacles that prevent them from accessing appropriate care for normal delivery and at times of emergencies. Care providers are required to assist women to overcome these obstacles through provider-

client dialogue. Simple messages on the importance of skilled delivery care and ways of overcoming obstacles to health units' delivery must be discussed.

Although the list may not be exhaustive, make sure that you discuss with each pregnant woman under your care, and where required and with her consent, her family on the following:

- Identify a place of delivery of her choice and with her family's assistance, know how to reach it
- The age of pregnancy in months and the expected date of delivery must be communicated to the woman. If the latter can not be reliably calculated from the date of the last normal menstrual period (LNMP), a rough estimate is accepted e.g. early, mid or late of a month. If it is early of a month take LNMP as 5th, if it is mid of the month take LNMP as 15th and if late of the month take LNMP as 25th. Calculate the EDD accordingly. Information that delivery can happen any time from two weeks from this date up to two weeks after should be communicated so that a woman knows when she is tentatively due for her to make plans to seek care in advance.
- The closest health units for basic and comprehensive essential obstetric care are known
- Transport arrangement to the place of delivery or in case of emergency (Type of transport and how it will be paid for if necessary)
- Funding arrangements for birth or emergency (estimated amount in TSH). Discuss both the cost for delivering/emergency at the nearby dispensary/health centre and hospital
- Identification of a person to accompany her to the health unit
- Identification of someone to look after the woman's household and the children while she is away if appropriate
- Identification of compatible blood donors in case of emergency
- Equally important, pregnant women at home whether in labour or not must be made to understand danger signs in pregnancy, labour, during delivery and after delivery so that appropriate care is sought early enough to avoid severe maternal morbidity and mortality. Likewise, danger signs in young babies must be recognized and babies sent for appropriate care as soon as such signs show up. The following are some danger signs in pregnancy, labour, delivery or after delivery. Make sure that all women understand them and where to get help if they develop such complications. The importance of postnatal care must be emphasized to all women and the information on how and when to seek this care communicated.

Key danger signs during pregnancy

Vaginal bleeding

Swelling of face, hands legs, feet

Blurred vision

Foetal movements stops for more than two days

Malpresentation beyond 36 weeks

Fever

Key danger signs during labour/childbirth

Severe vaginal bleeding

Labour of more than twelve hours

Convulsions

Retained placenta

Cord prolapse

Key danger signs in the puerperium

Bad smelling vaginal discharge (associated with or without fever)

Fever

Vaginal bleeding more than is expected for a puerperal woman

Key danger signs in the newborn

Convulsions/spasms/rigidity

Difficult/fast breathing

Very small baby or premature

Lethargy/unconsciousness

Fever

Important notes

Husbands/male partners have a very big role in decision making in this district and thus, their involvement in the formulation and implementation of the birth plans are important if the birth plans formulation and implementation are to succeed. Equally, TBAs have some roles to play if women are to abide by the plans. Unless otherwise, make sure that they are also involved in the formulation and implementation of the plans.

The EDD must be calculated for each woman and its meaning communicated to the woman and her husband/male partner so that plans to seek delivery care at the available health units are put in place in advance.

All women should deliver at health units under the care of skilled care providers because it is safer than home delivery for both the mothers and their young babies. The message that most problems occur suddenly and unexpectedly must be conveyed. Health unit delivery offers an opportunity for such problems to be managed promptly and effectively.

The message that skilled delivery care at health units is part of the continuum of maternal care which starts from conception through delivery to post delivery care must be conveyed. The full potential of this care will only be realized if all phases of care are utilized.

The message that it respects the women's birthing preferences must be conveyed e.g. one can be accompanied by a relative/family member or TBA.

Experience from the district indicates that emergency transport and opportunity costs are usually higher when a complication occurs in labour while at home than when at a health unit.

Examples of barriers to health unit delivery or getting appropriate care and possible solution

Barrier to access	Possible solutions (for normal delivery (if woman is unsure about place of delivery)	Possible solutions in case of emergency
Physical 1. Yes 2. No If yes see next column for possible solution(s)	Move near health units at term (Options: Stay at maternal waiting shelter 1. Yes 2. No 3. May be Stay with a relative/friend 1. Yes 2. No 3. Maybe Invite her male partner/important other(s) in future discussions 1. Yes 2. No 3. Maybe	Emergency plan for transport in place: Put money aside for transport, contact neighbour for use of donkey, car etc if problems occur, get mobile phone to call relative with a car etc or call hospital car or Flying Medical services.
Financial 1. Yes 2. No If yes see next column for possible solutions	Does the woman have saving?; how easily can she access it? What kind of assets is available? Does she have an insurance etc? Could she put some money aside for paying normal delivery? Exploration of the worthy status of the household e.g. Number of cattle and a possibility of selling some to pay for transport and opportunity costs. Exploration of the worthy status for her affinal and natal family and a possibility of getting their assistance.	Discuss with her the amount of money she will need to put aside in case of emergency etc.
Social responsibilities e.g. care of children. 1. Yes 2. No	Invite her male partner/important other(s) in future discussions. Exploration of her affinal and natal family ties. Is there someone else who could be availed to assist her while she is away?	
Health system perception e.g. poor service, fear of environment, no one familiar to. 1. Yes 2. No	Invite her male partner/important other(s) in future discussions. Explanation of the health unit delivery environment, the support she will get including a family member/TBA to accompany her in labour. Invite someone who had ever delivery services and has a positive recommendation for the service to share her experience with her. Explanation of how the previous encounter with poor services/perception of unfriendly services will be addressed e.g. unless otherwise, her preferred birthing practices will be respected; someone familiar to her will be around to assist.	
Having someone to donate blood for her in case transfusion is needed	Discuss if she has someone in mind who could donate blood for her Involve her husband/male partners to identify possible others to donate Make sure that the identified people are aware that they may be required to assist the woman if needed and be available Having someone informed when the woman goes to labour so that this information is communicated to the identified potential blood donors	Having someone informed in case a woman develops and emergence complication so that possible blood donors are informed and available in case blood is needed

Appendix 6: Birth plans completed

(To be filled by the provider. It should be complete at the last visit before delivery)

Participant's study number: _____

Name of the health unit _____

Where did she plan to give birth? (Preferred place of delivery before birth plans formulation. To be filled on the initial day of attendance)

- | | |
|--------------------------|------------------------------|
| 1. Home | 2. Health centre (Name.....) |
| 3. Hospital (name) | 4. Don't know yet |

Health unit for delivery identified and plans to reach it discussed/put in place

1. Yes 2. No

Identified health unit for delivery is: _____ (Fill in the place she has chosen to delivery at)

I want to be delivered by: _____ (Fill in if she has any specific person she would want to assist the delivery)

Arrangement and saving for reaching health units' for birth and emergency:

Transport to the delivery place discussed 1. Yes 2. No

Identified and planned means of transport to the place of delivery: (name the type of transport she has planned to use by ticking the appropriate response)

- | | |
|--|--|
| 1. Public transport by car | 2. Any other means of public transport |
| 3. Personal transport by car | 4. Any other personal transport |
| 5. Will just walk to the delivery unit | |

Cost of transport in TZS: _____

Arrangement to meet the cost for delivery services discussed 1. Yes 2. No

Cost for delivery services in TZS: _____

Arrangement for a person to escort the woman to the delivery site discussed

1. Yes 2. No

The person who will escort me to the place of delivery is: _____

Transport arrangements in case of an emergency discussed and put in place

1. Yes 2. No

For an emergency during pregnancy or childbirth, I will go to: (name of the health unit)

Nearest emergency contacts: person to be contacted in case of an emergency for assistance to reach appropriate care _____

Arrangements for blood donors who will help if needed:

1. Yes 2. No

If yes indicate their names and contact (just the names and village(s) suffice)

Identified someone to look after the house or children when she is away:

1. Yes 2. No

If yes, the person she has identified and who has agreed to look after her house or children when she is away during delivery is: _____ who is her (mention her relationship with the woman) _____

Birth preference(s): 1. Yes 2.No

If yes what are they?

A. Birth position 1. Yes 2. No Mention position

B: Birth attendant (mention specifics e.g. name/sex etc

Maternal and neonatal danger signs as well as measures/plans to seek appropriate care discussed: 1. Yes all 2. Yes some 2. No

Health unit for post natal check-up after delivery identified and plans to reach it put in place 1. Yes 2. No

Identified health unit for post natal check-up is: _____ (*Fill in the name of the health unit she has chosen to check-up for post natal care*)

I want a check-up one month after birth by: _____ (*Fill in if she has any specific person she prefers or if no choice and she mentions the unit, fill in the cadre who mans the clinic regularly e.g. midwife, clinical officer etc*)

Was she ever accompanied with her husband/male partner at this clinic?

1. Yes 2. No

Appendix 7: Birth plans: pictorial format



Wakunga wa jadi wanaweza kuwa kiungo muhimu cha kufanikisha mama kupata uzazi salama katika vituo vya huduma hivyo ni vyema wahusishwe katika majadiliano ya mpango wa uzazi salama.



Nilipokuwa mjamzito nilipanga na kufanikiwa kutimiza mipango yangu ya kupata uzazi salama; hakika na wewe unaweza.



Tuzifurahie kliniki zetu na mipango yetu ya uzazi salama katika vituo vya huduma vilivyo karibu nasi.

UNAFADHILIWA NA SHIRIKA LA AFYA DUNIANI (WHO), FORD FOUNDATION (USA) NA CHUO KIKUU CHA UTABIBU WA MAGONJWA YA NCHI ZA JOTO CHA LONDON (LSHTM)

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**MPANGO WA UZAZI
SALAMA WILAYA
YA
NGORONGORO**

Magoma M et al, 2008

**Mama/Familia
yenye ufahamu
imewezeshwa**



Jadiliana na mume wako wakati wa mahudhuro ya kliniki juu ya sehemu utakayopenda kujifungulia.



Kunaweza kuwa na vikwazo mbalimbali vinavyokuzuia kujifungulia sehemu yenye huduma ya uzazi salama. Tafadhali jadiliana na mhadumu wako wa kliniki jinsi ya kuviepuka na kutambua vidokezo vya hatari kwa mama wakati wa ujauzito, uchungu, kujifungua au mara baada ya kujifungua.



Zahanati, Kituo cha afya au Hospitali ni sehemu salama zaidi kujifungulia kuliko nyumbani. Amua mapema ni wapi utapenda kujifungulia



Mume/mwenzi wako ni mtu muhimu wa kukuwezesha kujifungulia sehemu ya huduma ya uzazi salama. Mhusishe katika majadiliano na mhadumu wa kliniki juu ya kupata usafiri wa kwenda mahali ulipopachagua kujifungulia, mtu wa kukusaidia kazi za nyumbani utakapokwenda kujifungua na kulipia gharama za usafiri na huduma ya uzazi salama.



Mama anaweza kuhitaji kuongezewa damu wakati wa ujauzito uchungu au baada ya kujifungua. Ni vyema mama amhusishe mume wake katika majadiliano ya jinsi ya kuwapata watu wa kumtolea damu kama itahitajika.

