MATERNAL REFERRALS TO SPECIALIZED CARE IN MTWARA TANZANIA: THE IMPACT OF A MODIFIED REFERRAL CRITERION ON COMPLIANCE

By

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A Thesis Submitted in Fulfilment of the Requirement for the Degree of Doctor of Philosophy of the Muhimbili University of Health and Allied Sciences.

Muhimbili University of Health and Allied Sciences

August , 2009

CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance a thesis entitled ***Maternal Referrals to Specialized care in Mtwara Tanzania: The Impact of a Modified Referral Criterion on Compliance,*** in fulfilment of the requirements for the degree of Doctor of Philosophy of the Muhimbili University of Health and Allied Sciences.

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DECLARATION AND COPYRIGHT

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ACKNOWLEDGEMENT

I owe particular thanks and praises to Almighty God who gave me good health, strength and protection all the time when I was working on this thesis. I am also grateful to the following people for their assistance and support:

First, I express my sincere and deep thanks to my supervisors Prof. Japhet Killewo, Dr Albrecht Jahn, and Prof Melkizedeck Leshabari for their commitment in providing critical and constructive comments, advices, guidance and supervision during the four years of my PhD programme. They made themselves available all the time and without their intellectual guidance, it could not have been possible to accomplish this work.

Secondly, my special thanks are to the Mtwara rural District Medical Officer Dr. H. Mwakipa, the District Reproductive and Child Health coordinator Mrs. A. Itandala, and the District Nursing Officer Mrs. R. Kapinga for their cooperation during data collection and follow-up phases of the study. I had a smooth fieldwork through their facilitation.

Thirdly, my appreciation goes to all maternal health care providers in health facilities in Mtwara rural district for their cooperation and dedication during the data collection period and particularly during the follow-up study. Without them the quality of my data would have been compromised.

Fourthly, I thank Prof. K. Pallangyo, the then Principal of Muhimbili University College of Health Sciences and now the VC of Muhimbili University of Health and Allied Sciences for giving a tremendous moral and administrative support during my training period. I am also indebted to Prof S. Massawe the Director of Postgraduate Studies and the Principal Investigator of the Quality Maternity Care Project (MATCARE) on which this work is based, for technical, financial and administrative support for my PhD programme.

Fifthly, I thank the Dean of the School of Public Health Dr. Gideon Kwesigabo and all colleagues at the School of Public Health and Social Sciences, particularly those from the Department of Epidemiology and Biostatistics for their moral support and constructive

comments and inputs throughout the preparation of this work. I would also like to thank a fellow PhD student from Heidelberg University Dr. Declare Mushi who read this dissertation and helped with formatting and presentation issues.

Sixthly, I am indebted to my research assistants Dr. Liwayway Hussein, Dr. Apaisaria Mbando, Dr. Beaty Mboya, Dr. Godfather Kimaro, Dr Vera Juma, Dr Beatrice Ringo and Dr. Swaumu Ahmed who agreed to travel to Mtwara and collected good quality data despite of hard working conditions. Ms Mtumwa Hashim and Reid Mchome are acknowledged for their assistance with data entry. Joyce Nyambelwa-Administrative officer of the Post graduate and Research and Publication directorates is acknowledged for assisting with all PhD administrative issues.

Seventhly, I extend my deep thanks to DAAD (Germany Development Aid Agency) for offering financial support for my short annual visits to Heidelberg University which made it possible for me to access resources which I could not get from my home institutions. Special appreciation goes to Ms.Judith Barniol and Dr. Uta Bischof and all members of the Department of Tropical Hygiene and Public Health for their support and cooperation during my short stays at Heidelberg. They made my life in Heidelberg conducive and hence highly productive.

Finally, my heartfelt thanks are to my father Mr. Daniel Mshamba and my late mother Mrs. Natujwa Mshamba for their tireless guidance and encouragement throughout my academic life. I will never forget their support. My deepest gratitude is to my husband Cleopa and my sons Gideon and Daniel who persevered my long absences from home while pursuing this work.

May God bless all of you abundantly.

This study was co-financed by European Unions INCO program (Quality Maternity Care Project, contract ICA4-CT-2001-10009) and Sida/SAREC which are highly acknowledged.

DEDICATION

This work is dedicated to my parents, my husband Cleopa, and my children Gideon and Daniel for their support, encouragement, tolerance and unrestricted love.

ABSTRACT

Background:

Maternal mortality in Tanzania which is estimated at 578/100000 live births is unacceptably high. Available data show that about two thirds of maternal deaths are caused by direct obstetric complications which can be avoided if women who develop complications can receive emergency obstetric care timely. The risk screening approach during ANC is used with the aim of increasing access to emergency care for women who are likely to have complications. However, it has been reported that referral compliance among women identified to be at a high risk is low and one of the reasons reported to lead to low referral compliance is having many unjustified risk factors. The ANC risk catalogue used in Tanzania has been found to be too wide and unspecific. The new WHO ANC model package identifies the list of risk factors for referral which are evidence based but are not used in Tanzania.

The main objective of this study was to determine the barriers to referral compliance and compare the effectiveness of the New WHO ANC model referral criteria and the Tanzania MoHSW ANC referral criteria in improving referral compliance and their validity in predicting adverse pregnancy outcomes. The study tested the hypothesis that the modified ANC referral criteria is more effective than the Tanzania MoHWS ANC referral criteria with regard to prediction of adverse pregnancy outcomes and improves referral compliance for women identified to be at risk of an obstetric complication.

Methods and Materials:

The study was conducted in Mtwara rural district in south eastern Tanzania. The design of the study was an intervention which was done in three phases. In the first phase, baseline studies were conducted at the community and in health facilities. These were cross sectional in design and employed qualitative and quantitative research methods. The second phase was an intervention which involved training of maternal health care providers on Focussed ANC. Also a Cluster Randomized Controlled Trial to compare the effectiveness of the modified ANC referral criteria and the MoHSW ANC referral criteria on referral compliance and their validity in predicting adverse pregnancy outcomes. The third phase of the study was a post intervention assessment which was cross sectional in design.

Data was entered into the computer using EPI INFO for windows version 3.1.1 and analysed using SPSS and STATA softwares. Bivariate analysis was done using Chisquare tests and multivariate analysis was done using Factor analysis and Multiple logistic regression.

Results:

A total of 974 women were interviewed and eighty six indepth interviews were conducted during the baseline assessment. Findings revealed universal use of antenatal care (99.8%), low use of skilled delivery care services (45.8%), a large proportion of women with risk factors (52%), high referral rate (40%), and low referral compliance rate (28%). Significant determinants of use of skilled care at delivery included distance to a health facility providing delivery care (OR=4.35 (2.76-6.89), knowledge of risk factors (OR=1.96 (1.05-3.68), discussion during pregnancy with partner on place of delivery (OR=2.48 (1.76-3.48) and advice of a health worker during ANC on health facility delivery (OR=1.61 (1.06-2.43). Similarly, compliance to a referral advice was seen to be significantly influenced by distance to the facility providing emergency obstetric care (OR= 4.89 (2.66-8.96), knowledge of risk factors (OR=.2.86 (1.26-6.5) and parity (OR=0.25 (0.12-0.59). Knowledge of pregnancy and delivery risk factors was found to be low with only 32.6% of women able to mention at least one pregnancy or delivery risk factor. Only few risk factors were perceived by women to require hospital delivery and they include previous operative delivery, excessive bleeding after delivery, eclampsia, prolonged labour and low HB. Facility survey showed a serious shortage of health care personnel of 49% but the state of infrasturture, availability of essential equipment and supplies in the surveyed facilities was good with all facilities scoring above the minimum score of 80% on service availability. Barriers to skilled care at delivery and referral compliance included distance to facilities providing delivery care and lack of reliable means of transport, unnecessary referral to hospital, presence of TBAs in the community and a belief that if a woman went through pregnancy safely she will also have a safe delivery.

In the cluster randomized controlled trial, a total of 7104 women had completed followup of which 3455 were in the control arm and 3649 in the intervention arm. There was almost a four fold reduction in ANC referrals in the intervetion arm (13%) compared to the control arm (52%). Referral compliance was significantly higher in the intervention arm compared to the control arm (OR=1.88 (1.32-2.68). Use of skilled care at delivery was much higher in the intervention arm (48.9%) than in the control arm (41.7%) and the difference was statistically significant (P<0.05). The modified ANC referral criteria was found to be a better screening

tool with regard to prediction of obstetric complications (PPV= 27% Vs 7% in the MoHSW ANC referral criteria), mode of delivery (PPV=8% Vs 2% in the MoHSW referral criteria), and pregnancy adverse outcomes (PPV=10.1% Vs 2.3% in the MoHSW ANC referral criteria) while fetal and maternal outcomes were similar in the two groups.

Conclusion and Recommendations:

Findings of the study lead to a conclusion that utilization of skilled assistance during delivery and the referral compliance rate for women at risk of obstetric complications are both very low in the study area. Findings also showed that the MoHSW ANC referral criteria lead to too many unnecessary referrals with low referral compliance rate where as the modified ANC referral criteria which employed the referral criteria in the new WHO ANC model leads to improved referral compliance and also increased use of skilled care at delivery without jeopardising pregnancy outcomes. The recommendations include adopting the modified ANC referral criteria, improving counselling on individual birth planning during pregnancy and improving knowledge of pregnancy and delivery danger signs at the community level.

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LIST OF ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
AMMP	Adult Morbidity and Mortality Project
ANC	Antenatal Care
BEOC	Basic Emergency Obstetric Care
BOH	Bad Obstetric History
BP	Blood Pressure
CS	Caesarean Section
CEOC	Comprehensive Emergency Obstetric Care
FIGO	International Federation of Gynaecologists and Obstetricians
FP	Family Planning
HB	Haemoglobin level
HIV	Human Immuno Deficiency Virus
IUFD	Intra Uterine Foetal Death
MCH	Maternal and Child Health
NPV	Negative Predictive Value
RCH4	Reproductive and Child Health Form no. 4
MCHA	Maternal and Child Health Aiders
MoHSW	Ministry of Health and Social Welfare
NMW	Nurse Midwife
PPV	Positive Predictive Value
PHNB	Public Health Nurse B
PMMN	Prevention of Maternal Mortality Network
RA	Risk Approach
RCHS	Reproductive and Child Health Section of the Ministry of Health
SMI	Safe Motherhood Initiative
TBA	Traditional Birth Attendant
TB	Tuberculosis
TDHS	Tanzania Demographic and Health Survey
TRCHS	Tanzania Reproductive and Child Health Survey
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund

WHO World Health Organization

DEFINITION OF TERMS

Specialized Care: Obstetric emergency care provided in the first referral level hospital

Skilled Birth attendant: People with midwifery skills (for example Doctors, midwives and nurses) who have been trained to proficiency in the skills necessary to manage normal deliveries and diagnose, manage or refer complications for interventions that are beyond their competence or not possible in the particular setting.

Risk Approach: Screening pregnant women for pregnancy risk factors and referral to a higher level of care women found to have the risk factors.

Referral: An upward movement for a health care seeking individual in the health system.

MoHSW ANC referral criteria: Antenatal referral guideline as described in the Ministry of Health Antenatal Card (RCH4)

Modified ANC referral criteria : A referral criteria developed using the New WHO ANC model referral Criteria and international literature on pregnancy risk factors. It has a reduced list of pregnancy risk factors compared to the MoHSW ANC referral criteria

Referral Compliance: Taking a positive action to go to a higher level of care as advised by the health care worker at the lower level health facility

Focused Antenatal care: A new model of antenatal care developed by WHO. The model emphasises only 4 antenatal visits (for uncomplicated pregnancies) that are spread out during the entire pregnancy period which might be thorough, comprehensive and personalised.

Skilled Care at Delivery: Attendance during delivery by a skilled attendant

Utilization of skilled care at delivery: Percentage of women who were assisted during delivery by a skilled attendant

Maternal Death: Death of a woman during pregnancy or within 42 days after termination of pregnancy, irrespective of the duration and site of pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.

Validity of the Referral Model in predicting adverse outcomes: How well the antenatal referral model is able to predict adverse outcomes. This was measured by the sensitivity and specificity of the two models.

CHAPTER ONE: INTRODUCTION

1.1 General Introduction

Mortality associated with complications of pregnancy and childbirth is still disproportionately high in most developing countries. According to World Health Organization (WHO) estimates, about 536,000 deaths occur each year world wide due to complications of pregnancy and delivery, of which 99% occur in the developing countries [1]. Women are at risk of maternal death each time they become pregnant and so the lifetime risk of maternal death is higher among women in developing countries compared to those in developed countries because their lifetime number of pregnancies is higher. It has been established that maternal mortality is a health indicator with the highest discrepancy between developed and developing countries [2]. The lifetime risk of a death as a result of pregnancy or child birth is estimated at one in 26 for women in some countries in Africa compared to about one in 7300 for women in Northern Europe [1]. Table 1.1 shows 2005 estimates of maternal mortality in the United Nations MDG regions.

In Tanzania, maternal mortality remains a major public health challenge. The recent Tanzania Demographic and Health Survey (TDHS) revealed a maternal mortality ratio of 578 per 100000 live births [3]. In this survey it was established that maternal deaths accounted for 18% of all female deaths between 15-49 years old [3]. The lifetime risk of a maternal death in Tanzania is estimated at 1 in 38 [4]. Although these figures are alarmingly high, they are still considered to be gross underestimates since many maternal deaths go unreported. Community based studies have revealed that almost 60% of maternal deaths occur outside the health system and hence go unreported [5].

Table 1.1: Estimates of Maternal Mortality and Lifetime risk of Maternal Deaths by United Nations MDG regions, 2005

Region	MMR (95%CI)	Lifetime risk of maternal death: 1 in:
Africa	**820 (410-1400)**	**26**
Northern Africa	160 (85-290)	210
Sub-Saharan Africa	900 (450-1500)	22
Asia	**330 (190-5200**	**120**
Eastern Asia	50 (31-80)	1200
South Asia	490 (290-750)	61
South Eastern Asia	300 (160-550)	130
Western Asia	160 (62-340)	170
Latin America and Carribean	130 (81-230)	170
Oceania	**430 (120-1200)**	**62**
Developed regions	**9 (8-17)**	**7300**

Source: [1]

In the Adult Mortality and Morbidity (AMMP) study which was conducted in three different districts in Tanzania mainland, maternal mortality ratios ranged from 306 to 977 per 100000 live births [5] while an earlier study conducted in Ilala District found that maternal mortality accounted for 18% of all deaths among women of reproductive age [6].

According to global health statistics, 80% of all maternal deaths are due to direct obstetric causes such as haemorrhage, abortion, sepsis, ruptured uterus and hypertensive diseases of pregnancy [7]. This situation is also true for Tanzania, but recently there has been an increase of maternal deaths due to indirect causes such as anaemia, malaria and HIV/AIDS [4, 6].

The Safe Motherhood Initiative (SMI) was launched in 1987 as a global strategy aimed at reducing maternal mortality [8]. The initial target of the initiative was to reduce maternal mortality at least by 50% by the year 2000. The initiative advocated a four-pronged

approach to improve women's health. These were: raising the status of women, ensuring access to family planning services and family life education, strengthening community based maternal health services and providing backup and support services at the first referral level.

The initiative was a call for action to reduce the high rates of maternal mortality and it created awareness on the magnitude of the problem and successfully stimulated much interest in reducing maternal mortality. Tanzania was one of the first countries in Sub-Saharan Africa to endorse and adopt the SMI. The national strategy adopted both the international SMI goals and strategies, and activities were planned to suit the local context. The Ministry of Health and Social Welfare published the strategy in 1992 and a number of activities were identified which included raising the status of women, improving family planning and family life education programmes and improving emergency care and referral programmes [9].

More than two decades after the launching of the Safe Motherhood Initiative, the challenges of reducing maternal mortality persist and the real impact is illusive. At the global level, maternal mortality is reported to be declining at an average rate of less than 1% annually between 1990 and 2005, and in Sub Saharan Africa, the annual decline has so far being estimated at only 0.1% [1].