Appendix 8: Health unit assessment form

1: Unit identification details

Name of the health unit	
Ward	
Division	
Ownership	1.Government 2.Faith based NGO 3.Parastatal
Name of the Assessor	
Date assessment made	
Distance in km from the nearby health unit offering Comprehensive emergency obstetric care	
Availability of care provider with midwifery skills (midwife, PHN etc)	1. Yes 2. No
2: Antenatal care-Facility level factors	
2:1 Availability of amenities in the delivery of antenatal care	
2:1:1 Availability of antenatal care room	1. Yes 2. No
2:1:2 Availability of a counselling room	1. Yes 2. No
2:1:3 Availability of privacy (both visual and auditory)	1. Yes 2. No
2:1:4 Availability of communication with higher level care unit (radio or phone)	1. Yes 2. No
2:1:5 Availability of care guidelines/protocol	1. Yes 2. No
2:1:6 Availability of Focused antenatal care guidelines/orientation package	1. Yes 2. No
2:1:7 Availability of antenatal cards	1. Yes 2. No
2:1:8 Availability of visual aids for antenatal care	1. Yes 2. No
2.2 Essential equipment, supplies and conditions for basic antenatal care	
2:2:1 Availability of a reliable examination light source	1. Yes 2. No
2:2:2 Availability of soap and running water for hand washing	1. Yes 2. No
2:2:3 Availability of clean latex gloves	1. Yes 2. No
2:2:4 Availability of a disinfecting solution	1. Yes 2. No
2:2:5 Availability of a sharp box	1. Yes 2. No
2:2:6 Availability of blood pressure machine	1. Yes 2. No
2:2:7 Availability of a foetalscope	1. Yes 2. No
2:2:8 Availability of iron tablets	1. Yes 2. No
2:2:9 Availability of iron tablets most times of the year	1. Yes 2. No
2:2:10 Are iron tablets given routinely to all pregnant women when available?	1. Yes 2. No
2:2:11 Availability of folic acid	1. Yes 2. No
2:2:12 Availability of folic acid most times of the year	1. Yes 2. No
2:2:13 Are folic acid tablets given routinely to all pregnant women when available?	1. Yes 2. No
2:2:14 Availability of TT vaccines	1. Yes 2. No
2.3 Availability of medicines for managing common pregnancy complications	
2:3:1 Availability of at least one broad antibacterial (Amoxacillin or Cotrimoxazole)	1. Yes 2. No
2:3:2 Availability of any Antihelminth (e.g Albendazole or Mebendazole)	1. Yes 2. No
2:3:3 Is the antihelminth provided to all pregnant women when available?	1. Yes 2. No
2:3:4 Availability of methyldopa (Aldomet)	1. Yes 2. No
2:3:5 Is methyldopa given to pregnant women in need when available?	1. Yes 2. No
2:3:6 Availability of any first line antimalarial	1. Yes 2. No
2:3:7 Is malaria prophylaxis given to all pregnant women at the clinic?	1. Yes 2. No
2:3:8 Availability of at least one drug for treatment of any of the following: Chylamydia, Gonorrhoea and syphilis	1. Yes 2. No

2:4 Time spent for antenatal care provision	
2:4:1 Number of days per week care is provided	
2:4:2 Number of hours per day when care is available	
2:4:3 Average total time in minutes spent for consultation services (e.g. history taking, counselling including birth plans, examination and drug administration) at initial clinic visit	
2:4:4 Average time in minutes spent for history taking	
2:4:5 Average time in minutes spent for counselling including for birth plans	
2:4:6 Average time in minutes spent for examination	
2:4:7 Average time in minutes spent for providing drugs and vaccinations	
2:4:8 Did you have enough time to spend with most of your clients today?	1. Yes 2. No
2:4:9 Conclusion of the birth plan dialogue that was provided to women on the initial clinic visit	1. Consistently provided 2. Inconsistently provided 3. Not discussed or provided
2:4:10 Conclusion of the HIV education that was provided to women on the initial clinic visit	1. Consistently provided 2. Inconsistently provided 3. Not discussed or provided
2:4:11 Is the importance of post natal care emphasized during the initial antenatal care visit to most women?	1. Yes 2. No
2:4:12 Average total time in minutes spent for consultation services (e.g. history taking, counselling including birth plans, examination and drug administration) during subsequent clinic visits	
2:4:13 Average time in minutes spent for history taking during subsequent visits	
2:4:14 Average time in minutes spent for counselling including for birth plans during subsequent visits	
2:4:15 Average time in minutes spent for examination during subsequent visits	
2:4:16 Average time in minutes spent for providing drugs and vaccinations during subsequent visits	
2:4:17 Did you have enough time to spend with most of your clients today?	1. Yes 2. No
2:4:18 Conclusion of the birth plan dialogue that was provided to women during subsequent visits	1. Consistently provided 2. Inconsistently provided 3. Not discussed or provided
2:4:19 Conclusion of the HIV education that was provided to women during subsequent visits	1. Consistently provided 2. Inconsistently provided 3. Not discussed or provided
2:4:20 Is the importance of post natal care emphasized to most women during subsequent visits?	1. Yes 2. No

2.5 Assessment of the provider-women interaction	
2.5.1 Were women able to participate actively in the discussions/clinic activities during antenatal care consultation? (Did they ask questions etc)	1. Yes 2. No
2.5.2 Rank of how women actively participated in the discussions/clinic activities during antenatal care consultation	1. Good (Women listened attentively and were able to ask questions freely) 2. Fair (Women listened attentively or

	otherwise but had limited opportunities to ask questions) 3. Bad (There was limited active participation in most activities which made listening of what was discussed difficult or provider rude when women asked questions) 4. Undetermined (unable to determine because of the short time frame of the ANC session or due to any other reason(s))
2.5.3 Were the providers respectful and compassionate towards their women clients?	1. Yes 2. No
2.5.4 Rank of respect and compassion the providers had on their women clients	1. Good (Listened to women attentively and asked them questions to ascertain whether the women understood what was discussed) 2. Fair (Listened to women (attentively or otherwise) but did not ask them question to ascertain whether the women understood the discussion or asked questions but did not listen attentively to what women said) 3. Bad (Neither did the providers listen nor ask women questions to ascertain if they understood the discussion or the providers were rude to the women) 4. undetermined (unable to determine because of the short time frame of the ANC session or due to any other reason(s))
2:6 Provider's satisfaction with care	
2:6:1 Compared to what you previously offered to women at this clinic, how do you rank the care you're providing at this clinic now?	1. Better than before 2. Same as before 3. Poorer than before
2:6:2 Were you satisfied with the care you provided to women at this clinic today?	1. Yes 2. No
2:6:3 How do you rank your satisfaction/dissatisfaction of the care you provided at this clinic today?	1. Very satisfied 2. Satisfied 3. Indifferent 4. Dissatisfied 5. Very dissatisfied
2:6:4 How many women do you usually see on a typical clinic day?	
2:6:5 How many providers are usually available to run this clinic?	
2.6.6 How long have you been providing MCH care? (Time in years)	
2.6.7 How long have you been providing MCH care at this clinic? (time in years)	
2.6.7 What is your highest qualification?	1. Clinical attendant 2. MCH nurse 3. Nurse Midwife 4. Trained nurse 5. Nursing officer 6. Clinical officer/Assistant medical officer
2.6.8 Are you able to speak the local language that is spoken by most women attending clinics at this unit?	1. Yes 2. No
2.6.9 What is your level of understanding of the local language spoken by most women attending care at this unit?	1. Fluent 2. Understands and speaks most but not fluent 3. often needs an interpreter/do not speak or understand it at all

3: Delivery care services-Facility level factors	
3:1 Delivery environment	
3:1:1 Availability of delivery room	1. Yes 2. No
3:1:2 Availability of privacy in the delivery room (visual and auditory)	1. Yes 2. No
3:1:3 Availability of at least one delivery bed	1. Yes 2. No
3:1:4 Availability of a reliable light source for the labour room	1. Yes 2. No
3:1:5 Availability of delivery kit(s)	1. Yes 2. No
3:1:6 Availability of at least one post delivery bed	1. Yes 2. No
3:1:7 Availability of clean/sterile cord ties	1. Yes 2. No
3:2 Conditions for clients' delivery	
3:2:1 Number of days in a week services offered	
3:2:2 Number of hours in a day services are offered	
3:2:3 Availability of sterile delivery gloves	1. Yes 2. No
3:2:4 Availability of items for infection control (soap, water, sharp box & disinfectant solution)	1. Yes 2. No
3:2:5 Availability of labour/delivery guidelines including partographs	1. Yes 2. No
4. Post natal care- Facility level factors	
4.1 Number of days per week care is provided	
4.2 Number of hours per day care is provided	
4.3 Average time in minutes spent for post natal consultation	
4.4 Are all women attendees examined during routine post natal clinic attendance?	1. Yes 2. No
4.5 Are all newborns examined during routine post natal clinic attendance?	1. Yes 2. No
4.6 Is post natal care attendance recommendation similar to what is required by the national guidelines? (The current national guidelines require women to attend post natal care one week, four weeks and six weeks post delivery)	1. Yes 2. No
4.7 Is the importance of post natal care emphasized during antenatal care sessions to all women?	1 Yes 2. No

Appendix 9: Ngorongoro district health units

Name	Staff level as of 30 th April 2007	Number of pregnant women (ANC) 2006	2006 number of health units' deliveries	Name	Staff level as of 30 th April 2007	Number of pregnant women (ANC) 2006	2006 number of health units' deliveries
Intervention health units				Control health units			
Arash dispensary	1midwife	236	0 (0)	Digodigo health centre	2 midwives, 1 CO	424	40 (9.4)
Oldoinyosambu dispensary	1 CO	95	0(0)	Soitsambu dispensary	1 midwife, 1 CO	155	3(1.9)
Nainokanoka dispensary	1 midwife, 1 CO	1,068	7(0.7)	Sero dispensary	1 CO	128	0(0)
Piyaya dispensary	1midwife	286	3(1.0)	Oibalbal dispensary	1 CO	183	0(0)
NCAA health	2 midwives, 2 CO, 1 MO	159	11(6.9)	Malambo dispensary	1 midwife, 1 CO	288	15(5.2)**
Engaresero dispensary	1 CO	43	4(9.3)	Loliondo dispensary	2 midwives, 1 CO	288	20(6.9)
Sakala dispensary	1midwife	45	0(0)	Samunge dispensary	1 CO	183	0(0)
Kakesio dispensary	1 CO	183	0(0)	Oloipir dispensary****	1CO	N/A	N/A
Other health units in the district (not included in the study)							
Wasso hospital	18 midwives, 3MO	1,461	279*(19.1)				
Endulen Hospital	12 midwives, 4 CO, 1MO	1,087	73(6.7)				
Sale dispensary	1 CO	116	0(0)				
Total ANC and delivery 2006		6,306	455 (7.2)				

* Number includes women from neighbouring Kenya and those referred to the hospital from other health units. For all health units except the

two hospitals, the number deliveries do not include women who delivered in other health units but attended ANC in these units. The figures may, therefore, underestimate the number of women who utilize health units for delivery. Unfortunately, reliable figures were not immediately available.

** Most women who delivered in this health unit were temporary pastoralist migrants from neighbouring Kenya with no ANC records. CO denotes clinical officer

Numbers in brackets denote % of ANC women who delivered in health units

Appendix 10: Questionnaires

A: ANTENATAL QUESTIONNAIRE

1: INDENTIFICATION

No	Question	Coding categories	Codes	Variable
Q1.1	Name of Health unit			[HEALTHUNIT]
Q1.2	Number assigned to the health units			[UNITNUMBER]
Q1.3	Interviewer's name			[INTNAME]
Q1.4	Date of interview (<i>date, month and year</i>)			[DATE]
Q1.5	Place of interview	1. Clinic site 2. Home 3. Other If other specify	 	[PLACE] [OTHERPLACE]
Q1.6	Participant's unit serial number (<i>What's her research participation clinic serial number?</i>)			[SN]
Q1.7	Antenatal clinic number			[ANCN]
Q1.8	Time interview started			[TIMESTART]
Q1.9	In which village is this health unit?			[HEALTHVILLAGE]
Q1.10	In which ward is this health unit?			[HEALTHWARD]
Q1.11	In which division is this health unit?			[HEALTHDIVISION]
Q1.12	Where do you usually live (<i>Name of her Village or street of residence</i>)			[VILLAGE]
Q1.13	In which Ward is this village or street?			[WARD]
Q1.14	In which Division is this village or street?	1. Ngorongoro 2. Salei 3. Loliondo		[DIVISION]
Q1.15	In what month and year were you born? (<i>your date, month and year of birth if known</i>)			[DOBPARTICIPANT]]
Q1.16	How old are you in complete years? (<i>your age in years</i>)			[AGERES]
Q1.17	What is the name of your ethnic group?	1. Maasai 2. Mtemi 3. Other (if not any pf the above) If other specify		[ETHNICPARTICIPANT]] [OTHERETHNRES]

2: SOCIO-DEMOGRAPHIC CHARACTERISTICS

Now I would like to ask you some questions on your personal and household issues.

No	Question	Coding categories	Codes	Variable
Q2.1	What of the following best describes your marital status	1. Married 2. Single 3. Cohabiting 4. Widowed 5. Divorced	☐	[MARITALSTAT]
Q2.2	What of the following best describes your marriage status?	1. Monogamous relationship 2. Polygamous relationship		[MARRIAGESTATUS]
Q 2.3	How many wives has your partner/husband including yourself?		☐ ☐	[WIVESNUMBER]
Q2.4	In what month and year was your male partner/husband born? (month and year of his birth)	Fill in 88 if she does not know	☐ ☐ ☐ ☐	[BIRTHPARTNER]
Q2.5	How old is he in complete years?		☐ ☐	[AGEPART]
Q2.6	What is the ethnic group of your male partner?	1. Maasai 2. Mtemi 3. Other (if not any of the above) If other specify	☐	[ETHNICPART] [OTHERETHNPA]
Q2.7	Have you ever attended school	1. Yes 2. No	☐	[EVERSCHOOL]
Q 2.8	What's the highest level of education you have: primary, secondary or higher? (Fill in the highest level completed)	1. No formal education 2. Pre-primary 3. Primary 4. Post primary training 5. Secondary 6. Post secondary training 7. University	☐	[EDUCRESP]
Q2.9	Did your male partner/husband ever attend school	1. Yes 2. No	☐	[PARTNERSCHOOL]
Q 2.10	What's his highest level of education: primary, secondary or higher? (Fill in the highest level completed)	1. No formal education 2. Pre-primary 3. Primary 4. Post primary training 5. Secondary 6. Post secondary training 7. University	☐	[EDUCPARTNER]
Q2.11	Is he assisting you in this pregnancy?(ask if he is assisting in her up-keep)	1. Yes 2. No	☐	[UPKEEP]
Q 2.12	What is your occupation; that is, what kind of work do you mainly do?			[OCCUPRESP]
Q 2.13	What's your husband's (partner's) occupation?			[OCCUPSPOUSE]
Q 2.14	Where does he live most of the year?	1. At home with me most of the time 2. Away temporarily; has migrated for pasture or trade 3. Not at home (he has migrated in town to look for employment)	☐	[LIVEMOST]

No	Question	Coding category	Codes	Variable
Q2.14	Where does he live now?	1. At home with me most of the time 2. At home but migrates for some months for pasture or trade 3. Not at home (he has migrated in town to look for employment)	☐	[LIVENOW]
What of the following best describes the house you live in? (please tick the appropriate description from the choices in the next column)				
Q2.15	Roof made of	1. Grass 2. Earth 3. Iron sheets 4. Roofing tiles	☐	[ROOF]
Q2.16	Walls made of	1. Grass 2. Simple earth bricks 3. Wood 4. Cement or improved earth bricks	☐	[WALLS]
Q2.17	Source of drinking water	1. In-house piped water 2. Piped water in a public tap 3. Well in residence 4. Public well 5. Spring for drinking water 6. River, canal or surface water for drinking 7. Uses rain water for drinking 8. Uses tanker truck water for drinking	☐	[WATER]
Q2.18	Type of toilet	1. Private flush toilet 2. Public flush toilet 3. Pit latrine for toilet 4. Has bush or field as latrine	☐	[TOILET]
Q2.19	What is the source of power for household lighting?	1. Electricity 2. Kerosene 3. Solar power 4. Gas	☐	[LIGHTSOURCE]
Q2.20	What is the source of power for household cooking?	1. Wood 2. Cow-dung 3. Charcoal 4. Biogas 5. LPG 6. Electricity	☐	[POWERCOOK]
Now let us talk on some possession in your household				
Q2.21	Does your family own a radio?	1. Yes 2. No	☐	[RADIO]
Q2.22	Does your family own a Bicycle?	1. Yes 2. No	☐	[BICYCLE]
Q2.23	Does your family own a Television?	1. Yes 2. No	☐	[TELEVISION]
Q2.24	Does your family have cattle?	1. Yes and able to sustain us throughout the year 2. Yes and able to sustain us most of the year 3. Yes but unable to sustain us most of the year 4. Does not have cattle	☐	[CATTLE]
Q2.25	Does your family have a farm?	1. Yes and able to sustain it throughout the year 2. Yes and able to sustain it most of the year 3. Yes but unable to sustain it most of the year 4. Does not have a farm	☐	[FARM]

No	Question	Coding category	Codes	Variable
Q2.26	Do you have enough food for your family throughout the year?	1. Yes 2. No	☐	[FOOD]
Q2.27	How often in a year do you usually have problems in satisfying the food needs of your household?	1. Never 2. Seldom 3. Sometimes 4. Often 5. Always	☐	[FOODSATISFY]

3: OBSTETRICS HISTORY

Now let us talk about previous pregnancy history if you had ever had any.

No	Question	Coding categories	Codes	Variable
Q3.1	How many pregnancies have you ever had in your lifetime including this one?		☐ Number	[GRAVIDITY]
Q3.2	Have you ever had any pregnancy that was miscarried?	1. Yes 2. No 3. Not applicable (1 st pregnancy)	☐	[PREG-LOSS]
Q3.3	How many of such pregnancies have you ever had in your life?	Fill not applicable value: '88' if have never had any	☐ Number	[PREGLOSSNOS]
Q3.4	How many of these were before five months (20 weeks)	Fill not applicable value: '88' if have never had any	☐ Number	[ABORTION]
Q3.5	How many of these were five months or beyond	Fill not applicable value: '88' if have never had any	☐ Number	[MISCARRIAGE]
Thank you for the discussion so far. Let us talk on the children you ever delivered in your life				
Q3.6	How many children have you ever delivered in your lifetime?	Fill not applicable value: '88' if have never had any	☐ Number	[PARITY]
Q3.7	How many of these were born alive? (<i>those that showed any sign of life</i>)	Fill not applicable value: '88' if have never had any	☐	[BORN-ALIVE]
Q3.8	How many children you had ever delivered are alive today?	Fill not applicable value: '88' if have never had any	☐ Number	[CHILD-ALIVE]
Q3.9	Just to be sure of what I've asked you; you said you have ever had live children and are still alive today. In other words of all the children you delivered are not alive today; is this correct? (<i>this must be equal to number given in Q3.7 minus that given in Q3.8</i>)	1. Yes 2. No 88. Not applicable	☐	[ALIVE-DEAD]
Q3.10	Have you ever delivered in a health unit?	1. Yes 2. No	☐	[HEALTHDELIV]
Q3.11	Have you ever attended antenatal care in the last five years?	1. Yes 2. No	☐	[ANTENATALFIVE YEARS]
Q3.12	Did you attend antenatal clinic in your last pregnancy	1. Yes 2. No 88. Not applicable (had never had any)	☐ Number	[ANCPREG]
Q3.13	Where did your last delivery take place?	1. Home 2. Health units 3. On way to health unit 88. Not applicable (had never had any)	☐	[DELIVERPLACE]

No	Question	Coding category	Codes	Variable
Q3.14	If delivery in a health unit please specify	1. Dispensary 2. Health centre 3. Hospital 88. Not applicable (had never Had any)	☐	[SPECIFYUNIT]
Q3.15	Who assisted you in the last delivery	1. TBA 2. Neighbour/relative 3. Care provider at health units 4. None 88. Not applicable (had never delivered)	☐ ☐	[ASSISTANTDEL]
Q3.16	When was your last delivery? (number of years)	Fill 88 if not applicable (had never delivered before)	☐ ☐ Years	[WHENLASTDEL]
Q3.17	What was the outcome of your latest delivery?	1. Live baby and alive today 2. Live baby but died within one month of delivery 3. Live baby but died beyond one month 4. Still birth 88. Not applicable (had never delivered)	☐ ☐	[OUTCOMELATESTDEL]

4: ANTENATAL CARE IN THE CURRENT PREGNANCY

Allow me to ask you some questions on your current pregnancy and the care you have been getting at this or any other clinic in this district.

No	Questions	Coding category	Codes	Variable
Q4.1	How many months pregnant are you? (age of your pregnancy in complete months)	Fill in 88 if she does not know and you cannot ascertain it from any other source	☐ ☐ Number	[GA]
Q4.2	How many months pregnant were you when you started attending antenatal clinic (If she is not sure, request her to show you the antenatal card and record the gestation age as initially recorded on the card)		☐ ☐ Number	[STARTATTENDANC]
Q4.3	How many times have you attended antenatal clinic in this pregnancy including this one? (check the antenatal card to ascertain this)		☐	[TIMESATTENDEEDANC]
Now let us talk of various components of care you had been given so far especially on your first and subsequent visits				
Q4.4	Were you asked on any information on your previous pregnancies today or on any other day? (History of previous pregnancies. This can be recorded from the antenatal card the respondent has)	1. Yes 2. No 88. Not applicable (1 st pregnancy)	☐	[PREVHISTORY]
Q4.5	Were you asked on any information on this pregnancy today or any other day? (history of current pregnancy. This information is recorded in the antenatal card. Check the card to ascertain it)	1. Yes 2. No	☐	[CURRHISTORY]
Q4.6	Did your provider check for how the baby is lying in the womb by putting her/his hands on your abdomen? (check the antenatal card if this is recorded. If not ask her again if she understands the question and record it as appropriate for her response)	1. Yes 2. No	☐	[BABYCHECK]

No	Question	Coding category	Codes	Variable
Q4.7	Did the provider check for the baby wellbeing by listening at the baby heart beats in the womb? <i>(check the antenatal card if this is recorded)</i>	1. Yes 2. No	☐	[ASCULTATION]
Q4.8	Was your weight measured today or on any other day of your clinic visit? <i>(check the antenatal card if this is recorded)</i>	1. Yes 2. No	☐	[WEIGHT]
Q4.9	Was your blood pressure checked today or on any previous day? <i>(a cuff put around your left arm. check the antenatal card if this is recorded)</i>	1. Yes 2. No	☐	[BP]
Q4.10	Was your urine sample taken today or on any previous day? <i>(check the antenatal card if this is recorded)</i>	1. Yes 2. No	☐	[URINE]
Q4.11	Was your blood sample taken today or on any previous day? <i>(check the antenatal card if this is recorded)</i>	1. Yes 2. No	☐	[BLOODSAMPLE]
Health education and counselling activities				
Q4.12	Were you told on the various complications that a pregnant woman may develop (dangers signs in pregnancy)	1. Yes 2. No	☐	[DANGERSIGNSPREG]
Q4.13	Were you told where to seek care in case of an emergency given?	1. Yes 2. No	☐	[SEEKCARE]
Q4.14	Were you told your expected date of delivery?	1. Yes 2. No	☐	[EDDDDETAILS]
Q4.15	Were you told the danger signs that may develop to a labouring woman?	1. Yes 2. No	☐	[DANGERSIGNSLAB]
Q4.16	Were you helped to identify a place of delivery?	1. Yes 2. No	☐	[PLACEDELIVERY]
Q4.17	Did you discuss with your provider on transport arrangements to reach the place of delivery of your choice?	1. Yes 2. No	☐	[TRANSPORT]
Q4.18	Did you discuss with your provider on financial arrangements for transport and delivery or emergency services?	1. Yes 2. No	☐	[FUND]
Q4.19	Did you discuss with your provider on someone to accompany you to the delivery place identified?	1. Yes 2. No	☐	[COMPANY]
Q4.20	Did you discuss with your provider on identifying possible blood donor(s)?	1. Yes 2. No	☐	[BLOODDONOR]

No	Questions	Coding category	Codes	Variable
Q4.21	Did you discuss with your provider on someone to look after the home when you are away for delivery?	1. Yes 2. No	☐	[HOUSEHOLDCARE]
Q4.22	Did you discuss with your provider on birthing preferences you have? (<i>birthing position or birth attendant you prefer</i>)	1. Yes 2. No	☐	[BIRTHPREFS]
Q4.23	If yes, what type of birthing preference(s) was/were identified?	1. Birthing position 2. Birth attendant 3. No I don't have any 88. Not applicable (did not discuss with provider)	☐	[PREFERENCE]
Q4.24	Did your provider discuss with you on identifying a place for care after delivery?	1. Yes 2. No	☐	[POSTDELCARE]
Q4.25	Did you discuss with your provider on other issues which may prevent you from delivering at a health unit?	1. Yes 2. No	☐	[OBSTACLES]
Q4.26	Did you discuss with your provider on how you can be assisted to overcome the issues above?	1. Yes 2. No	☐	[OVERCOME]
Q4.27	Did your provider discuss with you that all pregnancies are at risk?	1. Yes 2. No	☐	[DISCUSSRISK]
Q4.28	After the discussion with the care provider, do you think you will be able to access health unit/hospital delivery care	1. Yes 2. No 3. Not sure for now 88. Not applicable (not yet discussed with provider)	☐	[ACCESS]
Q4.29	If no what can be done to help you do so?	1. Need more time to think about it and decide 2. My husband, partner or family member need to be invited in the discussion as I cannot decide alone 3. No way (I simply cannot think of delivering in a health unit or hospital 88. Not applicable (not yet discussed with provider)	☐	[BEDONE]
Drug administration activities				
Q4.30	Were you given any drugs to swallow today or on any previous day? (<i>malaria prophylaxis tablets. Ascertain this by checking the antenatal card</i>)	1. Yes 2. No 3. Do not know	☐	[MALARIA]
Q4.31	Were you given any other drugs to take at home today or on any previous day? (<i>anaemia prophylaxis tablets ascertain this by checking the antenatal card</i>)	1. Yes 2. No	☐	[ANAEMIA]
Q4.32	Have you been given an injection in the arm to prevent the baby from getting tetanus (convulsions after birth)? (<i>ascertain this by checking the</i>	1. Yes 2. No 3. Given but do not know	☐	[TETANUS]