During the tenth anniversary of the Safe Motherhood Initiative in 1997, a Safe Motherhood Technical Consultative meeting held in SriLanka revealed the lessons learned regarding interventions that are most successful and cost effective. The lessons suggested a shift of emphasis from trying to predict and prevent obstetric complications (risk approach) to managing such complications adequately whenever they arise. It was agreed that having both skilled attendance at delivery and accessible quality emergency obstetric care (EmOC) were the most fundamental interventions associated with reduction in maternal mortality [10]. Due to this, the proportion of births attended by skilled personnel is used as one of the indicators to monitor progress towards the achievement of the Millenium Development Goal number 5 of improving maternal health [11].

Tanzania has an extensive health infrastructure. It is estimated that 72% of Tanzanians live within 5 kms of a health facility while 93% are within 10 kilometers [12]. Almost 100% of these facilities provide Maternal and Child Health services including family planning, antenatal, delivery and postnatal care free of charge. Despite the service coverage, the reported use of skilled care at delivery is quite low. Survey findings show that a large proportion (94%) of women attend antenatal care at least once during the course of pregnancy [3]. In contrast only 47% of women reported to have delivered in a modern health facility during their last pregnancy [3]. Thus 53% of women gave birth with an untrained Traditional Birth Attendants (TBA's), relative or with no attendant at all. The proportion of women who sought postnatal care was also low (17.4%) [3]. Globally, it is estimated that 15% of pregnant women will experience life threatening complications that require emergency care [13]. Therefore providing skilled attendants able to prevent, detect and manage major obstetric complications together with access to equipped referral facilities are most important factors in preventing maternal deaths.

1.2 Statement of the Problem:

Tanzania is among the countries with unacceptably high levels of maternal mortality. The maternal mortality ratio is estimated at 578 per 100000 live births and deaths due to maternal causes contribute about 18% of deaths nationally among women of reproductive ages [3]. Available data shows that more than 60% of maternal deaths in Tanzania are caused by direct obstetric complications [14]. It is now recognised that deaths due to direct obstetric complications can be avoided if women receive skilled care during pregnancy and childbirth. Thus, ensuring that a skilled health professional is present at every birth coupled with access to emergency obstetric care has been proved to be important interventions in reducing maternal deaths [10].

In Tanzania, utilization of skilled care at delivery is low in spite of an extensive health infrastructure where skilled care is provided free of charge. Survey findings show that the proportion of women delivering with skilled attendants is only 46%, which means that the rest of the deliveries occur in the presence of unskilled attendants [3].

It has further been established that the proportion of women receiving skilled care at delivery has been decreasing with time from 53% in 1991-1992 to 44% in 1999, the rate was 46% in 2004 [15]. Lack of reliable means of transport to health facilities and the poor quality of care in the health facilities have been reported in several studies as the main factors for non-use of skilled care at delivery. Other factors reported to influence use of skilled care at delivery include, cultural beliefs and customs, where for example, the etiology of pregnancy complications such as recurring abortion, still births and child deaths are usually associated with non-observance of traditions, taboos, witchcraft, God's will or curses. Low women's risk perception and knowledge of the benefits of a health facility delivery have also been reported to influence use of delivery care services [16-20]
In a country with low resource setting like Tanzania, improving access to care is a long-term undertaking. In such circumstances, personalized counselling of pregnant women during ANC on Individualized Birth Plan (IBP) and emergency preparedness have been suggested as ways to increase utilization of skilled care at delivery [21-23]. If women can be educated to make informed decisions and make preparations for safe delivery or any emergency that may arise, they could overcome some of the economic barriers and hence increase utilization of skilled care at delivery.

The newly introduced WHO ANC model (A new model of ANC with reduced number of visits and intensified counselling) on which this study is based, incorporates personalized counselling during ANC on birth plans and emergency preparedness [24].

In Tanzania since the 1970's, risk screening during pregnancy was used to identify women whose pregnancy or delivery was likely to be problematic so that they could be referred at the appropriate time to a facility with emergency obstetric care services. This process is referred to as the Risk Approach (RA). Tanzania uses an action oriented antenatal card and a number of risk factors for referral are specified in the card. Screening pregnant women for risk factors is done on the first antenatal visit and in each of the follow up visits, which according to the MoHSW antenatal guideline was supposed to be monthly.

In order for the risk approach to be effective in improving access to care, women who are identified to be at risk must agree to go to hospital with emergency obstetric care and

should be able to reach the hospital by the required time. Experience has shown that using the MOHSW ANC referral criteria, 30% or more pregnant women are referred to a higher level of care either for ANC or for delivery [25]. However, research findings show that compliance to referral advice is very low [26]. For example in a study conducted in Mtwara region it was found that only 25% of the at risk women referred for hospital delivery finally delivered in the hospital [26]. Low referral compliance rates have also been reported in other countries [27, 28]. Therefore there is a need to determine what factors influence compliance to referral advice among women with risk factors in order to design interventions to improve use of obstetric care facilities.

In the Tanzania Ministry of Health and Social Welfare ANC referral guideline [29], there are three categories of risk factors. Each of these categories consists of a number of risk factors which are meant to guide the health care provider to give the appropriate referral advice. The risk factors are grouped into three categories such that the referral advice is similar for all women who have risk factors falling in the same category. The three categories are as shown in Fig. 1.1

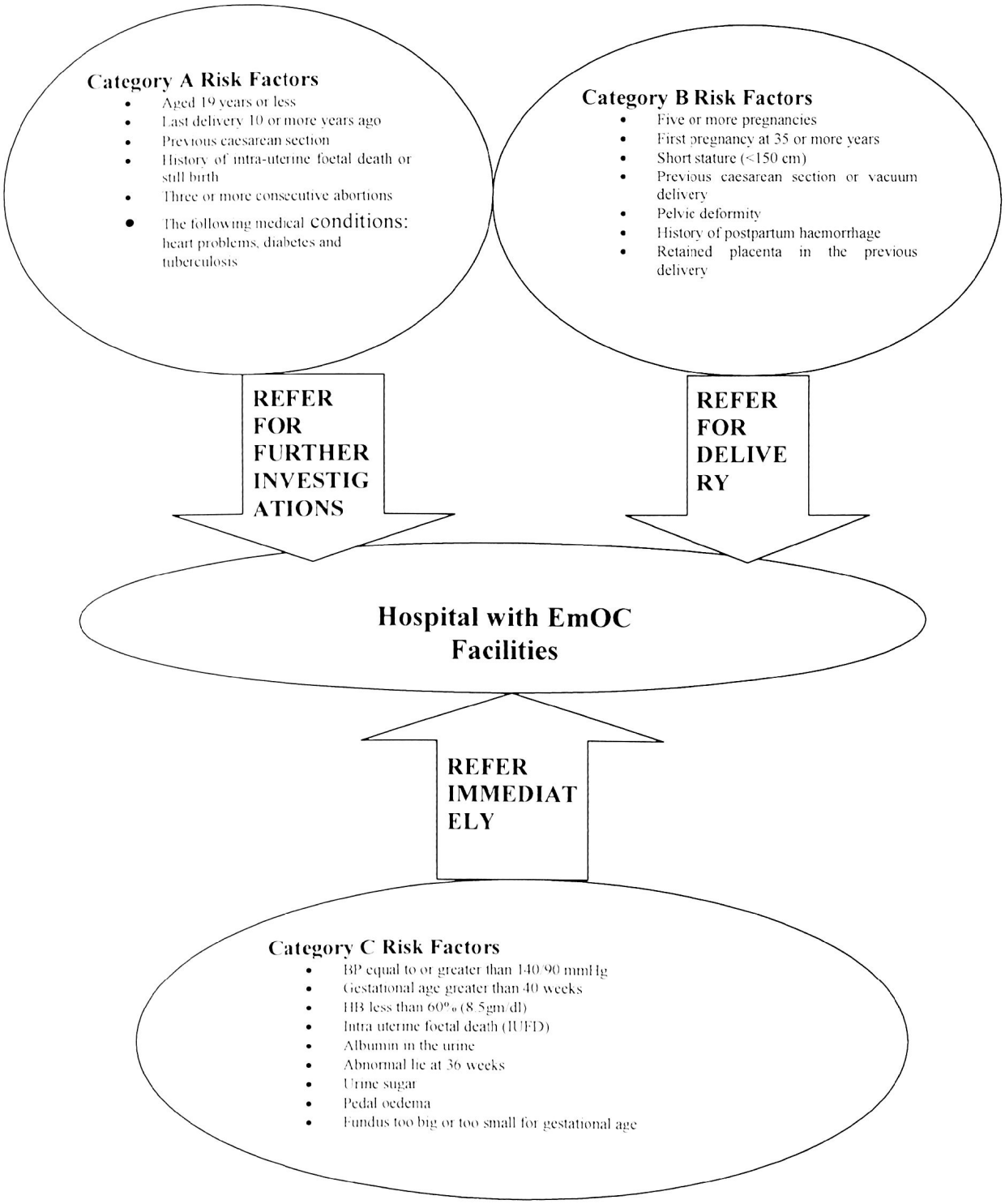
Although providers in ANC have tried to adhere to risk categories as specified in the ANC clinic card, the risk categories have been found to be too wide and unspecific in predicting outcomes. As such they are a source of confusion for both providers and women.

It has been established that only 10-30% of the women assigned to the high risk groups using the risk approach actually experience the adverse outcome the formal risk scoring system predicted [30-34]

In the most recent Demographic and Health Survey conducted in Tanzania it was reported that about 58% of women were identified to have at least one risk factor. Analysis of birth outcomes for these women showed that the mortality risk of infants was just slightly higher (3%) for women classified as high risk compared to those born to women at low risk category [3].

Paradoxically, it has also been found that a significant proportion (15%) of women classified as low risk do end up with complications [33]. In addition low positive predictive values for the risk factors, lead to rejected referral advice [35]. Discussions with health workers in Mtwara revealed that low compliance to referral advice is due to the fact that majority of high risk women referred to a higher level of care do not get complications and therefore women don't see the need to use their scarce resources for transport and other costs in hospital while they can deliver safely at home.

Figure 1.1: Categories of risk factors in the MoHSW ANC card:



In efforts to improve antenatal services, WHO has published the new Focused ANC model which emphasises reduction of the number of ANC visits from the usual monthly visits to only 4 visits for normal pregnancies with each visit being goal oriented [24]. The model also specifies clearly the indications for referral. This model has been published after being tested by using randomised controlled trials in four countries namely Argentina, Cuba, Saudi Arabia and Thailand and later it was conducted in Zimbabwe [36, 37]. In both of these trials, the new WHO ANC model was found to have similar outcomes as the model with monthly visits. The focused ANC model has now been proposed as a standard model for use in antenatal care [23]. However since local conditions may differ from country to country, the model needs to be modified to fit local contexts.

In Tanzania, the Ministry of Health and Social Welfare has partially adopted the new WHO ANC model by gradually shifting to Focussed ANC since 2002. However risk screening of women is still done based on the standard MoHSW ANC referral criteria printed on the maternal ANC card (RCH 4). Where focused antenatal care is used, it is recommended to replace the local referral criteria by the criteria for screening specified in the New WHO ANC model.

The screening form in the new WHO ANC model specifies a list of factors and women found to have any of them are required not to follow the basic component of the ANC model but have close monitoring and followup. However, because dispensaries and health centres in Tanzania do provide only basic ANC care, the requirement of close monitoring and followup for women with any of these factors may require them being referred to a higher level of care. The following are the factors specified in the screening form:

1. **Obstetric history**
   a. Previous still birth or neonatal death
   b. History of three or more consecutive abortions
   c. Birth weight of last baby less than 2500 gms
   d. Birth weight of last baby greater than 4500 gms
   e. Admission for hypertension, pre-eclampsia/eclampsia in previous pregnancy
   f. Previous surgery in the reproductive tract

2. **Problems in the current pregnancy**
   a. Diagnosis or suspected multiple pregnancy
   b. Age less than 16 years
   c. Age more than 40 yrs
   d. Isoimmunization Rh (-) in current or previous pregnancy
   e. Vaginal bleeding
   f. Pelvic mass
   g. Diastolic blood pressure of 90mm Hg or more

3. **General Medical Conditions**
   a. Insulin-dependent diabetes mellitus
   b. Renal disease
   c. Cardiac disease
   d. Known substance abuse/ heavy alcohol drinking
   e. Any other severe medical diseases or conditions

In addition to the above, the new WHO ANC model specifies that women should be checked at every ANC visit if they have any of the following conditions and those found to have any of the conditions should be referred to hospital:

   a. HB < 70 g/l
   b. Bleeding
   c. Evidence of pre-eclampsia, hypertension and/or proteinurea
   d. Suspicion of fetal growth retardation (uterine height values below 10^{th} percentile)
   e. Woman does not feel fetal movement (suspected IUFD)
   f. Suspicion of twins
   g. Suspicion of breech presentation

These are the risk factors recommended to be used inconjuction with the focussed ANC and therefore there is a need to adopt them for use in Tanzania in place of the currently used MoHSW list of risk factors.

It is in view of the above challenges that this study was conducted to compare the effectiveness of the new WHO ANC model referral criteria and the MoHSW ANC referral criteria in improving referral compliance and validity in predicting adverse pregnancy outcomes.

1.3 Study Objectives

1.3.1 General Objective

The broad objective of this study was to determine the barriers to referral compliance and compare the effectiveness of the New WHO ANC model referral criteria and the Tanzania MoHSW ANC referral criteria in improving referral compliance and their validity in predicting adverse pregnancy outcomes.

1.3.2 Specific Objectives

1. To determine the health care seeking behaviour of women during pregnancy and delivery in Mtwara district.
2. To assess women's knowledge and perceptions on pregnancy and delivery danger signs.
3. To assess availability of qualified personnel, essential equipment and supplies for obstetric care in health facilities in Mtwara district.
4. To determine the barriers to utilization of skilled care at delivery in Mtwara district.
5. To determine the proportion of women identified with risk factors who comply with referral advice.
6. To determine barriers and facilitating factors to referral compliance.
7. To compare the effectiveness of the new WHO ANC model referral criteria with the MoHSW ANC referral criteria in improving referral compliance and
8. To compare the validity of the new WHO ANC model referral criteria with the MoHSW ANC referral criteria in predicting adverse pregnancy outcomes.

1.4 Significance of the Study

Many studies have been conducted in Tanzania to determine factors which influence use of health facility delivery care services [19, 38, 39]. Findings from these studies revealed that, distance, lack of transport and poor quality of care in health facilities were major barriers to use of skilled care at delivery. However, most of these studies have been cross sectional

in design and none of them focused on interventions to increase utilization of skilled care at delivery.

Referral of pregnant women, based on risk scoring, has been practised in Tanzania for a long time as a basis of recommending appropriate level of care according to need. However compliance to referral advice has been found to be low, a situation that leads to decreased use of services for women identified to be at risk of obstetric complications. Knowledge of the factors which influence compliance to referral advice will help in designing interventions which will increase compliance and therefore increase utilization of essential obstetric care services in Tanzania.

The list of ANC risk factors used in Tanzania is quite long, many of which are already known to be non predictive of adverse outcomes. However the MoHSW has shifted to Focused ANC which is based on a shorter list of risk markers and recommends only four goal oriented antenatal visits. If Focused ANC is to be implemented effectively in Tanzania, it is necessary to adapt the referral criteria specified in the new WHO ANC model. Comparison of the predictive powers of the risk markers specified in the new WHO ANC model referral criteria and MoHSW ANC referral criteria, and referral compliance rates of women identified to be at high risk is therefore necessary. Findings of this study will provide information for use by the Ministry of Health and Social Welfare to improve referrals as well as utilization of emergency obstetric care services for women who are likely to have obstetric complications. Increased utilization of emergency obstetric care services may ultimately help to achieve the goal of reducing the burden of mortality due to maternal causes in Tanzania. It is in view of the above that this study was designed.