	<i>antenatal card)</i>			
No	Question	Coding category	Codes	Variable
Q4.33	Did you need to pay for any service(s) you received today?	1. Yes 2. No	☐	[PAY]
Q4.34	If yes how much did you pay? (Amount in TSH)	Fill in not applicable '88' if she did not pay for services		[AMOUNT]

5: PERCEPTION OF THE QUALITY OF CARE & DELIVERY PLACE PREFERENCE

Let us talk on your opinions on the care you received at this clinic today

Q5.1	How do you rank the quality of care you received at this clinic today?	5. Best ever had 4. Good 3. Neither good nor poor 2. Poor 1. Worst care ever	☐	[RANKQUAL]
Q5.2	Would you recommend this clinic to anyone for antenatal care?	1. Yes 2. No	☐	[RECOMMEND]
Q5.3	Where do you plan to deliver?	1. Home 2. Health unit/Hospital 3. Do not know	☐	[PLANDEL]
Q5.4	Give one major reason for the above choice			[MAJORREASON]
Q5.5	How do you rank the quality of care you are likely to get if you go to deliver at the nearest health unit?	5. Best I'll get 4. Good 3. Neither good nor poor 2. Poor 1. Worst care	☐	[QUALCAREUNIT]
Q5.6	How do you rank the quality of care you are likely to get if you go to deliver at the nearest hospital? (The name of the hospital must be mentioned to her. Two choices available Wasso or Endulen depending on which is near).	5. Best I'll get 4. Good 3. Neither good nor poor 2. Poor 1. Worst care	☐	[QUALHOSPITAL]

6: BARRIERS TO DELIVERY CARE UTILIZATION

No	Question	Coding category	Codes	Variable
Q6.1	Where do you live? (Name of the village or street/suburb depending on what is appropriate)			[PLACEYOU LIVE]
Q6.2	How long does it take you to reach this clinic on foot? (fill in time in minutes)		☐ ☐ ☐ ☐	[CLINICDISTANCE]
Q6.3	Why did you decide to attend antenatal clinic? (Give one major reason)	1. Good for my health 2. Good for my baby's well-being 3. Good for my health and that of my baby's well-being 4. No reason(s) (I attend simply because other women do so)	☐	[ANCREASON]
Q6.4	Where do you usually spend a night preceding your clinic visit? (Ask the name of the village if not her home village and estimate if it is far or neighbouring village for responses 2 or 3)	1. At home 2. Neighbouring village 3. Village/suburb far from my village	☐	[NIGHTSTAY]

No	Question	Code category	Codes	Variable
Q6.5	Which form of transport did you use to come to this clinic today?	1. Walk 2. Bicycle 3. Car 4. Other	☐	[TRANSPORTTOANC]
Q6.6	How long did it take you to reach this clinic using this transport today? (<i>Time in minutes spent to reach the clinic</i>)		☐ ☐ ☐ ☐	[TIMETOREACHANC]
Q6.7	Did you need to pay for transport to reach this clinic?	1. Yes 2. No	☐	[NEEDTOPAY]
Q6.8	If yes how much did you pay? (<i>amount in TSH</i>)	If response is no enter 88 (<i>not applicable</i>)	☐ ☐ ☐ ☐ ☐	[PAYANCTransport]
Q6.9	Which form of reliable and quick transport can you use to reach a nearest dispensary or health center?	1. Walk 2. Bicycle 3. Car 4. Other	☐	[FORMOFTransport]
Q6.10	How long does it take you to reach this health unit using this transport? (<i>Time in minutes spent to reach this health unit using this transport</i>)			[TIMETOREACHCLINIC]
Q6.11	Which form of transport can you use to reach the nearest hospital?	1. Walk 2. Bicycle 3. Car 4. Other	☐	[TRANSPORTTOHOSPITAL]
Q6.12	How long does it take you to reach this hospital using this transport? (<i>Time spent using this transport to reach this hospital</i>)		☐	[TIMETOREACHHOSPITAL]
Q6.13	What is the average transport cost in Tanzanian shillings from your village to this hospital?	Fill in not applicable '88' if she does not pay for transport	☐ ☐ ☐ ☐ ☐	[COSTTRANSPTOHOSPITAL]
Q6.14	What is the cost in TSH for services for normal delivery at nearby dispensary or health centre?	Fill in not applicable '88' if services are free	☐ ☐ ☐ ☐ ☐	[DELIVERYCOSTUNIT]
Q6.15	What is the cost in TSH for services for normal delivery at nearby hospital?	Fill in not applicable '88' if services are free	☐ ☐ ☐ ☐ ☐ ☐	[DELIVERYCOSTHOSPITAL]
Q6.16	What is the cost in TSH for services for C/S at nearby hospital?	Fill in not applicable '88' if services are free	☐ ☐ ☐ ☐ ☐ ☐ ☐	[CSCOST]
Now let us talk on various issues surrounding how various decisions are made in your household/family				
Q6.17	Did you need permission from anyone to come to this antenatal clinic?	1. Yes 2. No	☐	[PERMISSIONTOANC]
Q6.18	If yes from whom was the permission sought	1. Husband/partner 2. In-laws/parents 3. Others 88. Not applicable (if she does not need any permission)	☐	[YESPERMISSION]
Q6.19	Suppose that person is not around, who else gives that permission?	1. Husband/partner 2. In-laws/parents 3. Others 88. Not applicable (if she does not need any permission)	☐	[SECONDPERMISSION]

No	Question	Code category	Codes	Variable
Q6.20	Suppose you fall sick and you wish to seek treatment at a health unit in your area, do you need permission from anyone to seek such care?	1. Yes 2. No	☐	[SICKPERMISSION]
Q6.21	If yes from who is the permission sought?	1. Husband/partner 2. In-laws/parents 3. Others 88. Not applicable (if she does not need any permission)	☐	[SOUGHTFROMWHOM]
Q6.22	Suppose that person is not around, who else gives that permission?	1. Husband/partner 2. In-laws/parents 3. Others 88. Not applicable (if she does not need any permission)	☐	[ELSEPERMISSION]
Q6.23	Do you need permission to seek care for pregnancy related complication(s) at any health unit?	1. Yes 2. No	☐	[CAREPERMISSION]
Q6.24	If yes, from who is that permission sought?	1. Husband/partner 2. In-laws or parents 3. Others 88. Not applicable (does not need permission)	☐	[SEEKCAREPERMIT]
Q6.25	Suppose that person is not around, who else gives that permission?	1. Husband/partner 2. In-laws/parents 3. Others 88. Not applicable (if she does not need any permission)	☐	[SECPERMISSION]
Q6.26	Do you need permission from anyone if you decide to go to a health unit for a normal delivery? (<i>health unit means dispensary, health centre or hospital</i>)	1. Yes 2. No	☐	[PERMISSIONNORMALDEL]
Q6.27	If yes from whom was the permission sought	1. Husband/partner 2. In-laws/parents 3. Others 88. Not applicable (if she does not need any permission)	☐	[PERMISSIONNORMAL]
Q6.28	Suppose that person is not around, who else gives that permission?	1. Husband/partner 2. In-laws/parents 3. Others 88. Not applicable (if she does not need any permission)	☐	[SECONDPERMISSIONNORMAL]
Q6.29	Is such permission needed even for life threatening pregnancy related complication(s) to you and/or your unborn baby?	1. Yes 2. No	☐	[PERMISSIONTHREATLIFE]

No	Question	Code category	Codes	Variable
Q6.30	Which of the following best describes why do most women in your area deliver at home than at the available dispensaries or hospital?	1. Hospital/dispensaries are far or due to transport problems 2. Not allowed by their husbands or TBAs or relatives 3. Most have no problems and therefore feel that home delivery is equally safe 4. It is expensive to deliver at a dispensary or hospital 5. Traditions and norms do not allow	☐	[WHYHOMEDEL]

To be filled by the interviewer

Q6.31	How far is your residence from this clinic? <i>(distance in km)</i>		 km	[DISTANCEVILCLINIC]
Q6.32	If the respondent did not spend a previous night at home, how far in kilometers is this village/street/suburb from this clinic site	Fill in not applicable '88' if she did not spend a night outside her home	 km	[DISTANCENIGHTSTAYVIL]
Q6.33	How far is the nearest health unit offering delivery services from your house? <i>(distance in km)</i>			[DISTANCEHOMEDELUNIT]
Q6.34	Time interview ended			[TIMEEND]

Thank you very much for your time. Do you have any question to ask me? (Please write freely the questions she asks at the back of the page)

7: PROVIDER’S SATISFACTION WITH CARE

To be filled by the provider and given to the interviewer at the end of the clinic day

Q7.1	Compared to the care you provided to mothers at this clinic previously, how do you rank the care you provided to this mother today?	1. Same as before 2. Better than before 3. Worse than before	☐	[PREVIOUSCARE]
Q7.2	Were you satisfied with the care you provided to this woman today?	1. Yes 2. No	☐	[SATISFACTION]
Q7.3	How do you rank your satisfaction/dissatisfaction of the care you provided to this mother at this clinic today? <i>(copy it from the provider's key message sheet)</i>	5. Very satisfied 4. Satisfied 3. Indifferent 2. Dissatisfied 1. Very dissatisfied	☐	[RANK-SATISFACTION]
Q7.4	Is there anything that needs to be improved at this clinic?	1. Yes 2. No	☐	[THINGSTOIMPROVE]
Q7.5	If yes, mention one most important thing you feel should be improved			[FEELIMPROVED]
Q7.6	Had you enough time to talk to this woman today?	1. Yes 2. No	☐	[ENOUGHTIMESPENT]
Q7.7	How many women did you see today?			[WOMENSEENTODAY]
Q7.8	How many providers were you at this clinic today?		☐	[PROVIDERSATCLINIC]

B: POSTNATAL QUESTIONNAIRE

1: IDENTIFICATION

No	Question	Coding category	Codes	Variable
Q1.1	Name of health unit			[HEALTHUNIT]
Q1.2	Study number			[STUDYNUMBER]
Q1.3	Antenatal clinic number			[ANCNUMBER]
Q1.4	Name of the interviewer			[NAMEINTERVIEWER]
Q1.5	Place of interview	1. Clinic site 2. Home 3. Other If other specify	 	[PLACEINTERVIEW] [INTERVIEWPLACEOTHER]
Q1.6	Date of interview (dd/mm/yy)			[DOI]
Q1.7	Time at the beginning of interview			[TIMESTART2]
Q1.8	Have you moved residence since our last interview?	1. Yes 2. No		[MOVEDRESIDENCE]
Q1.9	If yes, where is your the new residence?	1. Within the previous village 2. Outside the previous village but within the same ward 3. Outside the previous ward but within the same division 4. Outside the previous division 5. Not applicable (Did not change residence)		[NEWRESIDENCE]

2. ANTENATAL CARE EXPERIENCE

Let us now talk on your experience during antenatal care to see whether the care met your expectation or not.				
Q2.1	How many times did you attend antenatal care before you delivered (<i>This information is also found on the antenatal card which the woman is likely to have. Please check it to ascertain what you will be told</i>)			[TIMESATTENDEDANTENATAL]
Q2.2	Were you always able to get care when you sought it at this or any other clinic in your recent pregnancy? (<i>Ask the woman if there were times she sought care but that care could be obtained due to any reason</i>)	1. Yes 2. No		[ALWAYSGETCARE]
Q2.3	If no how often did it occur in your entire recent pregnancy? (<i>Number of times the care could not be provided</i>)	Fill in 88 if she was always able to get care		[TIMESSESHEMISSEDCARE]

Q2.4	Were there times when you had to wait for long times before antenatal care was provided to you when you sought care at this or any other clinic in your recent pregnancy?	1. Yes 2. No	☐	[WAITLONGHOURSTOGETCARE]
Q2.5	If yes how often did it occur?	1. Very often (It always occurred) 2. Occasionally 3. Never	☐	[HOWOFTENWASTHEDELAY]
Q2.6	Did your provider listen to you well at discussions during the recent antenatal clinic attendances?	1. Yes 2. No	☐	[DIDPROVIDERLISTEN]
Q2.7	How do you rank how your provider(s) listened to you during these visits?	1. Good (Listened to me attentively) 2. Fair (Listened to me but not attentively) 3. Bad (Providers did not listen to me/ were rude)	☐	[RANKHOWYOUWERELISTENED]
Q2.8	Were you or other women attendees given chances to ask questions at discussions during these visits?	1. Yes 2. No	☐	[CHANCETOASKQUESTIONS]
Q2.9	How do you rank these discussions with your provider(s) during antenatal care visits?	1. Good (Allowed me to ask questions and I had sufficient explanations for most of my concerns) 2. Fair (I had no or limited time to ask questions and I was given insufficient explanations for my concerns) 3. Bad (Providers were rude/did not provide any explanation for my concerns)	☐	[RANKQUESTIONSASKED]
Q2.10	Mention one thing you did not like most from the antenatal care you received during your recent pregnancy			[WHATSHEDISLIKEDMOST]
Q2.11	Mention one thing you liked most from the antenatal care you received during your recent pregnancy			[WHATSHELIKEDMOST]

3: PREGNANCY, LABOUR AND DELIVERY PREPAREDNESS

Now let us talk of some arrangements you possibly had before delivery. If you had any, answer Yes but if you did not have one feel free to say no. There is no wrong or right answer, I just want to know what arrangement you had or did not have.