1.5 Literature Review

Complications of pregnancy and childbirth are still the leading causes of death and disability among women of reproductive ages in developing countries [40]. Of all health indicators monitored by the UN, the biggest discrepancy between developed and developing countries is in maternal mortality [40]. UNICEF and WHO estimated that for every woman who dies, at least thirty more women incur injuries, infections and disabilities that could be painful, humiliating, debilitating and lifelong [41]. The World

Bank (1993) ranked maternal mortality as number one health problem among women of reproductive age, accounting for 18% of the total disease burden [40].

Tanzania, like many other countries in Sub-Saharan Africa is also experiencing unacceptably high levels of maternal mortality [3, 5, 6, 42, 43].

1.5.1 Causes of Maternal Mortality

Research findings have shown that approximately 80% of maternal deaths are caused by direct obstetric complications such as haemorrhage, sepsis, hypertensive disorders of pregnancy, obstructed labour and complications of unsafe abortion [7]. In a study conducted in Ilala district in Dar-Es-Salaam region Tanzania, it was found that direct obstetric causes accounted for 62% of the maternal deaths [6]. Major indirect causes of death include anaemia, malaria and HIV/AIDS.

1.5.2 Interventions to reduce Maternal Mortality

The Safe Motherhood consultative meeting in Sri Lanka ten years after the Safe Motherhood Initiative discussed the interventions which are effective in reducing maternal mortality and suggested programmes which should be given priorities for action. Skilled attendance at delivery and access to quality emergency maternal health services for all pregnant women were identified as the most cost effective interventions to reduce deaths due to maternal causes [10]. A statement from the Technical Consultation on safe Motherhood [10] states:

> "Having a worker with midwifery skills present at childbirth, backed up by transport in case emergency referral is required, is considered as the most critical intervention for making motherhood safer".

This has been supported by findings from several studies as the following few examples show. Bhasker et al (2003) mentioned that the ability to reduce the high rates of maternal mortality was heavily dependent on having trained personnel especially midwives to attend women in labour [44]. Four organizational models for delivery care (home deliveries with unskilled personnel, home deliveries with skilled personnel, deliveries in basic health facilities and a model where all deliveries are conducted in a comprehensive care facility

were analysed and results showed that in delivery care models where most of the deliveries are at home with unskilled attendants, the level of maternal mortality appeared not to be reducible to below 100 per 100,000 live births. In models with skilled attendants conducting deliveries either at home or in a basic health facility, maternal mortality levels were of less than 50 per 100,000 live births [45]. Regression analysis of national estimates of maternal mortality for developing countries on percentage of deliveries attended by skilled attendants show that countries with high proportion of deliveries attended by professionals tend to have low levels of maternal mortality [46]. The World Health report (2005) reveals that although a number of countries succeeded in improving the health and well being of mothers in the 1990's, countries with a high burden of mortality made little progress and this was due to a breakdown in interactions between pregnant women and the health system, or women delay to seeking care or that the health system fails to provide adequate or timely care [2].

Based on the above studies it is evident that assistance by a skilled attendant during delivery reduces the risk of maternal death. Hence ways to increase utilization of skilled attendance during delivery and improving access to emergency maternal health care services should therefore be made a priority.

A skilled attendant is a health worker with midwifery skills (for example, doctors, midwives, nurses) necessary to manage normal deliveries and diagnose, manage or refer complications for interventions that are beyond their competence or not possible in the particular setting [46]. According to WHO a skilled attendant at delivery can:

1. Ensure that all deliveries whether complicated or not are conducted hygienically and according to accepted medical practises.
2. Identify complications promptly and manage them appropriately either by treating the complication or if the attendant cannot do so him/ herself, by stabilising the woman's condition and referring her to a higher level of care.
3. Provide high quality, culturally appropriate, and considerate care, ensuring necessary follow-up and linkages with other services (postpartum care, family planning, etc). [46].

In Tanzania due to shortages in human resource for health a special cadre referred to as Maternal and Child Health Aides (MCHA) were put in place to provide maternal and child health care services especially in rural areas. They were primary school leavers who were subjected to eighteen months training on midwifery and child health issues. These are the main providers of maternal health care services in dispensaries and Health centres.

1.5.3 Utilization of Skilled Care at Delivery

Despite the proven benefits of skilled care at delivery, it is clear that utilization of these services in most developing countries is very low. For example in Tanzania despite the existence of an extensive health infrastructure where skilled care at delivery is provided free of charge, the proportion of women who deliver with a skilled attendant is only 46% [3]. Moreover it has been observed that the proportion of births taking place in health facilities has been declining over time from 53% in 1992 to 47% in 1996 and to 44% in 1999, [15, 47]. In Mtwara region, although 99% of women attend antenatal care, only 37.6% utilize skilled care at delivery [3].

Use of skilled delivery care services has also been reported to be low in several countries in sub-Saharan Africa including Uganda, Ethiopia, Nigeria and Kenya [48-52].

1.5.4 Barriers to Skilled Care at Delivery

Barriers to skilled care at delivery have been the subject of several studies. Chiwuzie et al (1995) reported that barriers to use of obstetric care are at all levels. At the community level there were attitudes, perceptions and practices which would prevent or delay the decision to use obstetric care services. And when the decision is taken, difficulties of transportation were reported to arise frequently. He also found that at the facility level, poor attitudes and skill of staff as well as inadequate working materials discouraged pregnant women from using skilled care during delivery [53].

Distance to health facility which provides delivery care, lack of transport or high cost of transport where available have been shown by a number of researches as the main barriers to seek skilled care at delivery [38, 52]. Other reasons mentioned include: cultural beliefs, socio economic factors, dissatisfaction with services offered in the facility, low status of women in the society and their neglected role in decision making, traditional beliefs that

strong women should deliver without assistance, misconception that the first delivery should take place at home, the high
status of TBAs in the communities, having a previous normal delivery, cost of care and woman's reproductive behaviour [38, 39, 51, 52, 54-59].

Other studies have however shown that even in places where there are facilities which provide good quality maternity care within easy reach, women do not use them [20, 50, 60]. For example in a study done in one district in Uganda, it was found that adherence to traditional birthing practises and beliefs that pregnancy is a test of endurance and that maternal death is a sad but normal event are among the important factors contributing to the low use of maternity services in that part of Uganda [20]. In Nigeria, major barriers were found to be economic constraints, cultural bottlenecks and those related to the women's perceptions and misconceptions of their condition [50]. The study recommended that poverty reduction and economic empowerment of rural women are prerequisites for any tangible improvement in the use of ANC and skilled care at delivery. Griffiths et al, (2001) conducted a study in India and found that provision of services did not ensure that women used them. Women had to first perceive the services to be beneficial to their health and that of their unborn child [60]. In a study conducted in Ilala district in Dar-es-Salaam, it was found that equipping the district hospital with all elements of essential obstetric care did not influence increased utilization of the facility and neither did it reduce maternal mortality [14]. Findings of the Adult Morbidity and Mortality Project in Tanzania have shown that maternal mortality in Dar-es-Salaam which was served with the highest number of well equipped health facilities was as high as 733/ 100,000 live births [5].

From the above evidence it is clear that geographical factors, cost of transport or lack of transport and poor quality of maternity care provided in the facilities do play a significant role in utilization of skilled care at delivery. However in a country with low resource setting like Tanzania improving access to care will take rather long and therefore ways to increase utilization need to be explored. Currently proposed interventions to increase utilization of skilled care at delivery include individualized counselling of women during ANC on safe birth plan and emergency preparedness. It is thought that if women can be informed that every pregnancy is at risk of a complication and that they should be prepared

for any emergency that may arise, they will be able to make informed decisions and overcome the barriers in the use of skilled attendants during delivery. This study was based on Focused ANC which incorporates individualized counselling of women during ANC.

1.5.5 Access to Maternal Health Care Services in Tanzania

The importance of access to emergency obstetric care is undisputed [46]. This is also acknowledged by the Safe Motherhood Initiative which stated that about 15% of all pregnant women are likely to have obstetric complications which will require emergency obstetric care.

In Tanzania, efforts to improve access to maternity care services started in 1974 when the government of Tanzania launched an integrated Maternal and Child Health and Family planning (MCH/FP) program. The MCH services (Antenatal, delivery care, family planning and under five clinics) were provided in almost all public dispensaries, rural health centres and in all hospitals. In these facilities the MCH services were provided free of charge. However, dispensaries and health centres provided Basic Emergency Obstetric care (BEmOC), whereas, comprehensive emergency obstetric care (CEmOC) was provided in referral health facilities (hospital level) where there is capacity to handle such emergencies.

To ensure access to emergency care for women with obstetric problems, risk screening is done during ANC and women found to have risk factors are referred to a higher level of care either for ANC or for delivery. However, it has now been shown that risk screening during ANC is not very effective due to the following reasons: First, the risk categories are too wide and unspecific, Secondly acceptability of referral advice is very low and thirdly, quality of screening is poor because of use of inappropriate screening techniques [21, 22, 26, 27, 61-63].

1.5.6 Risk Categories

The effectiveness of ANC risk screening system is measured by its ability to identify women who are at high risk and those who are at low risk. Several studies have shown that the ability of ANC risk screening to discriminate between women at high and those at

low risk is poor. Only 10-30% of the women allocated to the high risk group actually experienced the adverse outcome for which the formal risk scoring system allocated them to be at risk and a significant proportion of women allocated to low risk group do end up with complications [30-34].

Individual risk factors have been seen to have low predictive values for adverse outcomes. For example, in a study conducted in Zimbabwe it was noted that the traditional risk allocation system was not effective in identifying women at risk of a pregnancy complication and resulted in too large a risk group for referral [33]. In the same study the authors also reported that only 20% of women identified as high risk developed complications and that those women with a history of previous obstetric complication were the only ones with a higher risk of complications [33]. In another study conducted in Bangladesh it was observed that ANC screening failed to distinguish women who will need special care from those who will not need such care [62]. Vanneste also found that women who attended ANC were four times more likely to deliver with a skilled attendant than women who had no antenatal visit. He was of the view that even if risk scoring is not efficient, ANC can be promoted to become an effective instrument to facilitate better use of emergency obstetric care. In another study which was conducted in Malaysia it was found that only 48% of the high risk women had obstetric complications and 25% of those classified as low risk had complications [22].

Despite the above paradox, there is evidence that selected screening interventions and referral can be beneficial if implemented properly. Examples are taking blood pressure for hypertension and measuring fundal height in order to identify multiple pregnancies. The following has been identified as a core set of absolute maternal perinatal indications for elective referral prior to delivery [62, 64-67].

BP ≥140/90 mmHg	Gestational age >42 wks
Previous CS	Suspected IUFD
Signs of pre/eclampsia	Abnormal presentation/ lie at 36 wks
Previous neonatal death	Severe anaemia (<8.5g/dl)
Multiple pregnancy	A severe medical condition such as diabetes, heart, kidney, TB or HIV/AIDS

One of the objectives of this study was to compare the effectiveness of the new WHO ANC referral criteria with the Tanzania MoHSW ANC referral criteria on the ability to predict adverse pregnancy outcomes with the aim of determining the optimum list of risk factors to be used for ANC referral in Tanzania.

1.5.7 Referral Compliance

Referral system is an essential component of district health care systems. The term referral has been used to mean an upward movement of health care seeking individual in the health system whether advised by the health worker or not. WHO emphasizes that referral is of particular importance in pregnancy and child birth, because a range of potentially life threatening complications require management and skills that are only available at the higher levels of care [68]. In pregnancy and child birth, referrals can be categorized as follows;

1) Institutional or self referral
2) Antenatal, delivery or postnatal referral and
3) Elective or emergency referrals [69].

According to WHO, the pyramid of levels of care starts with the family/community, the health centre and the district hospital [70]. The first referral level is the district hospital to which a woman at high risk is referred prenatally or sent for emergency obstetric care and where Comprehensive Essential obstetric care services should be available [71].

In order for the risk approach to be effective, women identified to be at risk should agree to give birth in a hospital and should be able to reach the hospital level. Many studies have

shown that, the majority of women who are advised to deliver in hospitals because they are at risk do not go. For example, in a study conducted in Mtwara, it was found that referral compliance among women with risk factors was only 25% [26]. In that study it was found that women significantly used referral level care for only two risk factors namely previous caesarean section and nulliparity. The proportion of women identified to have other risk factors who delivered in the hospital was much less than the proportions expected in the general population indicating low compliance to referral advice among women with other risk factors [26]. A study conducted in Mozambique revealed that less than half of the women in the high risk group were seen at the referral centre [72]. In this study it was reported that only about 11% of the women referred from a rural clinic delivered in the hospital, compared to about 66% of those referred from urban and a peri urban clinic. In DRC a study by Dujardin found that the referral success rate was only 33%. Major factors for non compliance were mentioned to be hospital inaccessibility and women's own perception of their risk status [27]. A similar study conducted in a rural health centre in India found that out of 167 high risk women who were referred, only 9% were seen in the referral health facility. The major reason mentioned by the women for non compliance was financial exigency [28].

The referral hospital is therefore used solely by by-passers of frontline health facilities as reported in the following studies. In a study conducted in Mtwara it was found that the majority (52.3%) of hospital deliveries were self referrals while emergency referrals were only 1.2% [26]. Similar findings were reported in a rural district in Nepal [21] where population based rates of emergency referral were found to be only 0.4%. In a study conducted in a teaching hospital in Ghana it was found that among the hospital deliveries, 82% were self referrals while only 2% were emergency referrals [73].

Problems of geographical and financial accessibility are well documented as reasons for avoiding or delaying maternal referrals [54, 74, 75]. However it has been established by other studies that the final decision for or against referrals will often depend on the balance between efforts and resources needed for transport and subsequent treatment and the perceived benefits of treatment in hospital. It has also been found that perceived quality of

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care and the perceived severity of the condition and local etiological concepts play decisive roles in decision making [76].

The main aims of the study was to determine factors which influence compliance to referral advice and to compare WHO ANC referral criteria with the Tanzania MoHSW ANC referral criteria on referral compliance and utilization of skilled care at delivery. The predictive powers of the two referral criteria were also compared to determine which referral criteria is better in predicting outcomes and at the same time associated with high referral compliance.

1.5.8 Conceptual Framework

Medical pluralism where patients seek care from different health systems is fairly common in both developed and developing countries [77]. Decisions to seek care are influenced by various factors including availability of health care, whether the patient can afford, the failure or success of the treatment within the popular sectors, how the patient perceives the problem and how others around them perceive the problem [77].

In Tanzania almost all (97%) pregnant women seek antenatal care but only 47% deliver in health facilities [3]. This big gap in use of services during ANC and for delivery can be explained by a number of factors as shown in the conceptual model below. The framework utilizes the WHO model where the pyramid of care starts with the family/Community, then the Dispensary/Health centre and the district hospital as the first referral levels [70]. The conceptual model specifies three kinds of transfer to a health facility.

1. Transfer from the Household/Community to the Dispensary/Health centre

These may be women seeking skilled attendants at delivery or may be women referred to these facilities from the community by TBA's or relatives after the onset of complications at home. Factors considered to influence this transfer include:

a. Quality of ANC counselling on Individual birth planning and emergency preparedness
b. Distance to the facility
c. Perceived quality of care at the health facility
d. Cultural beliefs about the delivery process and rituals after birth
e. Past experiences of the woman
f. Perceived Risk

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2. Transfer from the Household/Community directly to the hospital level

These may be self referrals, or women referred during routine ANC visits or women referred by TBA's/relatives after the onset of a complication at the community level. A number of factors are considered to influence this transfer and they include:

a. The referral criteria (The type of the risk factor the woman is referred for)

b. Quality of ANC counselling on Individual birth planning,

c. Distance to the hospital and availability of transport

d. Perceived quality of care at the referral level

e. Knowledge of danger signs (Mother, Relative or TBA)

f. Perceived Risk

g. Cultural beliefs about the delivery process and rituals after birth

3. Transfer from dispensaries/Health centre to the hospital

These are referrals between institutions and may be elective or emergency.

Factors considered to influence this transfer include:

a. Referral criteria

b. Perceived quality of care at the referral facility

c. Knowledge of danger signs

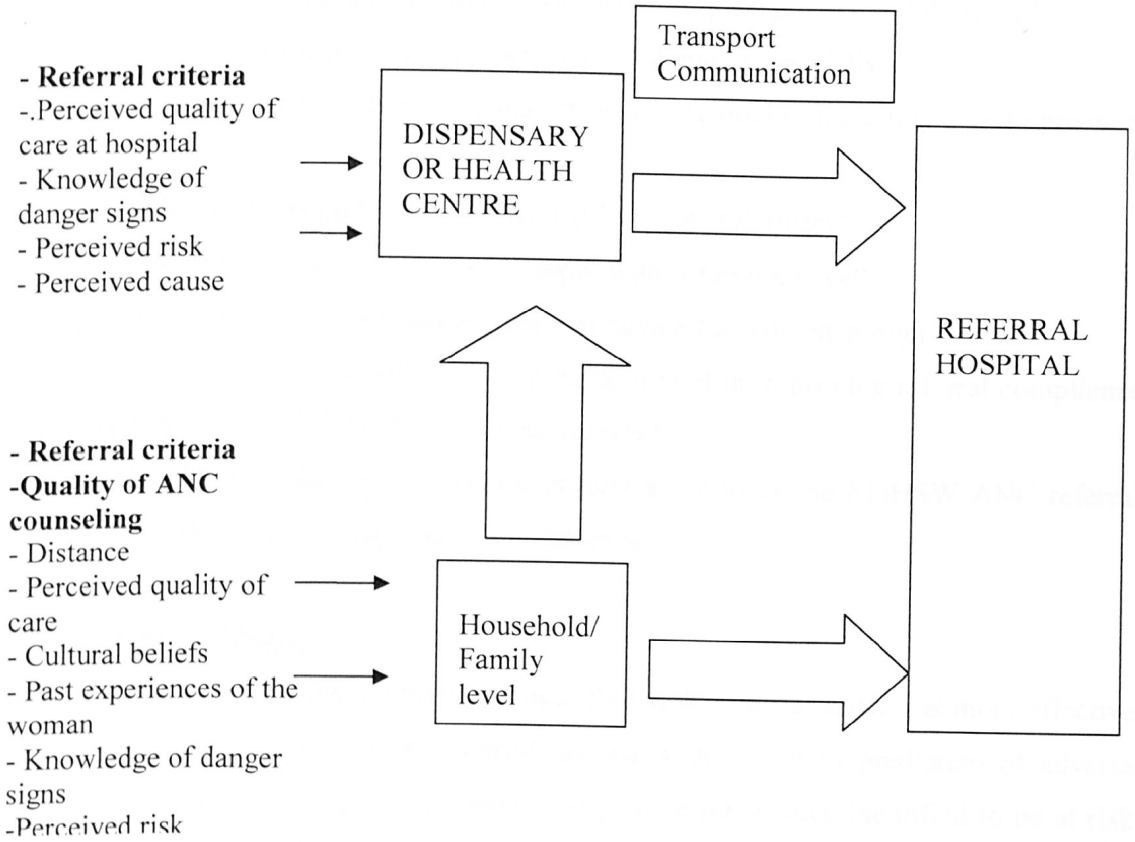
d. Perceived benefits of hospital delivery

e. Perceived Risk

f. Perceived cause of a complication

The study addressed issues around the quality of ANC Counselling (Prior staff training on Focused ANC) and referral criteria (testing the new referral model based on the new WHO ANC model).

Figure 1.2: The Study Conceptual Model



1.6 Research Questions

The study attempted to answer the following research questions:

1. What is the health seeking behaviour of women during pregnancy and delivery?
2. What do women perceive to be risk factors for pregnancy and delivery?
3. Are the existing health facilities capable of providing quality maternity care to pregnant women?
4. What are the major barriers to the use of skilled care at delivery?
5. What proportion of high risk women comply with referral advice?
6. What factors influence compliance to referral advice for women at high risk?
7. How effective is the New WHO ANC referral model in improving referral compliance as compared to the MoHSW ANC referral criteria?
8. Is the New WHO ANC model referral criteria as good as the MoHSW ANC referral criteria in predicting pregnancy adverse outcomes?

1.7 Research hypothesis

The study tested the hypothesis that: The modified ANC referral criteria is more effective than the Tanzania MoHWS ANC referral criteria with regard to prediction of adverse pregnancy outcomes and improves referral compliance for women identified to be at risk of an obstetric complication.

CHAPTER TWO: METHODS AND MATERIALS

This chapter describes the research methods employed in the study. It includes a description of the study area and a detailed methodology for each sub study.

2.1 The Study Site

The study was conducted in Mtwara rural district, Mtwara region. Mtwara rural district is one of the five districts that make up Mtwara region, located in the South Eastern corner of Tanzania. The district has an area of 3597 km^2 and has a total population of 204,770 [78]. Of these 96,869 are males and 107,901 are females. The number of women of reproductive age is 52,944 which is about 26% of the total population. The main ethnic groups in Mtwara include the Makonde, the Makua and the Yao. The majority of the population in the district are poor subsistence farmers growing food crops which include paddy, cassava and maize while the major cash crop is cashew nuts.

Other important economic activities include fishing, animal keeping, business and woodcraft. Over 50% of the population lives below poverty line (World Bank 2006). Of all four districts in the region, the poorest one is Mtwara rural district where the study took place. Important health and development indicators in Mtwara rural district are shown in the table 2.1.

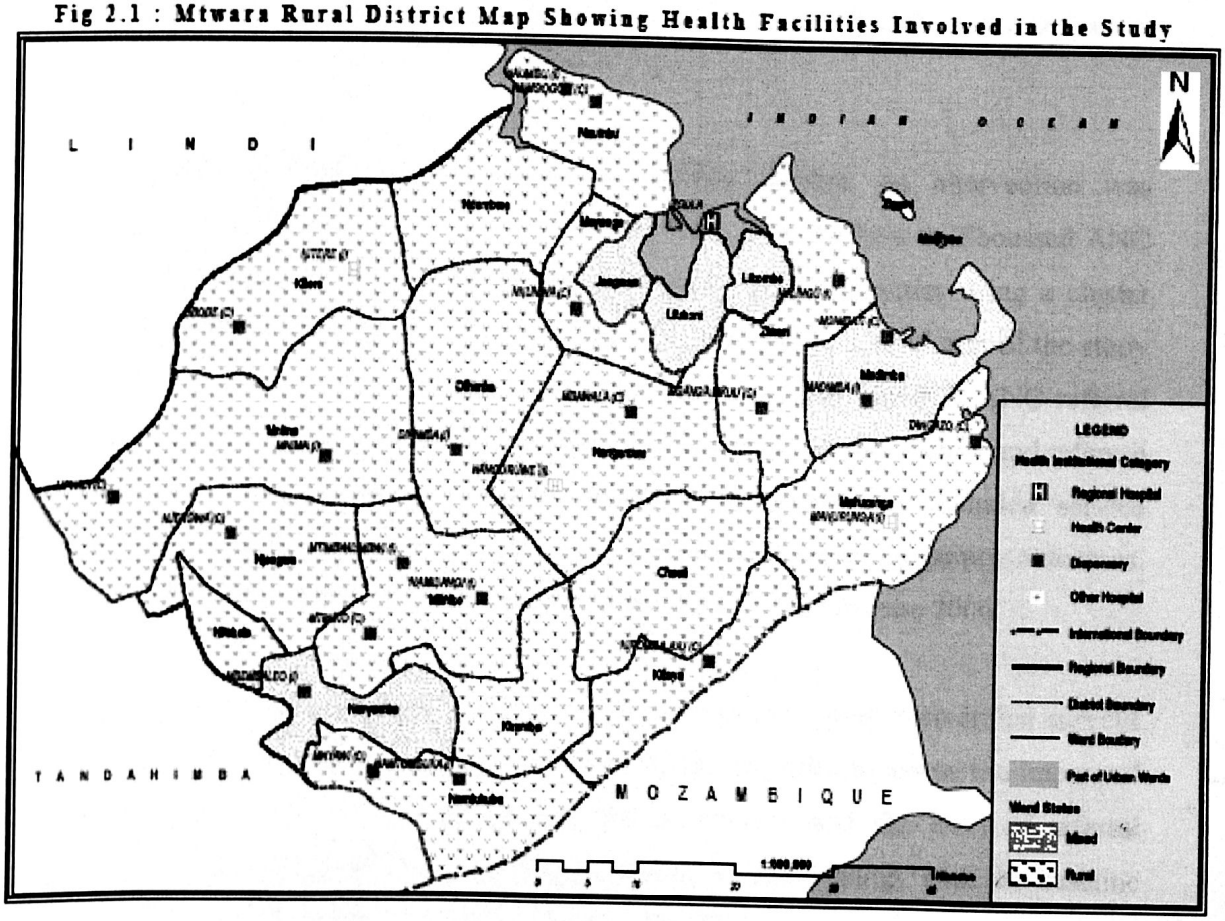
Table 2.1: Health and development indicators in Mtwara region

Indicators	Mtwara Rural	Mtwara	Country Average
Pop. with primary school education	40%	42.9	49.2
Population with secondary education	1.8	2.5%	8.6%
Maternal mortality ratio	600/100,000	600/100,000	578/100,000
Infant Mortality Rate	139/1000	136/1000	99/1000
Under-five mortality rate	231/1000	233/1000	139/1000
Life expectancy	Not available	44	46
Home delivery	63%%	62.8%	53%
Ratio Assistant Clinical Officers to population	1:7131	1:6000	

Sources:[40] [79-81]

Mtwara rural district has a total of 34 health facilities, 4 being health centres and 30 being dispensaries. There is no district hospital in Mtwara rural district but the regional hospital (Ligula) which is located in Mtwara township acts as the first referral level for emergency health care. The district council has one ambulance and one of the health centres has a vehicle in place for emergency transport. The remaining three health centres and 5 dispensaries located in very remote areas are fitted with radio equipment for calling an ambulance from the district headquarters in case of an emergency. In addition, all dispensaries in Mtwara rural district have recently been provided with what is locally called cycle ambulance (a bicycle fitted with a locally made stretcher). When there is an emergency, relatives pick the cycle from the dispensary and use it to transport the patient to the dispensary, health centre or even to the hospital. Both the ambulance and the cycle ambulances provide services free of charge. All dispensaries and health centres in the district provide antenatal and delivery care sevices. Fig 2.1 shows the map of Mtwara Rural District.

Figure 2.1: Mtwara Rural District Map showing Health Facilities Involved in the Study



The district has an estimated maternal mortality ratio of 600 per 100000 live births and only a small proportion (25%) of women use modern family planning services [82].

2.2 The Study Design

The study was conducted in three main phases with different study designs.

Phase 1: Baseline Studies. These were conducted in the community and in the health facilities. A baseline community survey was conducted to assess the health care seeking behaviour during pregnancy and delivery, barriers to the use of skilled care at delivery, referral compliance rate and barriers to comply with referral advice among women identified with pregnancy risk factors. The study used both quantitative and qualitative research methods. Parallel to the community survey, a baseline facility survey was conducted to assess availability of essential equipment and supplies, availability of

qualified personnel and assessment of health workers perceptions and attitudes towards pregnancy danger signs specified on the MoHSW ANC card (RCH4). The baseline studies were cross sectional in design and were conducted between September and December 2004.

Phase 2: The Intervention. Following the baseline surveys, an intervention was implemented. It comprised of training of maternal health care workers on Focussed ANC and testing a modified ANC referral criteria in selected health facilities using a cluster randomized controlled trial design. The trial had two arms. In the control arm of the study women were screened for risk factors and referred based on the MoHSW ANC referral criteria whereas in the intervention arm women were screened for risk factors and referred according to the modified ANC referral criteria. Main outcomes included service utilization, referral compliance and predictive properties for adverse pregnancy outcomes. The intervention was conducted for 18 months from January 2005 to June 2006.

Phase 3: Post Intervention Assessment. After the intervention, post intervention surveys were conducted both in the community and in the health facilities to assess the impact of the intervention on the use of skilled care during delivery and the level of referral compliance. These were cross sectional studies similar in methodology with the baseline studies and were conducted from August to September 2007.

2.2.1 Baseline studies:

2.2.1 1 Baseline Community Survey

The survey employed both quantitative and qualitative research methods. Quantitative research methods were used to determine service utilization rates during pregnancy and delivery, referral compliance among women at high risk and factors which determine use of services and referral compliance. Qualitative methods were considered to be appropriate for the assessment of perceptions, attitudes, behaviour and practises on use of health services during pregnancy and delivery, referral criteria and referral compliance.

2.2.1.1.1 Baseline Quantitative Survey

This was a cross sectional study to assess use of skilled care during delivery, barriers to use of these services, referral compliance, barriers to referral compliance, knowledge and perceptions on pregnancy and delivery danger signs.

The study population for the baseline survey were women in their reproductive ages from the catchments populations of the selected health facilities.

Sampling and Sample size for the baseline quantitative survey

A two stage cluster sampling technique was used to select a representative sample of women from the study area. In the first stage twenty four health facilities were selected from a list of all 34 health facilities in the district using simple random sampling technique. The selection was based on the recommendation that a random sample of 25 to 30% of the health facilities in a district of an average size is usually adequate to represent a district health service situation [83]. Of the 34 health facilities in Mtwara rural district, 24 facilities were selected for the study constituting more than 30% required to be representative of a district health service situation. Then, a list of villages in the catchment areas of each of the selected health facility was obtained from the health facility management. One village in the catchments area of each of the selected health facilities was selected randomly. In the selected villages, a house to house survey was conducted and all women who had been pregnant within one year preceding the survey were included in the survey. Women were interviewed on use of services during pregnancy and delivery, barriers to use of health services, referral compliance, barriers to referral compliance and on their knowledge and perception towards pregnancy and delivery danger signs.

EPI INFO version 6.04 was used to calculate the sample size using the sample size formula for a cross sectional study [84].

$$n = \frac{N Z^2 p (1-p)}{d^2 (N-1) + Z^2 p(1-p)}$$

Where:

n is the minimum required sample size

N is the estimated population

Z is the percentage point of the normal distribution corresponding to the level of significance. For 5% significance level, **Z**=1.96

p is the prevalence of use of skilled care at delivery (taken to be 0.44 ,[15].

d is the maximum likely error taken to be 0.05

Since the study employed cluster sampling, technique, a design effect was taken into consideration when calculating the sample size. The design effect of 2 was used, a value which have been reported in the most recent Demographic and Health Surveys as a design effect of the variable "Mothers received medical assistance at delivery" in the Southern Zone where this study was conducted [3]. Therefore using the above formula and taking into consideration the design effect, a minimum of 756 women were to be interviewed.

Data Collection Instruments Used for the Quantitative Survey

A structured interview schedule was used to generate data in the quantitative baseline survey (see Appendix 1A). The interview schedule was formulated in English and then translated into Kiswahili the local official language in Tanzania which is spoken by nearly everyone in the country. Back translation to English was done to ensure that the questions had the same meaning after translation. Pretesting of the interview schedule was done in a similar population in a neighbouring district to test for clarity, validity and reliability of the questions. After the pretesting exercise, the interview schedule was revised accordingly which involved rephrasing some questions which were found to be ambiguous and reorganizing the numbering of the questions in order to have a logical flow. The interview schedule was then finalised for use. Trained interviewers were used for data collection.