No	Questions	Coding categories	Codes	Variable
Q3.1	Were you able to make a definitive decision while pregnant where you wanted to deliver?	1. Yes 2. No	☐	[DECISIONDELIVERY]
Q3.2	Did you know which dispensary or health center to go to in case you developed a complication? <i>(circle yes only if she identifies correctly one of the nearby health unit and the interviewer should write the name of the unit in full if the response is yes)</i>	1. Yes 2. No	☐	[HEALTHUNITCOMPLICATION]

Q3.3	Did you know which hospital to go to in case you developed a major complication (<i>circle yes only if she identifies correctly the closest hospital, the answer is either Endulen or Wasso, depending on what is nearer. Write the name of the hospital she mentions in the space below the choice</i>)	1. Yes 2. No	☐	[HOSPMajorComplication]
Q3.4	What plans did you put in place to enable you to reach the place you intended to deliver at?	1. Move near the health unit before labour started so that I could reach the health unit after labour onset without delay 2. Travel by car directly to the health unit before labour onset 3. Travel by any other transport to the health unit after labour onset 4. Just walk to the delivery unit from home after or before labour onset 88. Not applicable (made no plans to reach the delivery site)	☐	[PlansPlacedDelivery]
Q3.5	Pregnancy complications are usually unpredictable and as a result women may be required to make transport arrangements in case of need. Did you have any?	1. Yes 2. No	☐	[TransportArrange]
Q3.6	Did your family manage to keep some money for transport to reach a health unit?	1. Yes 2. No	☐	[MoneyTransport]
Q3.7	If yes how much money did you put aside? (Amount in Tanzanian shillings)			[Put Aside MoneyTransport]
Q3.8	Did your family manage to keep some money for your delivery care costs if any?	1. Yes 2. No 88. Not applicable (delivery free)	☐	[PutAsideMoneyDelivery]
Q3.9	If yes how much money did you put aside? (Amount in Tanzanian shillings)			[Put Aside Money]
Q3.10	Most women prefer someone of their choice to be around them during labour and delivery. Did you identify one before labour?	1. Yes 2. No	☐	[DeliveryCompanion]
Q3.11	Did she/he accompany you to the delivery place?	1. Yes 2. No 88. Not appropriate (did not identify one)	☐	[Accompany]
Q3.12	Was she/he there with you during labour and delivery?	1. Yes 2. No 88. Not appropriate (did not have one)	☐	[LabourCompanion]

Q3.13	If a woman is required to leave home to go and deliver in hospitals she may have no one to take care of her home or even her children. As a result, arrangements can be made for someone to assist her with household duties while she is away. Did you make such arrangements for yourself?	1. Yes 2. No	☐	[HOMECARE]
Q3.14	Did you make arrangements for someone to donate blood for you in case you needed it during labour, delivery or after delivery?	1. Yes 2. No	☐	[DONATEBLOOD]
Q3.15	Were you accompanied by your husband or male partner to the pregnant women's clinic for a discussion on how you could be helped to deliver safely at any point of your pregnancy?	1. Yes 2. No	☐	[MALE-PARTNER]
Q3.16	Do you think such visits should be encouraged so that men attend routinely?	1. Yes 2. No	☐	[MENATTEND]

4: EMERGENCY OBSTETRIC CARE, LABOUR AND DELIVERY INFORMATION

I would like to talk to with you about your health today and during the just ended pregnancy and in particular any health problems you may have had including serious complications.

No	Question	Coding categories	Codes	Variable
Q4.1	How long ago was your delivery (duration in weeks)		☐ ☐	[DELIVERYDURATION]
Q4.2	When did you deliver your baby (date, dd/mm/yy)		☐ ☐ ☐ ☐	[DELIVERYDATE]
Q4.3	At what time did labour start?	1. Day time 2. At night		[TIMELABOURSTARTED]
Q4.4	At what time was your baby born?	2. Day time 3. At night	☐	[TIMEBABYBORN]
Q4.5	Where were you when labour started?	1. Home 2. Health unit 3. On way to health unit 4. any other place e.g field, looking after cattle etc (NB: health unit may be a dispensary, health centre or hospital)	☐	[PLACELABOURSTARTED]
Q4.6	How many months pregnant were you when you delivered?(This is the time in months from the date of her last normal menstrual period shown on the prenatal card to the delivery date)		☐	[DELIVERYGA]
Q4.7	Did you experience any complications during your last pregnancy?	1. Yes 2. No	☐	[PREGCOMPLICATION]
Q4.8	If yes, what was the complication?	Write 88 if she had no complication		[TYPEOFCOMPLICATION]

Q4.9	Who identified this complication?	1. Self 2. Care provider 3. TBA/traditional healer 4. Neighbour/relative/family member 88. Not applicable (had no complication)	☐	[ANTENATALPROBLEM]
Q4.10	Did you seek help from anyone?	1. Yes 2. No 88. Not applicable (had no complication)	☐	[WHETHERHELPSOUGHT]
Q4.11	Who decided that help be sought?	1. Husband 2. Neighbour/relative 3. TBA/traditional healer 4. Myself 5. Care provider during clinic visit/health unit 88. Not applicable (Had no complication)	☐	[DECIDEDTOSEEKHELP]
Q4.12	Where did you seek that help?	1. Health unit 2. TBA/Traditional healer 4. Neighbour or relative 3. Sought no help 88. Not applicable (had no complication)	☐	[SEEKCARECOMPLICATION]
Q4.13	Was this complication an emergency? (An emergency complication is any serious condition a woman had that necessitated urgent attention from the provider/caregiver or the woman herself. This could have necessitated transport to a nearby or distant health unit or not).	1. Yes 2. No 3. Do not know 88. Not applicable (had no complication)	☐	[PREGEMERGENCY]
Q4.14	Did you experience any complications during labour, delivery, or after delivery?	1. Yes 2. No 88. Not applicable (had no complication)	☐	[DELIVERYCOMPLICATION]
Q4.15	What type of complication had you?	Write 88 if she had no complication		TYPEDELIVERCOMPLICATION
Q4.16	Who identified this complication?	1. Self 1. Care provider 2. TBA/traditional healer 3. Neighbour/relative/family member 88. Not applicable (had no complication)	☐	[POSTNATALPROBLEM]
Q4.17	Did you seek help from anyone?	1. Yes 2. No	☐	[CARESOUGHTPOSTNATAL]
Q4.18	Who decided that help be sought?	1. Husband 2. Neighbour/relative 3. TBA/traditional healer 4. Myself 5. Care provider during clinic visit/health unit	☐	[DECIDEDPOSTNATALHELP]

Q4.19	Where did you seek help?	1. Health unit 2. TBA/Traditional healer 4. Neighbour/relative 3. Sought no help 88. Not applicable (had no problem)	☐	[SEEKCAREEMERGENCY]
Q4.20	Was this complication an emergency? (An emergency complication is any serious condition a woman had that necessitated urgent attention from the provider at delivery. This could have necessitated transport to a nearby or distant health unit or not).	1. Yes 2. No 3. Do not know 4. Not applicable (had no problem)	☐	[DELIVERYEMERGENCY]
Q4.21	What form of transport did you use to reach your place of delivery?	1. Walked 2. Car 3. Any other form of transport e.g bicycle etc 88. Did not need any as I delivered at home	☐	[DELIVERYTRANSPORT]

5: FACTORS INFLUENCING WHERE WOMEN DELIVERED

Let us now talk on factors you considered when planning for a place of delivery. Please tell me whether the following had no influence at all or influenced your choice to a small, moderate, large or very large extent.

No	Question	Coding categories	Codes	Variable
Q5.1	Where did you plan to deliver?	1. Home 2. Health unit/hospital 3. Had made no plans	☐	[WHEREPLANNEDTODELIVER]
Were the following factors of any influence on where you planned to deliver? Fill in the appropriate response				
Q5.2	Place of delivery near to your house	1. Not at all 2. To a small extent 3. To a moderate extent 4. To a large extent 5. To a very large extent 88. Not applicable (had made no plans)	☐	[DELIVERYNEAR]
Q5.3	Affordability of the cost of delivery care	1. Not at all 2. To a small extent 3. To a moderate extent 4. To a large extent 5. To a very large extent 88. Not applicable (had made no plans)	☐	[AFFORDABILITY]
Q5.4	Good care During the prenatal period	1. Not at all 2. To a small extent 3. To a moderate extent 4. To a large extent 5. To a very large extent 88. Not applicable (had made no plans)	☐	[BETTERCARE]
Q5.5	Belief that I will get good delivery care	1. Not at all 2. To a small extent 3. To a moderate extent 4. To a large extent 5. To a very large extent 88. Not applicable (had made no plans)	☐	[BETTERQUALITY]
Q5.6	Dialogue with providers during antenatal clinic visits	1. Not at all 2. To a small extent 3. To a moderate extent	☐	[DIALOGUEPROVIDERS]

		4. To a large extent 5. To a very large extent 88. Not applicable (had made no plans)		
Q5.7	Convinced that delivery would be safe there	1. Not at all 2. To a small extent 3. To a moderate extent 4. To a large extent 5. To a very large extent 88. Not applicable (had made no plans)	☐	[SAFEDELIVERY]
Q5.8	Opinion of family member (s)	1. Not at all 2. To a small extent 3. To a moderate extent 4. To a large extent 5. To a very large extent 88. Not applicable (had made no plans)	☐	[FAMILY]
Q5.9	Opinion of traditional birth attendant (TBA)	1. Not at all 2. To a small extent 3. To a moderate extent 4. To a large extent 5. To a very large extent 88. Not applicable (had made no plans)	☐	[TBA]
Q5.10	Traditions and norms that expects women to deliver where you delivered	1. Not at all 2. To a small extent 3. To a moderate extent 4. To a large extent 5. To a very large extent 88. Not applicable (had made no plans)	☐	[TRADITIONNORMS]
Q5.11	Had complication during pregnancy that necessitated referral to a place where the delivery had to take place	1. Not at all 2. To a small extent 3. To a moderate extent 4. To a large extent 5. To a very large extent 88. Not applicable (had made no plans)	☐	REFERALCOMPLICATION]

Let us now talk on factors that influenced you to choose the site you delivered in. .