2.2.1.1.2 Baseline Qualitative Survey

In the qualitative survey, key informants were interviewed to generate information on the following themes: Health care seeking behaviour during pregnancy and child birth, knowledge and attitudes towards pregnancy danger signs, referral compliance and barriers to comply with referral advice. Village leaders were requested to help in identifying the key informants who were specified to be long term residents with first hand knowledge about the community, and issues of availability and utilization of maternal health services.

The selection processes for the key informants was as follows: For each of the 24 health facilities, a list of the villages in the catchment area was made followed by a selection of one of them using simple random sampling technique. Leaders from each of the selected villages were then requested to identify at most five people, knowledgeable about reproductive health issues and long term residents in the village who were to form the pool of key informants. The selected informants were asked to come to the village government offices for interviews. Two followup visits were done for the respondents who were not available on the day of the interview. A maximum of five key informant interviews were conducted for each selected village. The indepth interviews were done by the principal researcher assisted by a Sociologist.

The qualitative survey was conducted prior to the quantitative survey and the information obtained was used in preparing the questionnaire for the quantitative survey.

Data collection Instrument for the qualitative survey

For the qualitative survey an interview guide was used to collect information on the following major themes:

1. Health care seeking behaviour during pregnancy and child birth
2. Knowledge and attitudes towards pregnancy and delivery danger signs
3. Barriers to referral compliance
4. Facilitating factors to referral compliance

2.2.1.2 Baseline Health Facility Based Survey

The facility based survey was a cross sectional study to assess availability of essential equipment, supplies and trained personnel. Guidelines from the Ministry of Health and Social Welfare on equipment, supplies and staff cadres that are required to be available at each level of the health facility was used [85]. Assessment of health workers perceptions on referral criteria and referral compliance by women identified with pregnancy danger signs was also done. Key informant interviews were conducted among staff working in MCH clinics to get their opinions on utilization of services by women during delivery, referral compliance and barriers to referral compliance and what they considered necessary to increase utilization. Information was also collected from them on what specific danger signs they knew to be predictive of adverse pregnancy outcomes, the information which

was later used to develop the modified referral criteria. Data collection was done by trained research assistants with medical backgrounds (Drs and Nurses). A medical background was necessary specifically in assessing availability and working condition of the medical equipment in the health facilities.

The facility survey was conducted in twenty four health facilities (21 dispensaries and 3 health centres) in Mtwara rural district which were selected randomly using simple random sampling technique.

Instruments used for the facility based study

Two instruments were used to collect baseline data from the health facilities. They were:

1. Checklists to assess availability and working conditions of essential equipment, availability of expendable supplies and qualified personnel in the selected health facilities. The checklists were developed based on the Ministry of Health and Social Welfare guideline standards of what equipment, supplies and personnel are expected to be at each level of care [85, 86]
2. An unstructured interview guide to maternal health care providers

The major themes included in the interview guide for health care workers were:

1. Health care seeking behaviour of women during pregnancy and child birth
2. Barriers and facilitating factors to referral compliance for women referred due to pregnancy risk factors

2.2.2 The Intervention and the related randomization procedure

This was a cluster randomized controlled trial (CRCT) where the health facility was used as a unit of randomisation. The cluster design was chosen for practical reasons, as effective individual randomization was not possible in this setting. It would not have been feasible for nurse midwives to use different referral models to randomly allocated women in individual health facilities.

All twenty four health facilities (dispensaries and health centres) selected for the baseline facility survey were included in the intervention phase of the study. The selected facilities were grouped into three groups according to their distance to the referral hospital (0-40 km, 41-60 km, >60 km). Random allocation to either an intervention or a control group

was done within the strata. Grouping of facilities according to distance from the hospital was meant to ensure that control and intervention facilities are similar with regard to an important aspect which have been reported to influence utilization of skilled care and referral compliance. The minimum distance from a control to an intervention health facility was about 9 km.

2.2.2.1 The Intervention Package

The intervention package was designed based on the findings of the baseline survey. During the baseline survey, health care providers, female respondents and key informants were interviewed on the utilization of maternal health services, barriers to use of services, barriers to referral compliance and on what they thought could improve utilization and referral compliance.

The intervention package had two components:

1. **Training of all maternal health care providers**. Maternal health care providers (MCHA or NMW) working in the selected health facilities were trained on focused antenatal care for one week. Focused antenatal care was being introduced in the district at the time when this was done so workers needed to be oriented to it. A list of workers working in the selected health facilities was obtained from the office of the district medical officer. The health care providers were invited through letters to assemble for a seminar at the district headquarters. The one week training was done using the National guidelines of Focused ANC which is the Tanzania adapted version of the new WHO ANC model [87]. The trainers were from the Regional training team for Mtwara region who had previously been trained on how to use the guidelines by the ministry of health team.

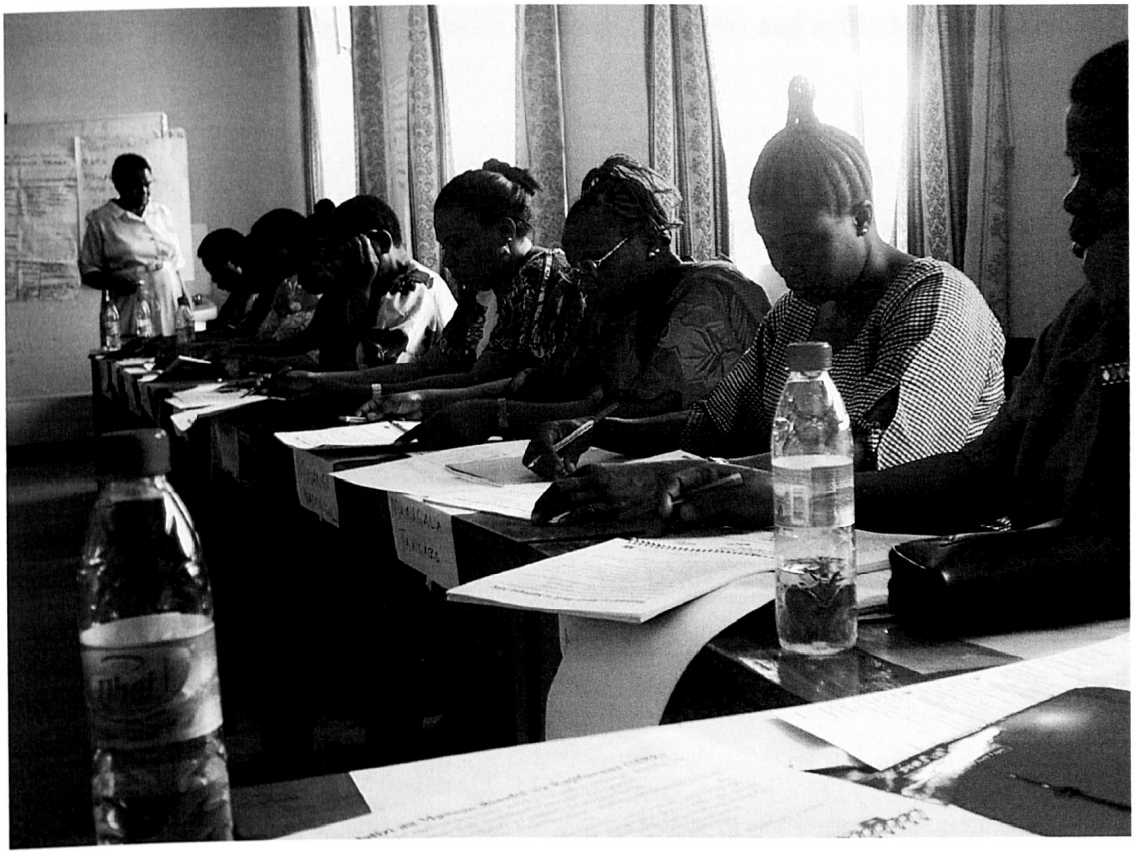


Figure 2.2: Health Care Workers Training Session in Mtwara

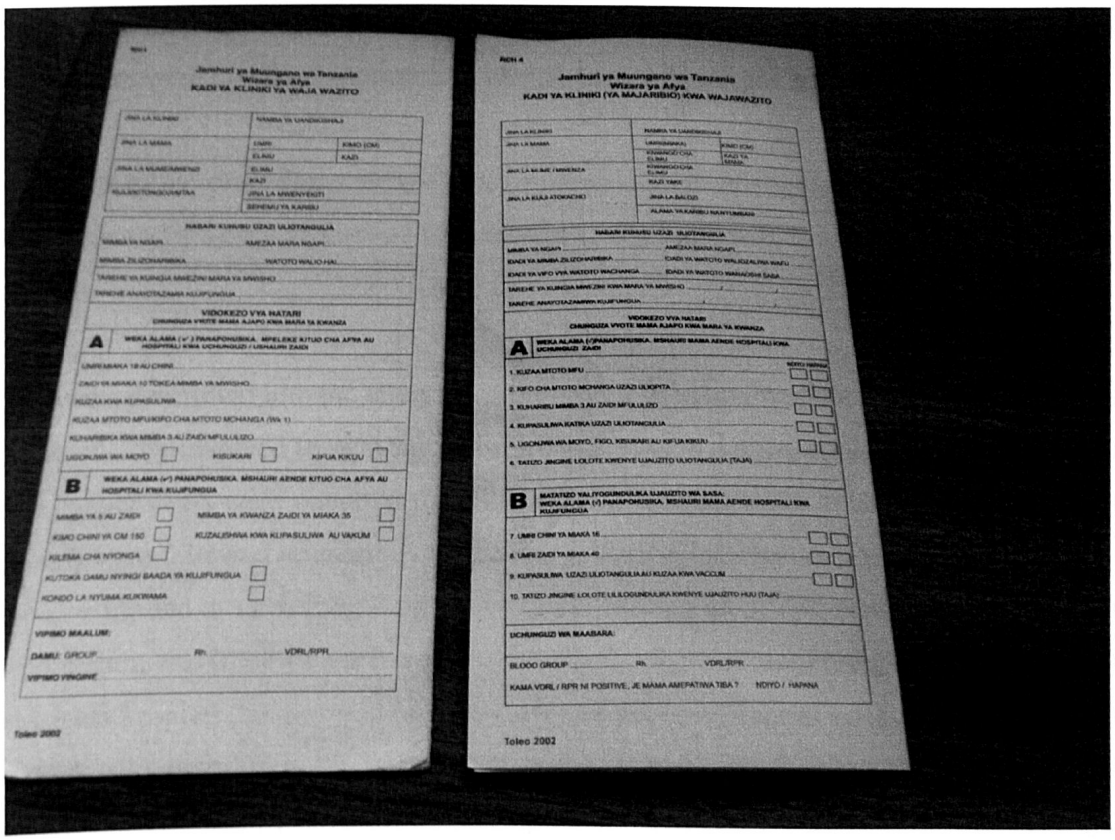
2. **Field testing of the modified ANC referral criteria**. At a first stage, in-depth interviews were conducted with maternal health care providers working in the selected health facilities. They were asked to mention what risk factors they considered to be predictive of pregnancy adverse outcomes and which they thought should be included in the modified ANC referral criteria. When this information was analysed, a modified list of ANC risk factors for referral was made taking into consideration the list of risk markers specified in the New WHO ANC Model. This was done in consultation with Obstetricians. The Reproductive and Child Health Section (RCHS) of the Ministry of Health was involved at this stage and agreed on the suggested list of risk factors to be used in the modified ANC card. It was after this that the modified ANC card was designed and printed ready for the trial. Table 2.2 shows the list of risk factors in the MoHSW ANC card and the risk factors used in the Modified ANC card.

Table 2.2: Risk Factors in the MoHSW ANC card (RCH4) and in the Modified ANC cards

Standard MoHSW ANC card	Modified ANC card
RISK CATEGORY A: Women with these risk factors should be advised to go to hospital for further investigation	
Age < 20 yrs	Dropped
10 or more yrs since last birth	Dropped
Caesarean section in the previous pregnancy	Moved to Category B
Still birth or early neonatal death in previous pregnancy	Still birth or early neonatal death in previous pregnancy
3 or more consecutive abortions	3 or more consecutive abortions
Heart condition, diabetes or TB	Heart or Renal condition, diabetes or TB
RISK CATEGORY B: Women with these risk factors should be advised to go to hospital for delivery	
5 or more pregnancies	> 7 pregnancies
First pregnancy at age of > 35 yrs or more	Age<16 yrs or Age > 40 yrs
Height < 150 cm	Dropped
Hip deformity	Dropped
CS or vacuum delivery in the previous pregnancy	CS or vacuum delivery in the previous pregnancy
History of PPH or retained placenta	History of PPH or retained placenta
RISK CATEGORY C: Women with these signs should be referred to hospital immediately	
BP > 140/90	BP > 140/90
HB < 8.5 gm/dl	HB < 8.5 gm/dl
Urine albumin	(symptoms of pre-eclampsia)
Pedal oedema	
Urine sugar	Dropped
-	Vaginal bleeding
Gestational age > 40 wks	Gestational age > 40 wks
Suspected IUFD	Suspected IUFD
Transverse lie at 36 wks	Transverse lie at 36 weeks
FH too big/ too small for GA	FH too big/too small for GA
	Heart or Renal condition, diabetes or TB

The modified ANC card resembled the MoHSW ANC card (which was in use at that time) in every aspect except the list of risk factors (See Fig 2.3).

Fig: 2.3: The MoHSW ANC card (RCH4) and the modified ANC card



Since all health care providers had been using the risk screening approach as specified on the MoHSW ANC card (RCH4), no specific training on risk factors and risk screening was given to health providers from the control health facilities except that health care providers working in the intervention facilities were trained on use of the modified ANC card. For this group, emphasis was also put on individual assessment of the woman on her health condition rather than relying fully on the list of risk factors.

2.2.2 2 The Trial Procedure

All women who came for antenatal care for the first time in the selected facilities and confirmed to be pregnant were consecutively recruited into the study and screened for risk factors according to the antenatal card allocated to the respective health facility. Those who attended ANC in the control health facilities were screened for risk factors based on the standard MOHSW ANC referral criteria (in the MoHSW RCH 4 card) while those who

attended ANC in the intervention health facilities, risk screening was performed based on the modified ANC referral criteria. In both arms women found to have any of the listed risk factors were given an appropriate referral advice as per the respective referral model.

Antenatal clinic procedures were similar in both clinics as stipulated in the focused ANC guideline and the only difference between the two groups was on the list of risk factors for referral.

All women recruited into the study were registered in special register books located in each health facility involved in the trial. Information on socio demographic variables, risk status and danger signs were obtained for all women at the first visit. Women recruited in both groups were followed up monthly till delivery. The register books were filled in at the first ANC visit, and at each follow up visit in case of change of risk status and also delivery information was filled for each woman if available. Special monitoring mechanism was set at Ligula hospital (the hospital normally used as the only referral centre for the district) to register all women from the intervention and control health facilities who showed up for delivery. Those women who did not deliver in the lower level health facilities or in Ligula hospital were followed up at home to get their delivery information otherwise the information was obtained at the health facility when they brought their babies for immunizations. Health care providers from the health facilities where these women were recruited and village health workers were trained and requested to help to do follow up of these women and were paid a small amount of money to compensate for their time.

Primary Outcome Measures

1. Compliance to referral advice (% of referred women complying with referral advice as indicated on the card)
2. Utilization of skilled care at delivery (% of women who were assisted during delivery by a skilled attendant)

Secondary Outcome Measures

1. Place of delivery (Home/dispensary/Health centre or hospital)
2. Mode of delivery (Normal delivery/Breech/Caesarean section/Vacuum delivery)
3. Occurrence and type of pregnancy or delivery complications.

4. Birth outcome (Live birth/Still birth/Early Neonatal death)

Instruments used in the intervention Trial

1. Registers in referring health facilities (Out going referrals) and in Ligula hospital (In coming referrals)
2. The Modified and MoHSW ANC cards.

Sample size for the Intervention Trial

EPI INFO version 6.04b was used to calculate the sample size for the cluster randomized trial [88]. The formula for comparison of two proportions was used to determine the minimum number of pregnant women to be included in the intervention phase of the study.

$N = n'/4 * [1 + \sqrt{5/n' p_2 - p_1}]^2$

Where

$$n' = \frac{\{Z(1-\alpha/2)\sqrt{[p(1-p) + Z(1-\beta)\sqrt{p_1(1-p_1) + p_2(1-p_2)}\}^2}}{(p_2 - p_1)^2}$$

The following assumptions were made:

p_1 - Proportion of women at high risk who comply with the referral advice in the control group was taken to be 25% [26].

p_2 – Proportion expected to comply in the intervention group (assumed to be 35%).

p - is the average of p_1 and p_2

Z_α= Alpha risk (taken to be .05)

$Z(1-\beta)$ is the desired power (taken to be 0.90)

The design effect of 2 was considered due to the fact that the sampling units were clusters and not individual women [89]. The design effect of 2 was reported in the most recent Demographic and Health Survey [3]. Using the above formula and including 20% to adjust for loss to follow-ups, The minimum required sample size for follow-up was 1101 women in each group.

2.2.3 Post Intervention Survey

The post intervention survey was done eighteen months after the start of the intervention phase of the study. Community and health facility surveys were done to assess the impact of the intervention on referral compliance and on the use of services during delivery.

2.2.3.1 Post Intervention Community Based Survey

This was a cross sectional study to assess the impact of the intervention on the use of services during delivery and on the extent to which women had complied with referral as directed by the health care providers. Only the quantitative methods were used to generate quantitative information which was used to derive rates of services use and referral compliance. These were compared with the baseline levels to see if there was any difference. The sampling scheme and sample size were similar to those used in the baseline survey. For data collection, a structured interview schedule similar to the one used in the baseline survey was used, and a representative sample of women who were in the reproductive ages from the catchments of the selected health facilities were interviewed.

2.2.3.2 Post Intervention Health facility based Survey

This was a cross sectional study. Semi structured interviews were conducted to health workers of all the health facilities involved in the study to get their opinions on the modified referral criteria, its impact on referral compliance, its ability to predict complications and adverse pregnancy outcomes and their suggestions on what should be done to improve utilization of ANC and delivery care services.

2.3 Data Management

Data collection instruments were checked daily in the field by the Investigator for consistency and completeness. Errors were corrected and gaps were filled by return visits to the interviewee. In order to improve the responce rate, during the baseline and post intervention household surveys, a maximum of three call backs were done for respondents who were not at home during the time of the visit. If the respondent could not be found during the three visits, she was recorded as a non respondent.

All open ended questions were coded for ease entry to the computer. Data was entered into the computer using EpiInfo for windows program revision 2 [90]. To avoid data entry errors each questionnaire was entered twice and entries compared using the validation utility of EpiInfo software. Data analysis was done using the SPSS statistical analysis program version 11 and STATA version 9 [91, 92]. In the CRCT analysis of data was by intention to treat. Frequency distributions and two-way tables were used to summarize the data. Statistical inferences were done using Chi-Square tests to compare proportions and to assess associations between variables. P-values of less than 0.05 were considered significant. Ninety five percent confidence intervals were constructed on proportions and odds ratios.

When analysing factors influencing utilization of skilled care at delivery and referral compliance, a composite socio-economic status indicator (wealth index) was created using information on source of drinking water, type of toilet facilities, housing construction material, household assets, ownership of any form of transportation, ownership of animals, land ownership and source of family income. Data Reduction using Factor analysis was used to generate weighted scores from the above variables and normalized with a mean of zero and standard deviation of one [93]. The resulting scores were then summed up within households, ranked and used to stratify the households into 5 levels of socio-economic status which were very low, low medium, high and very high.

Another variable, knowledge of pregnancy and delivery danger signs, was arrived at by analyzing the number of danger signs that the respondent were able to mention spontaneously. Those who could not mention any were considered to have no knowledge, those respondents who mentioned up to three danger signs were considered to have low knowledge and those who mentioned four up to ten danger signs were considered to have moderate knowledge of pregnancy danger signs. No respondent was able to mention more that ten danger signs and so none was considered to have a high level of knowledge.
Multiple logistic regression were used to assess individual effect of variables on use of health facility for delivery and referral compliance while adjusting for potential confounding variables which included age of the woman and parity. In multiple logistic regression a set of covariates is used to predict the odds of a woman using or not using

skilled assistance during delivery or odds of complying or not complying with the referral advice.

The multiple logistic regression model is represented by the following equation [94-96]:

Logit (p) = $\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots . \beta_k x_k$

Where $\beta_{i's}$ are the regression coefficients associated with the exposure variables the $x_{i's}$.

Odds ratios (OR) and their respective 95% confidence intervals were computed from the regression coefficients and their respective standard errors using the following formular.

$OR = e^{\beta i}$

The 95% confidence intervals of the OR were calculated by

$e^{\beta i} \pm 1.96\ (SE\beta_i)$.

Goodness of fit of all models was assessed using the following two Goodness of fit tests:

1. The Omnibus Test of model Coefficients which indicates how well the model is over and above the model without any predictor variables. Models were considered to have the best fit if the p-value of the Omnibus test was less than 0.05.
2. Hosmer and Lemeshow Goodness of fit test. In this test, the model was considered to have the best fit if the p-value for the Hosmer and Lemeshow test was greater than 0.05 [96] .

Measures of screening tests which are, Sensitivity, specificity, positive and negative predictive values were used to assess the ability of the modified ANC referral criteria to distinguish women who will have complications or adverse outcomes from those who will not in comparison to the MoHSW ANC referral criteria.

Analysis of qualitative data was done using content analysis. The data were manually analyzed from the instruments of data collection (Field observation log book) to discover emerging themes. After categorization, all narrative statements and comments were grouped according to the main thematic topics into sub-heading. Similar information were grouped in one category and aggregated.

2.4 Ethical Issues

The research was approved by the Muhimbili University of Health and Allied Sciences (MUHAS) Research Ethics Committee. Permission to carry out the study was granted by the relevant authorities at the Ministry of Health and Social Welfare, the district, ward and village levels. Respondents for this study were given a full explanation of the purpose of the study and informed consent was obtained from each pregnant woman. Confidentiality of information provided was assured to the respondents and the interviews were anonymous for both cross sectional surveys. There were no potential risks arising from participation in the study. All women were counselled to prepare individualized birth plans, and to be prepared for any emergency that might arise as per the focused ANC model. During ANC all women were also advised to deliver in a health facility with a skilled assistant. They were also informed on pregnancy and delivery risk factors and the dangers associated with them and were advised on where to go in case of any emergency. Maternal health care services were provided free of charge by the government in all health facilities in the district. Mtwara district had an ambulance which could be called using radio calls to pick patients from the lower level health facilities in case of an obstetric emergency. The ambulance service was paid for by the district council and women with complications were not supposed to pay anything. Women were free to go for delivery where they preferred and in no way the study forced them to adhere to the advices.

CHAPTER THREE: HEALTH SEEKING BEHAVIOUR AND DETERMINANTS OF USE OF SKILLED CARE AT DELIVERY

This chapter is organised following the sequence of the specific objectives of the study starting with health care seeking behaviour of women during pregnancy and delivery and ending with a section on barriers to utilization of skilled care at delivery. All these are findings from the baseline studies.

3.1 Health Care Seeking Behaviour of Women during Pregnancy and Delivery in Mtwara District

To determine the health care seeking behaviour of women during pregnancy and delivery we interviewed women who were pregnant within one year prior to the survey. A total of 974 women in Mtwara rural district were interviewed. Overall the response rate was 92% (974/1059). The ages of respondents ranged from 14 to 50 years with mean age of 26.86±6.76 years. One hundred and three women (10.6%) did not know their ages and efforts to estimate their ages by referring to a local calender of events failed.

About half (49.5%) of the respondents had never been to school and of those who reported to have attended formal schools, almost three quarters (72.2%) reported only seven years of schooling. An overwhelming majority of respondents (94%) were Muslims and of Makonde tribe. Major occupation of respondents was subsistence farming, accounting for 95.7% of the respondents. Over three quarters (77.2%) were married or cohabiting and 12.2% were divorced. Number of children ever born ranged from 1 to 11 with a median of 3. Table 3.1 below shows the Socio - demographic characteristics of respondents.

Table 3.1: Socio demographic Characteristics of Respondents

Characteristic	N (%)
Age	
14-19	120 (12.3)
20-34	624 (64.1)
35+	127 (13.0)
Unknown age	103 (10.6)
Religion	
No religion	12 (1.2)
Christian	48 (4.9)
Muslim	914 (93.8)
Tribe	
Makonde	915 (93.9)
Makua	17 (1.7)
Other	42 (4.3)
Years spent in school	
0	482 (49.5)
1-6	125 (12.8)
7+	367 (37.7)
Occupation	
Subsistence Farming	932 (95.7)
Other	34 (3.5)
Not stated	8 (0.8)
Marital status	
Single	98 (10.1)
Married	752 (77.2)
Divorced, widowed/separated	124 (12.7)
Household size	
0-5	632 (64.9)
6+	334 (34.3)
Missing	8 (0.82)
Parity	
1	249(25.6)
2-4	544(55.9)
5+	181(18.6)
Total	974 (100)

3.1.1 Use of Antenatal Care (ANC) Services

Respondents were asked whether they attended antenatal clinics during their most recent pregnancy and for those who attended, information on gestational age at start of ANC and the number of ANC visits was obtained.

Findings show that utilization of antenatal care services was universal with 972 (99.8%) of respondents reporting to have attended antenatal clinic at least once during

their last pregnancy. This was consistent with what was reported during indepth interviews with key informants.

The following are selected statements from the key informants: One man aged 70 years. from Lipwidi village stated

"All pregnant women attend antenatal clinic, we have never seen any one who does not attend"

Another respondent a woman aged 54 yrs from Navikole village stated

"No body argues about attending antenatal clinic. Every woman who is pregnant goes to the clinic beginning from 3 months onwards".

Health workers from the surveyed health facilities also testified that all pregnant women in their catchment areas attend antenatal clinic at least once during pregnancy. They reported first antenatal visit coverage of 100%.

In addition to attending formal antenatal care in health facilities, 34 (3.5%) respondents reported that they also consulted other service providers for ANC including Traditional Birth Attendant (65%) and Village Health Workers (VHW) (29%). The majority of the women started antenatal care later than recommended. Gestational age at first ANC visit ranged from 1 to 8 months with a median of 5 months.

Only 42% of respondents had their first ANC visit before 20 weeks of gestation which was the recommended time to start ANC. Table 3.2 shows the gestation age at first ANC visit by socio-demographic characteristics.

None of the socio demographic characteristics was found to be significantly associated with gestational age at first antenatal care visit except the household size. Women from big households (more than 5 people) had a significantly small proportion (38%) of women who booked for ANC before 20 weeks of gestation as compared to those from households with less than 5 people (44.0%). Also the proportion of women who booked early for antenatal care decreased with increasing age varying from 53% among women aged less than 20 years to 44% among those aged 40 or more years. The decreasing trend on early

booking with increasing age of women was not statistically significant (χ^2 trend, p=0.144). A higher proportion (42%) of respondents who perceived the ANC care quality to be very good booked earlier for antenatal care compared to those who perceived that the quality of care is bad or very bad (40.2%) but the difference was again not statistically significant (p=0.698).

Also a higher proportion (44.4%) of women who were ranked in high socio-economic status booked early for antenatal care compared to those in the low socio economic status (34.7%) but again the association was not statistically significant (p=0.11).

Reported number of antenatal visits ranged from 1 to 13 with a median of 4 visits. Over a third (36%) of respondents attended for less than the recommended minimum of 4 visits for a normal pregnancy. Women who had never been to school had significantly lower proportion (61.4%) with at least four visits compared to those who have ever been to school (p=0.003). The proportion of women with at least 4 antenatal visits decreased significantly with parity from 66% among women with parity 4 or less to 56% among those with parity 5 or more and the difference being statistically significant (p=0.013).

Table 3.2 Use of ANC and Delivery Care Services by Socio-demographic Characteristics

Variable	Total in the group n ....(%)	Women with 1st ANC visit at < 20 wks gestation (%)	Women with at least 4 ANC visits (%)	Women who delivered in Health facilities (%)
Age				
14-19	120 (12.3)	53.3	69.2	62.5
20-34	624 (64.0)	39.7	65.1	45.4
35+	127 (13.0)	44.1	58.3	48.8**
Years spent in school				
0	482 (49.4)	42.5	61.4	41.1
1-6	125 (12.8)	43.2	77.6	48.0
7+	367 (37.8)	41.1	62.7**	53.7**
Marital status				
Single	98 (10.1)	41.8	68.4	62.2
Married	752 (77.2)	42.7	62.4	44.4
Divorced/ Widowed/separated	124 (12.7)	38.7	70.2	48.4**
Household size				
0-5	632 (64.9)	44.0	65.0	47.0
6-11	334 (34.3)	38.0*	61.7	46.4
Parity				
1-4	793 (81.4)	41.6	65.7	48.0
5+	181 (18.6)	44.2	56.4*	40.9
Distance to facility (km)				
0-5	791 (81.2)	42.4	64.2	52.5
>5	183 (18.8)	41.0	62.8	21.9***
Perceived ANC care quality				
....Very good/Good	837 (85.9)	42.1	64.4	47.9
....Bad/very bad	82 (8.4)	40.2	56.1	40.2
Socio-Economic Status				
Very Low	190 (19.5)	34.7	65.2	40.5
Low	191 (19.6)	42.4	64.0	38.2
Medium	187(19.2)	40.6	61.0	43.9
High	189 (19.4)	48.1	69.8	51.0
Very high	189 (19.4)	44.4	60.3	58.7***
Total	**974 (100)**	**410 (42.1)**	**623 (64.0)**	**455 (46.7)**

*** p<0.05, ** p<0.01, *** p<0.001**

Almost two thirds (64.4%) of respondents who perceived the quality of care to be very good had at least 4 visits compared to those who perceived the care quality to be bad (56%) but the difference was not statistically significant (p=0.084). There was a decrease in the proportion of women attending for 4 or more visits with increasing age from 69.2%

among those aged less than 20 years to 58.3% among those aged 35 or more years but the difference was not statistically significant (p=0.146). Other variables including distance to the health facility which provide ANC and socio-economic status were found to have no significant association with number of times a woman visited the ANC clinic (p=0.741 and p=0.331) respectively (Table 3.2).

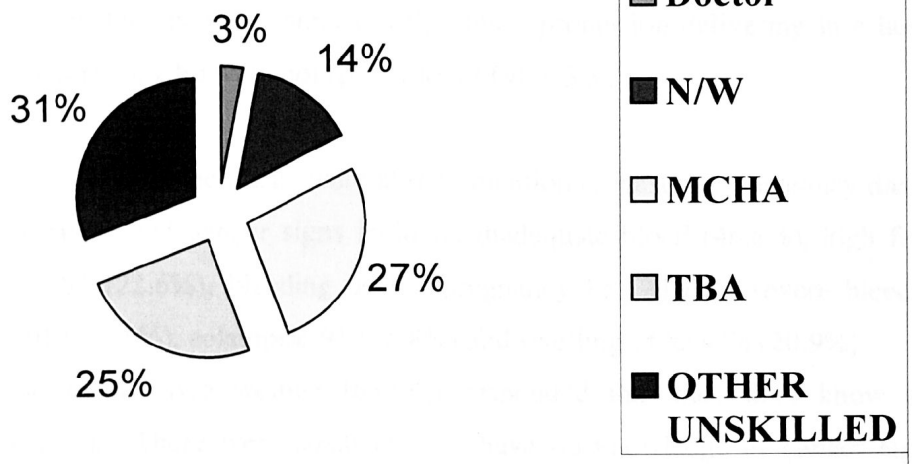
3.1.2 Use of Delivery Care Services

Findings from this study showed that use of health facility for delivery was low with only 455 (46.7%) of respondents reporting to have delivered in the health facility in their most recent delivery. Of these, 35% delivered in a hospital level and 65% delivered in lower level health facilities (dispensaries and health centers). Skilled attendance at delivery was reported by only 446 (45.8%) of the respondents and of these 16 (3.6%) were home deliveries. Maternal and Child Health Aids (MCHA) assisted over a quarter (27.1%) of all deliveries while nurse midwifes attended only 14.4% of the deliveries as shown in Fig 3.1. Among women who delivered at home, 50.1% were assisted by untrained relatives or friends while 46.3% were assisted by Traditional Birth Attendants (TBA's). Only 3.1% of home deliveries were assisted by skilled midwives.