No	Question	Coding categories	Codes	Variable
Q5.12	Where did your delivery take place?	1. Home 2. Health unit/hospital 3. On way to a health unit/hospital 4. Any other place other than the above		
Q5.13	How did you deliver?	1. Normal vaginal delivery 2. Assisted vaginal delivery (example baby delivered using a vacuum or when the buttocks were the presenting part (breech)) 3. Through an operation (C/S)	☐	[MODEOFDELIVERY]
Q5.14	If you delivered at a health unit, at which health unit did you give birth? <i>(The name and of the health unit (dispensary, health center or hospital) must be filled)</i>	Name of health unit (Fill 88 if she delivered at a place other than a health unit)	☐	[WHERE SHEDELIVERED]
Q5.15	Give one major reason for the above choice			[REASONDELIVERYPLACE]
Q5.16	Was this the delivery site of your choice?	1. Yes 2. No	☐	[SITEOFOURCHOICE]

Q5.17	If this was not the delivery site of your choice, why did you deliver at this location? (Please write any verbatim explanation the woman gives freely in the space below if the response is other)	1. Advised so by care provider during ANC 2. Advised so by a family member or relative or TBA 3. Labour came earlier than the expected date 4. Had no one to take care of my household 5. Had no money for transport and/or service fee 6. Had emergency referral 7. Other 88. Not applicable (delivery site was of her choice)	☐	[WHYNOTYOURCHOICE]
Q5.18	What was the outcome of your delivery?	1. Baby alive and well 2. Baby alive but unwell 3. Baby born dead 4. Baby born alive but died within the first week 5. Baby born alive but died more than one week after delivery	☐	[NEONATALOUTCOME]
Were the following factors of any influence on choosing where you delivered? Please tell me whether the following had no influence at all or influenced your choice to a small, moderate, large or very large extent. Fill in the appropriate response.				
Q5.19	Place of delivery near to your house	1. Not at all 2. To a small extent 3. To a moderate extent 4. To a large extent 5. To a very large extent	☐	[DELIVERYNEAR]
Q5.20	Affordability of the cost of delivery care	1. Not at all 2. To a small extent 3. To a moderate extent 4. To a large extent 5. To a very large extent	☐	[AFFORDABILITY]
Q5.21	Good care During the prenatal period	1. Not at all 2. To a small extent 3. To a moderate extent 4. To a large extent 5. To a very large extent	☐	[BETTERCARE]
5.22	Belief that I will get good delivery care	1. Not at all 2. To a small extent 3. To a moderate extent 4. To a large extent 5. To a very large extent	☐	[BETTERQUALITY]
Q5.23	Dialogue with providers during antenatal clinic visits	1. Not at all 2. To a small extent 3. To a moderate extent 4. To a large extent 5. To a very large extent	☐	[DIALOGUEPROVIDERS]
Q5.24	Convinced that delivery would be safe there	1. Not at all 2. To a small extent 3. To a moderate extent 4. To a large extent 5. To a very large extent	☐	[SAFEDELIVERY]
Q5.25	Opinion of family member (s)	1. Not at all 2. To a small extent 3. To a moderate extent 4. To a large extent 5. To a very large extent	☐	[FAMILY]

Q5.26	Opinion of traditional birth attendant (TBA)	1. Not at all 2. To a small extent 3. To a moderate extent 4. To a large extent 5. To a very large extent	☐	[TBA]
Q5.27	Traditions and norms that expects women to deliver where you delivered	1. Not at all 2. To a small extent 3. To a moderate extent 4. To a large extent 5. To a very large extent	☐	[TRADITIONNORMS]
Q5.28	Had complication during pregnancy that necessitated referral to a place where the delivery took place	1. Not at all 2. To a small extent 3. To a moderate extent 4. To a large extent 5. To a very large extent	☐	REFERALCOMPLICATION]
Q5.29	Had emergency complication that necessitated referral to a place where the delivery took place (An emergency complication is any serious condition a woman had that necessitated urgent attention. This could have necessitated transport to a nearby or distant health unit or not).	1. Not at all 2. To a small extent 3. To a moderate extent 4. To a large extent 5. To a very large extent	☐	[EMERGENCYREFERAL]
Let us talk on your delivery place and how you were assisted				
Q5.30	Who assisted you during delivery?	1. TBA 2. Neighbour/relative 3. Care provider at health unit 4. None (delivered alone)	☐	[DELIVERYASSISTANT]
Q5.31	Did your delivery assistant wash his/her hands with soap or any other material before assisting you at delivery?	1. Yes 2. No 3. Do not remember 88. Not applicable (delivered alone)	☐	[WASH]
Q5.32	Did your assistance put on gloves when assisting you at delivery?	1. Yes 2. No 3. I do not know 88. Not applicable (delivered alone)	☐	[GLOVES]
Q5.33	Which of the following best describes the surface on which your delivery took place?	1. Health unit bed 2. Traditional bed at home/family bed 3. Animal skin/cloth put on the floor 4. House floor/ground outside the house	☐	[SURFACEDELIVERED]
Q5.34	Which of the following best defines what was used to cut your baby's cord?	1. Health unit scissors 2. New razor blade 3. An old razor blade from the woman 3. TBA's/old woman's knife/razor blade 4. Do not know/remember	☐	[CORDCUT]
Q5.35	Which of the following best defines what was used to tie the cord of your baby?	1. With a health unit tie 2. With a prepared new/clean thread 3. With a cloth 4. With a prepared traditional tie	☐	[CORDTIED]

6: POST NATAL CARE AND PRACTICES

Let us now talk on the care you and your baby have received so far after delivery

No	Question	Coding categories	Codes	Variable
Q6.1	Have you attended any post delivery care yet?	1. Yes 2. No	☐	[ATTENDPOSTNATALCARE]
Q6.2	If yes when was the initial care sought? (Give date month and year. The information can also be obtained on the post natal card of the baby which is usually kept by the mother)		☐ ☐ ☐ ☐ ☐ ☐	
Q6.3	How long after the delivery date was the initial care sought? (Time in days)	Fill in 88 if she had not sought any post delivery care yet	☐	
Q6.4	From who was that care sought?	1. Provider at health unit 2. TBA/old woman 88. Had not sought any	☐	
Q6.5	What was the main reason for this attendance?	1. For routine care 2. Woman had a problem 3. Baby had a health problem 4. Both woman and the baby had health problems 88. Not applicable (Has not sought any care)	☐	
Allow me to ask you some questions on the care given to your baby after it was born				
Q6.6	Which of the following best describes what was applied to your baby's cord stump immediately after delivery?	1. Nothing applied 2. Spirit 3. Any other antiseptic 4. Any other material 5. Do not know	☐	[APPLIEDTOCORD]
Q6.7	How long did it take from delivery to the time your baby was wrapped in any cloth?	1. Immediately after birth and before the placenta was delivered 2. Immediately after birth but after the placenta was delivered 3. Some time after the baby was born 4. Do not know	☐	[WRAPPED]
Q6.8	How long did it take before your baby was initially bathed?	1. Immediately after delivery 2. Sometime after delivery but within the first day 3. After the first 24 hours 4. Do not know/remember	☐	[BATH]
Q6.9	How long did it take before you initially breastfed your baby?	1. Less than one hour after delivery 2. Some hours after delivery but within the first three hours 3. Three hours or more hours after delivery and within the 1 st day 4. After the first day 5. Did not breastfeed	☐	[BREASTFED]
Q6.10	Were you able to breastfeed your baby with the initial breast milk (colostrum)?	1. Yes 2. No	☐	[COLOSTRUM]
Q6.11	If the woman did not breastfeed her baby, what was the reason?	1. Advised so by care providers 2. Decided on my own not to breastfeed 3. Baby refused breastfeeding 4. Any other reason	☐	[NOTBREASTFEED]
Q6.12	What was the initial food given to your baby?	1. Water 2. Breast milk 3. Animal fat 4. Any other food other than the above mentioned 5. Do not remember	☐	[INITIALFOOD]

7: KNOWLEDGE OF DANGER SIGNS IN PREGNANCY, LABOUR, DELIVERY AND AFTER DELIVERY

Let us now talk of some health problems which can occur during pregnancy, labour or childbirth. I am going to read a list of these health problems to you. Please tell me which one are danger sign that require medical care. Not all of the signs I will read are real danger signs I will read are serious enough to require immediate action. I am doing this to see whether you have received sufficient information on the real danger signs from your provider.

No	Question	Coding category	Codes	Variable
Knowledge of the danger signs in pregnancy Do you think the following are danger signs in pregnancy?				
Q7.1	Vaginal bleeding	1. Yes 2. No	☐	[BLEEDPREGNANCY]
Q7.2	Blurred vision with or without headache and/or upper central abdominal pain just below the ribs	1. Yes 2. No	☐	[BLURREDVISION]
Q7.3	Fever; that is high body temperature with or without chills	1. Yes 2. No	☐	[FEVER]
Q7.4	Swelling of the face, hands and feet	1. Yes 2. No	☐	[OEDEMA]
Q7.5	Baby in the womb presenting other than by the head after nine months	1. Yes 2. No	☐	[MALPRESENTATION]
Q7.6	Loss of foetal movements for more than two days	1. Yes 2. No	☐	[LOSSMOVEMENT]
Q7.7	Twin pregnancy	1. Yes 2. No	☐	[TWIN]
Q7.8	Abnormal lie of the baby after 36 weeks (nine months)?	1. Yes 2. No	☐	[ABNORMALLIE]
Q7.9	Previous Caesarean section or vacuum delivery	1. Yes 2. No	☐	[LSCSVACUUM]
Q7.10	Having a rash on your face	1. Yes 2. No	☐	[SPOT]
Knowledge of danger signs in labour or delivery Do you think the following are danger signs in labour or delivery?				
Q7.11	Severe bleeding during labour or childbirth; that is bleeding excessively to an extent that you feel extremely thirsty or weak	1. Yes 2. No	☐	[BLEEDINGINLABOUR]
Q7.12	Labour lasting more than 12 hours	1. Yes 2. No	☐	[PROLONGEDLBOR]
Q7.13	Convulsions in labour or childbirth	1. Yes 2. No	☐	[ECLAMPSIA]
Q7.14	Cord coming out of the womb before or during labour	1. Yes 2. No	☐	[CORDPROLAPSE]
Knowledge of danger signs after delivery Do you think the following are danger signs in a woman who has delivered?				
Q7.15	Failure of the placenta to come out after the baby had been delivered	1. Yes 2. No	☐	[RETAINEDPLACENTA]
Q7.16	Fever; that is high body temperature sometimes associated with chills in a delivered woman	1. Yes 2. No	☐	[FEVERAFTERDELIVERY]
Q7.17	Bad smelling vaginal discharge	1. Yes 2. No	☐	[SMELLYVAGDISCHARGE]
Q7.18	Bad smelling vaginal discharge associated with high body temperature	1. Yes 2. No	☐	
Q7.19	Vaginal bleeding more than expected in a woman who has delivered; that is bleeding excessively for days more than expected in a delivered woman	1. Yes 2. No	☐	[POSTDELBLEEDING]

Knowledge of danger signs in the newborn					
Do you think the following are danger signs in the newborn?					
Q7.20	Convulsions/spasms/Rigidity	1. Yes	2. No	☐	[CONVULSIONS]
Q7.21	Difficult/fast breathing	1. Yes	2. No	☐	[DYSPTNOEA]
Q7.22	Very small baby (less than 2.5kg) or premature	1. Yes	2. No	☐	[LBWPREM]
Q7.23	Lethargy/Unconsciousness	1. Yes	2. No	☐	[LETHARGY]
Q7.24	Fever; that is high body temperature that makes the newborn body hot	1. Yes	2. No	☐	[BABYFEVER]
Q7.25	Newborn that cries immediately after delivery	1. Yes	2. No	☐	

8: CARE SATISFACTION BY RESPONDENTS

Let us talk on your perception of the care you received during pregnancy and delivery. I just want to know how you assess the quality of this care and the extent to which it fulfilled your expectations or not.