3.1.2.1 Determinants of Delivery Care

Proportion of women delivering in a health facility was seen to decrease significantly with increasing age of women from 62.5% among women below 20 years of age to only 48.8% among women aged 35 or more years (Table 3.2). The age differences in the proportion of health facility deliveries was found to be statistically significant (p=0.003).

Fig 3.1: Qualifications of Birth Attendants



Years spent in school also showed a significant association with place of delivery with women who have more schooling years having a higher proportion of health facility deliveries compared to those with fewer schooling years or those who did not go to formal schooling (p=0.001). A significantly higher proportion (62.2%) of women who are single delivered in a health facility compared to their married counterparts (44.4%) (p=0.004). The proportion of women delivering in health facility was seen to decrease with increasing distance to the health facility which provide delivery care from 52.5% among women residing within 5 km from a health facility to only 21.9% among those residing more than 5 km from a health facility (p=0.0001). Perceived quality of care in health facilities had no significant association with place of delivery although women who perceived care quality to be good had a higher proportion of deliveries (48%) in the health facility compared to those who perceived care quality to be poor (40%) (p=0.184). There was a significant increase in proportion delivering in health facilities with socio economic status from 40.5% among women with very low socio economic status to 58.7% among those with very high socio economic status. The increasing trend in proportion of women who delivered in health facilities with socio economic status was significant (χ^2 for trend, p=0.00002).

Table 3.3 shows place of delivery by selected women and ANC service characteristics. Women who reported that they ever discussed with their husbands or partners on where to go for delivery while pregnant and those who were advised during ANC by health workers to deliver in a health facility had a significantly higher proportion delivering in a health facility compared to those who were not (p=0.0001) (Table 3.3).

A total of 352 (36.1%) of respondents were able to mention at least one pregnancy danger sign. Commonly mentioned danger signs included inadequate blood (46.8%), high fever during pregnancy 80 (22.6%), bleeding during pregnancy 85 (24.1%), severe bleeding during delivery 101 (28.6%), eclampsia 91 (25.8%) and swelling of legs 74 (20.9%).
Six hundred and twenty two women (63.9%) responded that they dont know any pregnancy danger sign. These were considered to have no knowledge of danger signs. Among women who responded that they knew pregnancy and delivery danger signs, more than half (53%) mentioned two or less danger signs and only 72 (20.4%) respondents could mention 4 or more signs of danger. Respondents who mentioned two or less danger signs were considered to have low knowledge where as those who mentioned between four and nine danger signs were considered to have moderate knowledge. None of the respondents mentioned more than nine danger signs so there was no respondents with a high knowledge of danger signs. Proportion of health facility deliveries increased with knowledge of danger signs from 42% among women who did not mention any to 52.1% among those with low knowledge to 66.7% among those who mentioned 4 or more danger signs. The difference in the proportion of hospital deliveries with knowledge of danger signs was statistically significant (p=0.0004). Women who started ANC clinic early and those who had 4 or more ANC visits were more likely to deliver in a health facility compared to those who booked late for ANC and those with fewer than recommended ANC visits (p=0.01). Women who reported that they had health problems during pregnancy did not have an increased chance to use health facilities for delivery compared to those who had no health problems during pregnancy (p=0.152).

Table 3.3: Place of Delivery by Selected Characteristics

	Place of delivery			
	Home	**Health facility**	**Total**	**p-value**
Discussed with partner on place of delivery during pregnancy				
Yes	158 (41.0)	227 (59.0)	385 (39.5)	
No	361 (62.0)	221 (38.0)	582 (59.8)	0.0001
Knowledge of risk factors				
No knowledge	361(58.0)	261 (42.0)	622 (63.9)	
Low knowledge	134 (47.9)	146 (52.1)	280 (28.7)	
Moderate knowledge	24 (33.3)	48 (66.7)	72 (7.4)	0.0004
Received advise on place of delivery during ANC				
Yes	382 (49.5)	390 (50.5)	766 (79.3)	
No	136 (68.7)	62 (31.3)	198 (20.3)	0.0001
1st ANC visit				
Within 1st 3 months	199 (48.5)	211 (51.5)	410 (42.1)	
After 3 months	313 (56.8)	238 (43.2)	551 (56.6)	0.011
Number of ANC visits				
Less than 4	199 (60.1)	132 (39.9)	331 (34.0)	
4 or more	308 (49.4)	315 (50.6)	623 (64.0)	0.0016
Illnesses/complication during pregnancy				
Yes	38 (45.8)	45 (54.2)	83 (8.5)	
No	481 (54.0)	410 (46.0)	891 (91.5)	0.152
Total	519 (53.3)	455 (46.7)	974 (100)	

All variables which showed a significant association with place of delivery in the bivariate analysis were put in a multiple logistic regression model as is shown in table 3.4. Even after adjusting for other variables, distance to the health facility providing delivery care showed a significant influence on place of delivery. Women who were within five kilometers of a health facility were 4 times more likely to deliver in a health facility compared to those residing six or more kilometers away from the facility OR=4.36 (2.76-6.89) , Table 3.4. Whether or not the woman discussed with her husband/partner during pregnancy where to go for delivery also showed a significant influence on place of delivery

even after adjusting for other variables. Those women who had discussed with their partners were almost 2.5 times more likely to use the health facility for delivery compared to those who had not discussed with their partners OR=2.48 (1.76-3.48).

Advice on place of delivery during ANC was also a significant predictor of place of delivery. Those women who reported that they were advised by health providers to come to the facility for delivery during ANC were almost twice as likely to deliver in the facility compared to those who were not advised OR=1.6 (1.06-2.43). Women of higher socio-economic status were also more likely to deliver in a health facility compared to those of very low socioeconomic status (Table 3.4).

Knowledge of risk factors was found to play a significant role in the choice of place of delivery. Women who had a moderate knowledge of risk factors were almost twice likely to utilize health facilities for delivery compared to those with no knowledge OR=1.96 (1.05-3.68).

Table 3.4: Coorrelates of use of delivery care services

Variable	n (%)	OR (95%CI)
Distance (kms)		
0-5	415 (52.5)	4.36 (2.76-6.89)*
6+	40 (21.9)	1
Age (yrs)		
< 20	75 (62.5)	1
20-34	283 (45.4)	0.55 (0.33-0.91)
35 +	62 (48.8)	0.69 (0.37-1.29)
Marital status		
Single	61 (62.2)	1
Married	334 (44.4)	0.43 (0.24-0.77)*
Divorced/widowed/separated	60 (48.4)	0.56 (0.28-1.12)
Discussed with partner on where to deliver		
No	221 (38.0)	1
Yes	227 (59.0)	2.49 (1.76-3.48)*
Advised where to go for delivery during ANC		
No	62 (31.3)	1
Yes	390 (50.5)	1.61 (1.06-2.43)*
Socio Economic status		
Very low	77 (40.5)	1
Low	73 (38.2)	0.83 (0.50-1.37)
Moderate	82 (43.9)	1.23 (0.75-2.02)
High	96 (51.0)	1.54 (0.94-2.52)
Very high	111 (58.7)	2.03 (1.24-3.33)*
Knowledge of risk factors		
No knowledge	261 (42.0)	1
Low knowledge	146 (52.1)	1.32 (0.93-1.87)
Moderate knowledge	48 (66.7)	1.96 (1.05-3.68)*

* P<0.05

3.1.3 Health Care Seeking Behaviour for Pregnancy and Delivery Complications

Respondents were asked whether they experienced any complications or illnesses during pregnancy, delivery or during the postnatal period and whether they sought health care for the reported complications. Eighty two women (8.4%) reported to have experienced an

illness or complication during pregnancy. Of these, 73 (89%) reported that they sought health care of which 71/73 (97%) sought care from a health facility. However seeking care for pregnancy complications or illnesses was not found to be associated with any socio-demographic or economic characteristic but there was a tendency of women with specific complications for example low HB and eclampsia to go to the hospital for care. For the majority of other conditions, care was sought from lower level health facilities. Fifty respondents (5.1%) reported a complication during delivery or postpartum period. In 23/50 (46%) the complication occurred while in the health facility and the rest, 27/50 (54%) reported that the complication occurred at home. Of the later group 22/27 (81.3%) reported to have sought care from a health facility while the rest did not seek care. However these numbers are too small for further statistical analysis.

3.2 Women's Knowledge and Perceptions of Pregnancy and Delivery Danger Signs

3.2.1: Knowledge of Pregnancy and Delivery Risk Factors/Danger Signs

Knowledge and perceptions of pregnancy and delivery danger signs were determined by both quantitative interviews of women and key informant interviews. The women respondents profile is as shown in table 3.1. A total of 86 key informants were interviewed in all the 24 villages selected to be included in the study using the methods explained in the methodology section.

Demographic Characteristics of Key Informants

At least three indepth interviews with key informants were conducted in each of the 24 villages selected. A total of 86 indepth interviews were conducted. Fifty four (63%) of respondents were males while 32 were females. Their ages ranged from 43 to 84 years. Majority of them were subsistence farmers with additional societal roles. For instance some of the female respondents were TBA's and some of the males were community leaders. Table 3.5 shows the demographic characteristics of the key informants.

Table 3.5: Demographic Characteristics of Key Informants

Variable	n (%)
Age	
< 50	12 (14)
50+	74 (86)
Sex	
Male	54 (63)
Female	32 (37)
Marital Status	
Married	69 (80)
Single	2 (2)
Divorced	8 (9)
Widowed	7 (8)
Occupation	
Subsistence farming	83 (96)
Other	3 (4)
Education level	
No formal education	51 (59)
Incomplete primary education	21 (24)
Completed primary education +	14 (16)
Total	86 (100)

Women respondents and key informants were asked to mention spontaneously pregnancy and delivery risk factors which they knew. As stated in the previous section it was noted that knowledge of risk factors was low among reproductive age women in this community. The most commonly mentioned danger signs by the key informants include: Baby not in normal position mentioned by (43%) of the key informants but only by 5% of the women respondents. First pregnancy was mentioned by (37%) of the key informants and only by 10% of the women respondents. Too young (age less than 20 yrs) was also commonly mentioned by key informants (39%) but rarely mentioned by women respondents where as inadequate blood (17%), fits (9.3%) and bleeding during pregnancy were most commonly

mentioned by women respondents. Others commonly mentioned by key informants included too many deliveries (33%), too old (23%) and previous operative delivery (16%) (Table 3.6).

Table 3.6: Common Risk Factors Mentioned by Key Informants and Women Respondents..

	Key informants n=86	Women interviews n= 974
Danger sign	**n (%)**	**n (%)**
First pregnancy	32 (37.2)	101 (10.3)
Too many deliveries (>5)	28 (32.6)	13 (1.3)
Too young	34 (39.5)	15 (1.5)
Baby not in normal position	37 (43.0)	53 (5.4)
Too old (>35yrs)	20 (23.2)	1 (0.1)
Previous operated delivery	14 (16.2)	9 (1)
Big baby	13 (15.1)	0
Inadequate blood	10 (11.6)	166 (17.0)
Bleeding during pregnancy	1 (1.2)	85 (8.7)
Fits	2 (2.3)	91 (9.3)
Swelling of legs	1 (1.2)	74 (7.6)
Labour lasting >12hrs	3 (3.5)	62 (6.4)
Severe bleeding at delivery/Retained products	1	144 (14.7)
High BP	0	28 (2.9)
Others	11 (12.7)	84 (8.6)

3.2.2 Perceptions on Pregnancy and Delivery Danger Signs

One of the objectives of the study was to determine what risk factors are perceived by women to be predictive of adverse outcomes and for which they think should comply with the referral advice. The information on women's perception was determined by both qualitative key informant interviews and the quantitative women interviews. In the latter, women were asked to mention spontaneously the risk factors which they knew and those who mentioned any risk factor were asked a follow up question to mention those risk factors which she thought it's necessary for the woman to go to hospital as advised by the health worker.

Majority of the key informants conveyed the message that the community generally has a feeling that it is important for all women with danger signs who have been advised to go to hospital for delivery to comply with the advice. They mentioned that at the hospital there are skilled personnel who can conduct safe deliveries and who can also help incase of any emergency complication. The following are examples of statements which show their feelings:

> *"Women advised to go to Ligula hospital for delivery should go because at the hospital there are skilled people incase of any problem it is easy to get assistance".(*Woman respondent age 56yrs Mpondomo village. Oct 06.)

Another respondent said:

> *"All risk factors are important because the main aim is to protect women's health. Women need to comply with the advice given".* (Male age 71 yrs Mpondomo village).

The process of labour and delivery was understood to be very dangerous sometimes and making it necessary that women referred to hospital for delivery should comply. One respondent had this to say:

> *"All risk factors are important and all who are advised to go to Hospital should go. Delivery can be very dangerous".* (Male respondent 52 yrs old, Mnima village.)

However some of the key informants mentioned that some risk factors are more serious than others and women should go to a referral facility as advised. The following was a common statements from the key respondents:

> *"It is important that all women advised to go to hospital for delivery do go but its extremely important for those women with inadequate blood and abnormal lie of the foetus or those who were delivered by operation in their last pregnancies".(*Female respondent age 52 yrs, Imekuwa village)".

A similar finding was also observed from the quantitative interviews with women. In these interviews it was found that there was a selection of risk factors which women considered to be more important and which they saw a need to comply with the referral advice. It can be seen from table 3.6 that risk factors which most women thought were important and required hospital care included: Previous caesarean section (78%), eclampsia fits (75%),

excessive bleeding after delivery (71%), labour pains lasting more than 12 hours (66%) and low haemoglobin level which was mentioned to be important by 64% of the women who mentioned it. It can be seen that very common risk factors like age <20yrs and 5 pregnancies or more were mentioned to be important by less than a third of women who mentioned it (Table 3.7).

Table 3.7: Number of Women who Mentioned Specific Risk Factors and who said will Comply with Referral Advice for the Mentioned Risk Factors

Risk factor	Number of women who mentioned the risk factor	Number (%) who thought its important to go to hospital
Inadequate blood	166	107 (64%)
Abnormal lie	53	31 (58%)
Swelling of legs	74	19 (26%)
Bleeding during pregnancy	85	42 (49%)
Excessive bleeding after delivery (PPH)	101	72 (71)
Eclampsia fits	91	68 (75%)
Previous CS	9	7 (78%)
Labour lasting >12hrs	62	41 (66%)
Retained placenta	44	25 (57)
<20yrs of age	15	2 (13%)
5 or more pregnancies	13	4 (31%)
BP > 140/90	28	9 (32%)

3.3 Availability of Qualified Personnel, Essential Equipment and Supplies for Obstetric Care in Health Facilities.

3.3.1 Coverage of Health Facilities Providing Maternal Health Care

One of the World Health Organization (WHO) process indicators developed to measure availability of obstetric care services is the number and distribution of facilities that provide obstetric care within a geographic area. The WHO standards stipulate a minimum of 1 facility which provides Comprehensive Emergency Obstetric Care (CEOC) and 4 facilities which provide Basic Emergency Obstetric Care (BEOC) for a population of 500,000.