No	Question	Coding category	Codes	Variable
Q8.1	Taking everything into account, are you satisfied with the antenatal care that was provided to you when you were pregnant?	1. Yes 2. No 3. Not sure	☐	[SATISFIED]
Q8.2	Do you think you had enough time to discuss all your concerns with your provider when you were attending care while pregnant?	1. Yes 2. No 3. Not sure	☐	[TIMEFPRCONCERNS]
Q8.3	Will you recommend this care (clinic) to someone else?	1. Yes 2. No 3. Not sure	☐	[SAMECLINTOSOMEONE]
Q8.4	How satisfied/dissatisfied were you with the antenatal care provided to you before delivery	5. Very satisfied 4. Satisfied 3. Indifferent 2. Dissatisfied 1. Very dissatisfied	☐	[HOWSATISFIED]
Q8.5	Did you change clinics for antenatal care when you were pregnant? (probe for reason(s) if she did change antenatal clinics and write down the reason(s))	1. Yes 2. No	☐	[CLINICCHANGE]
Q8.6	Were you satisfied with the care you received during labour and delivery	1. Yes 2. No 3. Not sure	☐	[DELSATISFACTION]
Q8.7	Do you think you had enough time to discuss all your concerns with your provider when you were in labour and/or during delivery?	1. Yes 2. No 3. Not sure	☐	
Q8.8	Will you recommend the place you delivered to someone else?	1. Yes 2. No 3. Not sure	☐	[DELRECOMEND]
Q8.9	How satisfied/dissatisfied were you with the care you received during labour and delivery?	5. Very satisfied 4. Satisfied 3. Indifferent 2. Dissatisfied 1. Very dissatisfied	☐	[RANKSATISFACTION]
Q8.10	Taking everything into account, are you satisfied with the post delivery care you have received so far?	1. Yes 2. No 3. Not sure 88. Not applicable (has not sought any)	☐	
Q8.11	Do you think you had enough time to discuss all your concerns with your provider when you attended the initial post delivery care?	1. Yes 2. No 3. Not sure 88. No applicable (has not sought any)	☐	

Q8.12	Will you recommend this care (clinic) to someone else?	1. Yes 2. No 3. Not yet decided yet 88. No applicable (has not sought any)	☐	
Q8.13	How satisfied/dissatisfied were you with the post delivery care provided to you so far?	5. Very satisfied 4. Satisfied 3. Indifferent 2. Dissatisfied 1. Very dissatisfied 88. Not applicable (has not sought any)	☐	
Q8.14	Time interview ended			[TIMEEND]

Thank you very much for your time. Do you have anything to ask me? (Please write her comments down)

Appendix 11: A focus group discussion guide

A focus group discussion guide for a cluster randomized controlled trial on the effectiveness of antenatal birth plans in improving the utilization of skilled delivery care in Ngorongoro district, northern Tanzania (English version)

A: Discussion guide for FGDs with service users

Introduction

Welcome and thank you for taking time to talk with us today.

We will be taking about issues related to antenatal care, pregnancy, and factors leading to the low utilization of health units for delivery.

We are interested in learning from you about these issues in order to find ways of serving you better in future.

Please feel free to share your ideas and opinions, even if they are different from others.

There are no right or wrong answers.

We want to get as many different points of view as we can.

The purpose of this discussion is to help us learn more about how we can help pregnant women and their families.

Anything we say here today is private, and what you say will not be shared with anyone else.

It is important to remember that what is said in the group today stays in the group. Please do not share with others what is said here today.

The session should last between 1 ½ and 2 hours.

We are requesting to tape record this discussion to make sure we don't miss any of your comments. We will also be taking notes, but often they are not as complete as when we tape record the discussion.

Try to speak up so the tape recorder picks up your answers, and try to speak one person at a time so we will be able to hear all the voices in the recording.

Since this is a group discussion you do not have to wait for me to call on you to speak. Just speak up whenever you have something you want to say, as long as no one else is talking.

Let's start by going around the circle one at a time and introducing ourselves. Please tell us your first (not family) name, the number and age of your children if you have any, and what you enjoy doing (or some other question that would not be intrusive and would just help people relax a bit).

Now let's talk a little bit about delivery preferences among women in this district.

Many women go to the health units or mobile clinics for antenatal care during pregnancy, but choose to deliver their babies at home. What is the best place to deliver a baby? Why? Under what conditions would the home be the best place to deliver? Who is the best person to attend a home delivery? (Probe: age, training, practices of TBAs) Is there anything to be afraid of when you deliver at home?

Under what conditions would the health units (hospitals, health centres and dispensaries) be the best place to deliver? Is there anything to be afraid of when you go to the health unit for delivery? (Probe: reason for stigma) Who makes the decision about where a woman should deliver her baby? If a woman wants to deliver at the health unit, what might prevent her from having her delivery there? (barriers to hospital/other health unit delivery)

What would make it easier for her to have a health unit delivery? (how can women be helped to surmount the obstacles e.g. financial, cultural, provider related and distance barriers). Ask how each barrier can be surmounted, role of providers, women themselves, family members etc. Example for infrastructure for referral systems: What transport is used in case of an emergency to reach a nearby health unit? How long does it take? Is there fear among women for the referral system- something socially or culturally unusual e.g. use of cars, planes etc, for socio-cultural reasons: are there traditions/norms attached to delivery which people can do at home but can't when women deliver in health units/hospitals, can they be done outside the health unit setting e.g. at the dispensaries, health centres or hospital. Continue for other barriers (physical/geographic, lack of decisions to seek care on their own, poor services including lack of drugs, equipments, poor staff attitude). For example: 1) Financial: Do women in this area have money of their own to pay for services at health units? If yes, do they need permissions from husbands/partners or family members to do so? If no, who pays for such services? Do families save money for emergencies and routine services at health units? If yes how? If no why? Can the money be accessed easily? If no, why? What other assets are available to use in case of emergency (e.g cattle, agricultural produce etc)? Who usually decides the use of such assets in normal life and in emergencies? What other assistance may be available for a woman in need of health unit care but does not have any money? (probe e.g. in-laws, her parents, relatives, friends or neighbours). How expensive are transport and delivery costs? (enquire how much they need to pay for such services. For delivery enquire costs for normal delivery and Caesarean section). Do you think this is one of the major reasons why most women prefer to deliver at home?

2) Health service related

Do health units allocate specific time or day for antenatal, delivery or after delivery? If yes enquire when the units are open for antenatal, delivery and after delivery services? Specifically do you have any problems with this arrangement? How could it be improved?

Are there times when a pregnant, labouring or a woman who had delivered fails to get services due to lack of drugs, blood, personnel or other usables? Are there times when you are forced to buy drugs or things like gloves, syringes or razor blades? If yes how often does this happen?

Are there times when women feel that they are not treated well at health units (probe for things like abuse or disrespect from care providers)? How common is this problem? Do you think your needs are usually met when you attend health units for antenatal,

delivery and after delivery care? If yes or no explain how? Do you women usually get enough time to talk to the care providers on delivery care? (probe how?)

Should all women deliver at health units where skilled providers are found? Why and why not? Probe if they agree/disagree and ask for their opinions. What are the problems encountered by women when they deliver at health units How can they be addressed? (Possible solutions)

Is there any role for antenatal care to help them deliver at health units/hospitals? (Start by asking them the reasons for attending antenatal clinics followed by the role of antenatal clinics in increasing utilization of health units/hospitals for delivery) If yes how? How can it be improved to include this component? If no why?

Can antenatal care providers have a role in convincing them to deliver at health units/hospitals? What is the difference between having modern antenatal care during pregnancy and having a health unit delivery? (probe: why is the former acceptable and the latter not).

Specifically, are there some risks which might be introduced in health unit delivery to the mother, baby and to future fertility or reproductive health. If Yes how are these risks taken care of when one delivers at home? What can be done at the health unit level to prevent these complications?

What can be done to improve delivery under skilled providers at the available health units? (Introduce the birth plans concept: discussion and arrangements on desired place of birth, Transport and financial for delivery and emergency, blood transfusion, birthing practices, having a companion in labour and at delivery and social support for household chores like child care, cooking and house keeping)? If yes how? (probe for details) If no why? (probe for details).

CLOSING

We've talked about a lot of things today and we appreciate your willingness to discuss these issues. Is there anything else you would like to say before we stop?

Remember that this discussion is private and please do not share anyone's comments with others outside the group.

Thank you very much for your time.

B: Guide for FGDs with care providers

Introduction

Welcome and thank you for taking time to talk with us today.

We will be taking about issues related to antenatal care, pregnancy, and factors leading to the low utilization of health units for delivery.

We are interested in learning from you about these issues in order to find ways of serving you better in future.

Please feel free to share your ideas and opinions, even if they are different from others.

There are no right or wrong answers.

We want to get as many different points of view as we can.

The purpose of this discussion is to help us learn more about how we can help pregnant women and their families to utilize skilled care at delivery and after delivery at the available health units.

Anything we say here today is private, and what you say will not be shared with anyone else.

It is important to remember that what is said in the group today stays in the group. Please do not share with others what is said here today.

The session should last between 1 ½ and 2 hours.

We are requesting to tape record this discussion to make sure we don't miss any of your comments. We will also be taking notes, but often they are not as complete as when we tape record the discussion.

Try to speak up so the tape recorder picks up your answers, and try to speak one person at a time so we will be able to hear all the voices in the recording.

Since this is a group discussion you do not have to wait for me to call on you to speak. Just speak up whenever you have something you want to say, as long as no one else is talking.

Let's start by going around the circle one at a time and introducing ourselves. Please tell us your first (not family) name, your cadre (Midwife, Public health nurse, Nursing officer, Clinical officer, Assistant medical officer or Medical officer), your work station, the number and age of your children if you have any, and what you enjoy doing (or some other question that would not be intrusive and would just help people relax a bit).

Many women go to the health units or mobile clinics for antenatal care during pregnancy, but choose to deliver their babies at home. Why this discrepancy? (probe for reasons from their perspective). Does antenatal care have any role to promote delivery under skilled providers? (probe for reasons). What is usually done at antenatal clinics to encourage more women to deliver under your care at health units? (Lead the discussion in light of enquiring if counselling/promotion for skilled care at delivery and after

delivery is done at antenatal clinics) If yes, what topics are usually covered? In comparison to other issues you do during antenatal clinics, how much time do you spend on counselling/promotion of skilled delivery attendance? Do you think the time you spend for skilled care counselling is adequate? How can this be improved to include emphasis on skilled care at delivery and after delivery?

Currently, focused antenatal care is offered at all clinics in the district and among many others it emphasizes on provider/client dialogue on birth plans (birth and emergency preparedness). How many of you have been trained on this? What are the things discussed? Do you think birth plans are feasible in your working environment? (explain what you mean by birth plans: planned place of delivery if other than health unit, transport arrangements to the delivery site at onset of labour or during emergency, funding arrangements for delivery or emergency, identification of possible blood donors, identification of a birth companion if needed and if appropriate, support in looking after the household while the woman is away and discussion on danger signs during pregnancy, labour and postpartum). (probe, if yes how and if no, why?).

How common is the involvement of male partners and family members in antenatal care? How can it be improved?

What is the average number of providers at an antenatal clinic/ labour ward on a normal working day? Do you often feel overworked? Are there mechanisms for you to tell the administration of such problems? Do you have enough equipments and supplies for your day to day duties? Are there specific times or days for antenatal clinics or official working hours for delivery care at health units?

Are there specific problems a woman in labour is likely to face at your unit? (probe, if yes what are they, if no why so? Ask for reasons). Attending to pregnant women at clinics or at delivery can be frustrating. Do you encounter communication problems with such women? Who else other than the labour attendant is allowed to be around with a woman in labour? (probe if a family member, relative, friend or TBA can be allowed). Are there specific problems with birth preferences women suggest which you fail to honour? (e.g. positions, birth attendant preferences for example female over male attendants) If yes how do you usually handle them? (probe for details)

Are there some costs to be incurred either directly or indirectly by pregnant women at the antenatal clinics or those who come to deliver in the health units? (probe for the details, how much does it cost for normal delivery, for a C/section)

CLOSING

We've talked about a lot of things today and we appreciate your willingness to discuss these issues. Is there anything else you would like to say before we stop?

Remember that this discussion is private and please do not share anyone's comments with others outside the group.

Thank you very much for your time.

Appendix 12: Key informant interview guide

Key informant interview guide for a study on the effectiveness of antenatal birth plans on utilization of skilled delivery care in Ngorongoro district, Northern Tanzania (English version)

Introduction

Welcome and thank you for taking time to talk with me today.

We will be talking about issues related to care that pregnant women in your area get when they are pregnant, during delivery and after delivery and factors that lead to the very low utilization of health units for delivery.

I will be interested in learning from you about these issues in order to find ways of serving you better in future. Please feel free to share your ideas and opinions with me, even if you know they are different from others.

The purpose of this discussion is to help me learn more about how we can help pregnant women and their families so that pregnancy and delivery are made safe.

There are no right or wrong answers.

Anything we discuss here today is private, and what you say will not be shared with anyone else.

The session should last between 1 ½ and 2 hours.

I'm requesting to tape record this discussion to make sure I don't miss any of your comments. I will also be taking notes, but often, they are not as complete as when we tape record the discussion.

Try to speak up so that the tape recorder picks up your answers

Let us start by discussing the discrepancy between antenatal care and skilled delivery care in this area. Many women in this area attend at antenatal clinics at the health units or outreach clinics in big numbers and with regularity but few opt to deliver at any. What are the reasons for this discrepancy? Why do women attend antenatal care?

What are the general attitudes towards delivery at health units/hospitals in this area? How are various household decisions made in your area? Are there times a woman decides what she wants to do? Can she for example own property or cash? Who makes the decision where pregnant women deliver? (explore for the roles of various groups: the woman herself, the husband or male partner, in-laws, TBAs, traditional leaders/elders, elder women and care providers). What happens if that person is not available i.e. who else can make the decision? What happens in emergency situations? Is permission a must even for life threatening conditions?

In what condition is health unit (dispensary, health centre or hospital) delivery necessary? When is it not necessary?

What are the barriers which can prevent a pregnant woman who prefers to deliver at the health unit not to do so? (Explore for factors such as distance, financial, cultural and health system related like provider attitude, quality of services etc.

What can be done to surmount the above barriers?

Is there any role of antenatal care in helping women to deliver at the available health units? If yes how? If no why

What can be done to improve delivery under skilled providers at the available health units? (Lead him/her to the concept of birth plans i.e. discussion and arrangements on desired place of birth, Transport and financial for delivery and emergency, blood transfusion, birthing practices, having a companion in labour and at delivery and social support for household chores like child care, cooking and house keeping)? If yes how? (probe for details) If no why? (probe for details)

CLOSING

We've talked about a lot of things today and I appreciate your willingness to discuss these issues. Is there anything else you would like to say before we stop?

Remember that this discussion is private and please do not share anyone's comments with others outside the group.

Thank you very much for your time.

Appendix 13: Antenatal clinic participant attendance diary

Name of the Health unit: Unit number

[illegible]

Appendix 14: Delivery register extraction form

(To be filled at discharge from a health unit/hospital).

Participant number ¹	Clinic/ cluster site ²	Date of delivery ³	Gestation age in weeks at delivery ⁴	Mode of delivery ⁵	Delivery outcome ⁶	Postnatal clinic/ cluster site ⁷

1&2: Information to be extracted from the antenatal card.

3: Information to be extracted from the health unit/hospital delivery register.

4: Gestation age in weeks at delivery. Information can be extracted from the ANC or the delivery register.

5: Information to be extracted from the delivery register 1. spontaneous vaginal delivery 2. Assisted vaginal delivery 3, Caesarean section. Please fill in the number and the best description of the mode of delivery from the three choices given.

6: Immediate postpartum pregnancy outcome (fill in information for the first 48 hours or at discharge depending on what occurs earlier). Both maternal and foetal outcomes required (1.Both mother and baby o.k. 2. Mother had complication(s) baby o.k. 3. Baby with complication(s) mother o.k.). Fill in the best description of the outcome as indicated in the delivery register.

7: Ask the mother which postnatal clinic sites she will be attending at. This is important for postnatal follow-up.

Appendix 15: Focused antenatal care attendance protocol -Tanzania

Basic components checklist (The current standard and the one to be used for control arm of the study) Note: Activities carried out at each visit indicated by the unshaded boxes.
(The closest gestational age at the time of visit used.)

FIRST VISIT for all women at first contact with clinics, regardless of gestational age. If first visit later than recommended, carry out all activities up to that time Date: / /	1st <16weeks	2nd	3rd	4th
Classifying form which indicates eligibility for the basic component of the programme				
Clinical examination				
Clinically severe anaemia? Hb test				
Obstetric examination: (gestational age estimation, uterine height)				
Gynaecological examination: (can be postponed until second visit)				
Blood pressure taken				
Maternal weight / height				
Rapid syphilis test performed, detection of symptomatic STIs				
PMTCTC (HIV test & record her appropriately 1,2 or 0)				
Urine test (multiple dipstick) performed				
Blood type and RH requested				
Tetanus toxoid given				
Fe/ Folic acid supplementation provided				
Discussion on immunization schedule and birth and emergency preparedness				
SECOND VISIT and SUBSEQUENT VISITS DATE: / /	Gestational	Age 20-24 wks	approx. # 28-32wks	of wks 36- 40wks
Clinical examination for anaemia				
Obstetric. exam: gestation age estimation, uterine height, foetal heart rate				
Blood pressure taken				
Maternal weight (only women with low weight at first visit)				
Urine test for protein (only nulliparous women/ women with previous pre-eclampsia)				
Fe/ Folic acid supplementation given				
Mebendazole 500mg start				
Malaria prophylaxis (repeat after 4 weeks or during next visit)				
Recommendation for emergencies				
THIRD VISIT: add to second visit DATE: / /				
Haemoglobin test requested				
Tetanus toxoid (second dose)				
Instructions for delivery/plan for birth				
Recommendation for lactation/contraception				
FOURTH VISIT: add to second and third visits DATE: / /				
Detection of breech presentation and referral for external cephalic version				
Complete delivery plans/more education on danger signs/emergencies				
Complete ANC card, recommend that it be brought to hospital				

NB: Table format adopted from a table in the World Organization document titled, "WHO Antenatal care Randomized Trial. Manual for implementation of the new model. , WHO, Geneva 2002".⁸⁴

Appendix 16: Process evaluation of the birth plans intervention and routine care provided to women during antenatal and postnatal care consultations in the trial

Intervention logic	Indicators		Source of verification		Information use	Assumption(s)
	Description	Baseline	Target	Data source	Data collection method	Responsible person
Goal: To evaluate how the birth plans intervention was implemented and routine ANC provided to women in various primary care units in Ngorongoro district, northern Tanzania	Proportion of units providing the various care components including that for birth plans	unknown	100% coverage at intervention units	i) Care observation ii) Interview with care providers & attendees iii) Recorded provider-attendees interaction at care sessions iii) Timing of ANC consultations	Cross-section survey	PI, trained research assistant
Purpose: understand how the birth plan intervention and routine ANC were implemented at various care units	Proportion of care units offering various antenatal care components after the introduction of the birth plan intervention Time for ANC steps in both the intervention and control health units	Unknown	100% of intervention care units that offered all the antenatal care components including for birth plans	i) Care observation ii) Interview with care providers & attendees iii) Recorded provider-attendees interaction at care sessions Timing of various steps of ANC provided to women in both the intervention and control health units.	Cross-section survey	PI, trained research assistant
					i) understand how the birth plan intervention was implemented ii) understand the components of routine care that are provided to women at various primary level care units Document the duration for providing the various steps of focused ANC in the two arms of the study	i) the intervention was implemented at the intervention units ii) routine care is provided as per available national focused antenatal care guidelines

Intervention logic	Indicators		Source of verification		Information use	Assumption(s)
	Description	Baseline Target	Data source	Data collection method		
Output 1 Improved time of consultation for antenatal and post natal care	i) Time spent for various components of antenatal care consultation including for birth plans dialogue in both intervention and control health units		Recorded provider-interaction	Analysis of the recorded provider-interaction	PI	All intervention and control clinics with be audio-taped
	ii) Time spent for post natal consultation in both the intervention and control clinics					
	iii) Proportion of units offering health education for PMTCT		Recorded provider-interaction	Analysis of the recorded provider-interaction	PI	All intervention and control clinics with be audio-taped
			Recorded provider-attendees interaction	Analysis of the recorded provider-attendees interaction	PI	All intervention and control clinics with be audio-taped

Intervention logic	Indicators			Source of verification			Information use	Assumption(s)
	Description	Baseline	Target	Data source	Data collection method	Responsible person		
Output 2 Improved provider attendees interaction at intervention clinics	Proportion of health units with attendees who participated actively at discussions/clinic activities during antenatal care consultations	Unknown	100% at intervention clinics	Recorded provider-attendees interaction Care consultation observation	Analysis of the recorded provider-attendees interaction & field diary for the observed consultations	PI	Compare the attendees interaction between the intervention and control clinics	
	Proportion of health units with providers showing respect and compassion to attendees during care consultation	Unknown	100% of intervention clinics	Recorded provider-attendees interaction Care consultation observation	Analysis of the recorded provider-attendees interaction and the field diary for care consultations observation	PI	Compare the attendees interaction between the intervention and control clinics	
Output 3 Understand various components of antenatal care that women receive during ANC consultation	Proportion of health units that reported the availability of various ANC care components as stipulated in the nation ANC guideline		unknown	Recorded provider-attendees interaction Care consultation observation	Analysis of the recorded provider-attendees interaction and the field diary for the observed care consultations	PI	Compare the various components of antenatal care that was offered to clinic attendees at the intervention and control health units	
Output 4 Understand facility level factors for	Proportion of health facilities with factors that enabled the provision of delivery			Recorded provider-attendees interaction Care consultation	Analysis of the recorded provider-attendees	PI	Compare various facility level factors for delivery and post natal care between the intervention	

delivery and post natal care at primary level health units	and post natal care	observation	interaction and the field diary for the observed care consultations	and control units	
Output 5 Increased satisfaction among provider on the care they provider to care attendees	Proportion of health units with providers who reported various levels of care satisfaction	Interview with providers & care consultation observation	Analysis of the interview data and field diary from consultation observation PI	Compare the level satisfaction among provider on the care they provider at the intervention and control units	

Activities	Indicators			Source of verification			Information use	Assumption(s)
	Descr iption	Baseline	Target	Data source	Data collection method	Responsible person		
1.1 Improve care providers- attendees interaction during ANC consultations for various components of ANC including that for birth plan implementation	i) Time spent for various care components during ANC consultation: history taking, counselling including dialogue for birth plans, examination and drug administration			i) Recorded ANC consultations	i) Analysis of the recorded ANC consultations	PI	i)Comparison of time taken for various components of ANC consultation between the intervention and control health units	
	ii) Proportion of health units in which attendees participate actively in ANC activities/discussions			ii) Recorded ANC consultations and observations at care clinics	ii) Analysis of the recorded ANC consultations and field diary information from observations of the care consultations	PI	ii)Comparison of the attendees' participation in the care that is provided between the intervention and control health units.	
	iii) Proportion of health units with providers categorized as respectful and compassionate to the ANC attendees			iii) Recorded ANC consultations and observations at care clinics	iii) Analysis of the recorded ANC consultations and field diary information from observations of the care consultations	PI	iii)Comparison of the respect and compassion of providers between the intervention and control clinics	

Activities	Indicators			Source of verifications			Information use	Assumption(s)
	Description	Baseline	Target	Data source	Data collection method	Responsible person		
1.2 Improve care satisfaction among providers at the intervention clinics	Proportion of health units with providers reporting various levels of satisfaction with the care they provider to women			Interview with care providers	Analysis of the reported providers' satisfaction with the care they provide to clinic attendees	PI	Compare providers' satisfaction between the intervention and control health units	
1.3 Understand various ANC components provided to antenatal attendees at primary care level units	Proportion of health units that had amenities for ANC & reported performance of some basic ANC activities as stipulated in the national ANC guideline: i) Availability of amenities for ANC ii) Availability of essential equipments, supplies and conditions for basic ANC iii) Availability of medicines for managing common pregnancy complications			Observation, interview with care providers and review of recorded consultations for ANC	Analysis of the field diary from the observations, data from care provider interviews and recorded consultations	PI	Compare the availability of services between the intervention and control clinics	

Activities	Indicators Description	Baseline	Target	Source of verification Data source	Data collection method	Responsible person	Information use	Assumption(s)
1.4 Understand facility level factors for delivery care at primary level health units	i) Proportion of health units with delivery rooms ii) Proportion of health units with delivery bed(s) iii) Number of days and hours care is provided iv) Proportion of health units with supportive environment for delivery (privacy, delivery kit(s), post delivery beds and cord care) v) Proportion of health units with usable for delivery: delivery: gloves, infection control and labour or delivery guidelines such as partographs.			Observation & interviews with care providers	Analysis of the field diary of the observations and data from care provider interviews	PI	Compare the availability of delivery services between the intervention and control health units	
1.5 Understand facility level factors for postnatal care provided to care attendees at primary care level units	i) Number of hours/days care is provided ii) Proportion of health units that provide mandatory examination to all post natal attendees on their initial visit iii) Proportion of health units that provide examination to all newborns on their initial clinic attendance iv) Proportion of health units that provided post natal clinic attendance schedule as per national guidelines			Observation, interview with care providers	Analysis of the field diary of the observations and data from care provider interviews	PI	Compare postnatal care that was provided to care attendees between the intervention and control health units	