Findings of this study show that the distribution of facilities in the district far exceeds the minimum WHO requirement for both BEOC and CEOC facilities. With a population of 204,157 [78], Mtwara district has a total of 4 facilities which provides BEOC services which complies with the number required for a population of 500,000. Although the district has no hospital which provides CEOC, it has a full access to Mtwara regional hospital, Ligula, which is also a referral centre for Mtwara Mikindani district. Total population for the two districts is 296,313 which is also less than the 500,000 specified in the WHO standards.

3.3.2 Availability of Services in the health facilities

According to WHO, every level of maternal health care services should include:

- Antenatal care (Including counseling on diet and nutrition, iron/folate supplementation, treatment of existing conditions, early recognition of obstetric complications and referral, malaria prophylaxis and tetanus toxoid immunizations)
- Normal delivery care (i.e clean, atraumatic delivery care)
- Post partum care.
- Services for detection and treatment of sexually transmitted infections

It is also recommended that these services should be intergrated and available whenever the facility is open [97].

All surveyed facilities reported that they provide all the above mentioned services with exception of laboratory services for detection of sexually transmitted infections (STIs) which was not provided in the majority of the dispensaries. Antenatal and postnatal care services are provided every day except Saturdays, Sundays and public holidays, while delivery care is provided round the clock in all health facilities.

For good quality maternal health care services to be provided, the health facility should have a good infrastructure, skilled personnel, essential equipment, supplies and drugs. For the purpose of this study, maternal health care services were considered available if in the facility there was at least one skilled personnel and the facility infrastructure which allows service provision, optimum availability level of essential equipment, supplies and drugs.

3.3.3 Availability of Qualified Staff

The Ministry of Health (MoHSW) guidelines recommend 4 main categories of trained staff to work in health centres and dispensaries [85]. At the health centre level there should be an Assistant Medical Officer (AMO) who should be the in charge, two clinical Officers, 2 Nurse midwivews and one public health nurse or a maternal and child health Aider (MCHA). At the dispensary level there should be one clinical Officer (CO) who is the facility in charge, one nurse midwife and one Public Health nurse B or Maternal and Child Health Aid (MCHA).

Findings showed that none of the health facilities met the MoHSW recommended staffing levels. For example, none of the health centres had an Assistant Medical Officer and none of the dispensaries had a nurse midwife. Seven out of twenty four surveyed facilities had no clinical officer and among these, 2 dispensaries had neither a Public Health Nurse nor a Maternal and Child Health Aid (Table 3.8). Public Health Nurses and MCHA are the common providers of maternal health services at these lower levels of care but in case of a complication, they refer the woman to the Clinical Officer who is incharge of the facility.

Table 3.8 Number of Staff Recommended by MoHSW and the Actual Number Available by Cadre

Level of care	AMO		CO		NMW		PHNB/MCHA	
	Recommended	In Post	Recommended	In Post	Recommended	In Post	Recommended	In Post
Dispensary	0	0	21	14 (66%)	21	0 (0%)	21	18 (86%)
Health Centre	3	0	6	4 (66%)	6	3 (50%)	3	3 (100%)
% of the recommended staff in post	0		67		11		87	

The shortage of personnel in the surveyed health facilities as per the national standards was severe with about 49% of the required workforce not in place. However when considering skilled providers for maternal health care we found that only two of the twenty four health facilities did not have a skilled staff.

3.3.4. The state of Infrastructure of Health Facilities

To assess the infrastructure of the facility, we considered availability of key structural items necessary for provision of care. These items included antenatal and delivery rooms with both visual and audio privacy, waiting area protected from sun or rain, running water for hand washing and toilet for patients. Overall it was noted that the infrastructure status in most of the facilities was good. The only item found to be deficient in most of the facilities was running water for washing hands which was available in only 50% of the surveyed health facilities (Table 3.9).

3.3.5 Availability of Essential Equipment

Guidelines from the Ministry of Health on equipment and supplies that are required to be available at each level of care was used [86]. The list of essential equipment for delivery of

maternal health care at health centres and dispensary levels are as shown in Table 3.9. Results show that majority of health facilities were adequately equipped to provide maternal health care services. Health centres were particularly found to have almost all essential equipment except Ambu-bag for new born which was found to be missing in all facilities. At the dispensary level although majority of the equipment were found to be available, a functioning BP machine was found to be missing in about 20% of the dispensaries (Table 3.9).

3.3.6 Availability of Essential Drugs and other Consumables

At the time of the assessment, lower level health facilities were provided with consumables from the monthly kits supplied from the government Medical Stores Department. The contents of the kits were similar for dispensaries but different from those of the health centres. The quantity of supplies and drugs in the kits was the same for a specific level of care regardless of the size of the catchment population.

On the day of the assessment, most of the consumables were in stock in the surveyed health facilities. Most of the essential supplies were available in more than 90% of the health facilities except sterile gauze and infusion giving sets which were available in only 29% and 88% of the facilities respectively. With the exception of sterile gauze, health centres had all essential supplies in stock on the day of the assessment. However it was mentioned by the key informants that shortages of consumables and essential supplies in the health facilities is common. Health care providers who were interviewed also mentioned that the content of the kits have not been reviewed for a long time and while the essential drugs finish within two weeks, there is quite a number of drugs which are not used and they end up expiring and thrown away. Example of unessential items supplied in the drug kits was mentioned to be ointments for skin conditions (eg BBE for scabies) which are not common in the area.

Table 3.9: Availability of Personnel, Essential Equipment, Supplies and Drugs in Health Facilities.

	Health Centre (n=3) (%)	Dispensary (n=21) (%)	Total (n=24) (%)
Staff availability (% with at least 1)			
AMO	0	NA	0
CO	100	62	66.7
NM/MCHA	100	85.7	87.5
Infra structure of ANC and Delivery rooms (%)			
Waiting area protected from sun or rain	100	100	100
Room with privacy for ANC	100	100	100
Room with privacy for delivery	100	100	100
Emergency Lighting	100	91	92
Running water for washing hands	100	43	50
Toilet for patients	100	95	96
Essential equipment (% with the equipment)			
BP Machine	100	81	83.3
Stethoscope	100	95	96
Fetal scope	100	100	100
Thermometer	100	100	100
Height measure for adults	100	95	96
Weight Scale for adults			
Examination bed	100	100	100
Speculum	100	95	96
Sterilizer	100	100	100
Refrigerator for vaccines	100	95	96
Delivery set	100	95.2	96
Delivery bed	100	100	100
Ambubag for new born	0	0	0
Essential supplies (% with stock)			
Sterile gloves	100	95	96
Sterile needles and syringes	100	100	100
Antenatal cards	100	100	
Partogram forms	100	100	100
Sterile gauze	33.3	29	29
Infusion giving sets	100	86	88
Intravenous fluids	100	91	92
Suture material	100	100	100
Decontamination facilities	100	91	92
Drugs/vaccines (% with stock)			
Antimalarials	100	100	100
Ferrous/Folate	100	100	100
Tetanus toxoid	100	100	100
Paracetamol/Aspirin	100	100	100
Amoxycillin	100	43	50
Procaine Penicillin	66.7	100	96
Ergometrin	100	100	100
Antihypertensives	33.3	4.8	8.3
Anticonvulsants (Diazepam)	100	95	96
Drugs for local anaesthesia	100	67	71
Laboratory diagnosis (% Providing the service)			
VDRL/RPR	100	38	46
Malaria	100	29	38
HB	67	14	21

3.3.7 Availability of Laboratory Screening Facilities

Laboratory screening tests enable early diagnosis and treatment of conditions that might subsequently cause morbidity for both the mother and the baby. In the Ministry of Health and Social Welfare ANC guidelines, it is recommended that syphilis screening (VDRL/RPR test) should be done at first ANC visit for every woman and HB should be monitored regularly through out pregnancy. Findings of the study showed that all health centres had capacity to perform a VDRL/RPR tests and malaria screening but in one health centre, HB test could not be performed due to lack of supplies. Majority of the dispensaries could not do any laboratory tests due to lack of laboratory equipment and lack of laboratory personnel. While only eight out of twenty one dispensaries could do a VDRL/RPR test only three could do a HB test (Table 3.9). Fifty percent of the dispensaries did not provide any laboratory tests at the time of the study. In these facilities, women were advised to go to any other health facilities with laboratory services for HB, syphillis screening and for malaria diagnosis when symptoms are seen.

3.3.8 Overall Assessment of Service Availability in Each Health Facility

Analysis of service availability was done using a scoring system. The scoring system was designed as follows: For infrastructure and essential equipment, if the item is available and functional as per standard, it was given a score of 2. A score of 1 was given if the item is available but not fully functional and a score of 0 if the item is not functional or non existent. For expendable supplies and drugs, a score of one was given
when the item was available and a 0 if the item was out of stock on day of visit. A higher score therefore meant that the respective facility was better eguipped than the one with a lower score. The list of items used in the scoring procedures is as shown in Table 3.9 Availability and working conditions of the items listed were assessed and scored by qualified medical doctors.

The actual score for each item were summed for each health facility and were expressed as a percentage of the total score which represented the overall availability. A cut off point of 80% was used to distinguish between facilities which were well equipped and those which were not well equipped to provide maternal health care services. The same cutoff point was used by other researchers in Tanzania [98].

Table 3.10: Health Facility Average Scores on Services Availability

Facility Level	Infrastructure Total Score=12 Me* (range)	Equipment. Total score= 26 Me (range)	Essential Supplies Total Score= 8 Me (range)	Essential drugs Total score=10 Me (range)	% of total Me (range)
Dispensaries	10 (10-12)	23(20-25)	7(5-8)	8 (7-9)	88 (82-93)
Health Centres	12	22 (22-23)	7 (7-8)	9 (8-10)	91(88-93)
Total	11 (10-12)	23 (20-25)	7 (5-8)	8 (7-10)	88 (82-93)

***Me= median**

It can be seen from Table 3.10 that all facilities scored above the cutoff point of 80% score and hence they all had good infrastructure and availability of essential equipment, supplies and drugs for provision of maternity care services was fairly good. However despite of this, two dispensaries did not have a skilled attendant and so services of the required quality could not be provided in these two health facilities.

3.4 Barriers to Utilization of Skilled Care at Delivery.

As mentioned in the methodology section, we used different data collection methods to assess the barriers to seeking care. The methods were structured interviews with women who were pregnant within one year prior to the survey and indepth interviews of key informants.

The key informants were asked to mention where women in their area normally delivered their babies. The majority of them said that women deliver at home and are attended by either relatives or traditional birth attendants. This is consistent with the findings in structured women interviews which showed that only 47% of women delivered in a health facility during their most recent pregnancy (Table 3.2).

The key informants were then asked to mention why most of the women do not go to deliver in health facilities. The following were identified as barriers in utilizing skilled attendants at delivery:

1. A belief that if a woman went through pregnancy without any complications then she will also have a safe delivery
2. Long distance to health facilities that provide delivery care, lack of reliable means of transport and presence of wild animals at night
3. A belief that majority of women who go for delivery in lower level health facilities get referred to Ligula hospital unnecessarily.
4. There were TBAs in the community who can provide delivery care and who were trained by the government
5. Its husbands and or parents who decide where women should go for delivery
6. Weaknesses in the health facilities such as lack of midwives and their poor attitudes towards pregnant women.

3.4.1.1 A belief that if a woman went through pregnancy without any complications then she will also have a safe delivery

There was a belief that if a woman had no problems during the course of pregnancy, she is also likely to deliver safely and so there is no need for her to go to a health facility for delivery. The following statements which support this belief were commonly mentioned by the key informants:

> "*Pregnant women who did not have problems during pregnancy deliver at home, only those who experienced problems during pregnancy go to deliver in health facilities as these are also likely to have problems during delivery*" (Male respondent, aged 57 years, Imekuwa village).

A similar statement was mentioned by another respondent

> "*Majority of the women go to Nanyamba (a health centre) for delivery. Only those who did not have problems during pregnancy do give birth at home.*" (female respondent aged 58 years, Milango minne village)

However, this contradicts with the findings from structured women interviews which showed that even women who had complications during pregnancy did deliver at home. In the survey it was found that about 46% of women who had reported a complication during pregnancy still delivered at home with unskilled attendants (Table 3.3).

3.4.1.2 Long Distance to Health Facilities, Lack of Reliable Means of Transport and Presence of Wild Animals at Night

Long distance to health facilities which provide delivery care was one of the main reasons for home delivery given by the key informants in villages where there were no dispensaries. The key informants mentioned that neither the time nor the duration of labour can be predicted so when labour starts at night, it is not easy to travel to a health facility for delivery. The following statement supports this concern:

> "*The village where the dispensary is located is quite far from here you have to go through a forest. At night there are lions and other wild animals so we cannot go. Women have to deliver at home*" (Male 52 years old, Meuta village).

This is in consistence with the findings of quantitative survey with women which showed that proportion of women who used health facility delivery care services decreased with increasing distance to the health facility.

The majority of key informants mentioned that distance to a health facility is further complicated by the nature of the terrain of the study area as explained by the following respondent:

"It is difficult for a woman in labour to walk a long distance especially in hilly areas like this. If the health facility was close then those who do not go can be considered lazy. However, currently the facility is quite far and the only means of transport we have is cycling. This discourages women from going to the health facility" (Male respondent aged 58 years, Hinju village).

Lack of a reliable means of transport also came up as a barrier in seeking delivery care from a health facility:

"In this village we have transport problems. A woman in labour is put in a large traditional basket, (tenga) and transported on a bicycle. This is very uncomfortable but we have no other alternative as public transport is not regularly available" (Female respondent, age unknown, Nkunwa village).

3.4.1.3 A belief that majority of women who go for delivery in lower level health facilities get referred to Ligula hospital unnecessarily.

The key informant interviews revealed that one of the reasons why women do not go to deliver in health facilities is the fear of being referred to Ligula hospital in Mtwara. They mentioned that majority of women in labour who go to the nearby health facilities for delivery get referred to Ligula Hospital while they think that they can deliver safely in these lower level health facilities. Others mentioned that being referred to the hospital is unnecessary because they have experienced that most women in labour do not reach the hospital to which they have been referred but instead deliver safely on the way. The following statements support this perception:

"When women in labour go to the nearby dispensary for delivery they are referred to Ligula hospital in Mtwara even before the health provider attempts to deliver them.

*They deliver on the way even before reaching the next dispensary along the way to Mtwara ". (*Male aged 71 years, Mpondomo village).

The above statement was considered to be true even among women who are identified to be at high risk and referred for hospital delivery. The majority of key informants (76%) said that referral to hospital for delivery is due to technical incompetence of the health care providers in the dispensaries. The following statement among the respondents testifies this feeling:

"Women in this village say that the midwife in the dispensary is not skilled – why does she have to refer women to Ligula hospital and they end up delivering on the way? .... It is better to give birth at home than spilling blood on the grass along the way". (Woman respondent, age unknown, Lipwidi village)

The key informant interviews also revealed that women who were identified to have risk factors and advised to go to hospital for delivery were not accepted to deliver in the lower level health facilities when they came there with labour pains. Due to this predicament they decided to deliver at home as indicated by the following statements:

"If a woman was told to go to Ligula hospital for delivery, she would not be received to deliver in the dispensary that referred her even if she came in labour. This situation discourages them from using health facilities for delivery. The Provider should observe the woman to see if she can deliver there, but what he does is to refer to Ligula hospital every woman who comes" (Male 49 years old, Lipwidi village).

Referral to hospital for delivery was considered as disturbance as the following statement indicates.

*"Among us the Makonde, it is better to give birth at home to avoid the disturbance of being referred to Ligula hospita" (*Male aged 60 years, Utende village*).*

To find out whether this had anything to do with the cultural or social norms of the Makonde tribe, I tried to interview if there was any ritual/custom which is performed

during labour/ delivery or immediately after delivery which causes the women to prefer home rather than hospital delivery. However I found that there was nothing specifically done during this time. But according to Islamic religion, a religious leader should read Qoran, *"shahadu"* immediately after birth to signify that the new born is an Islamic believer but they say this procedure can be done even later at home.

3.4.1.4 There were TBAs in the community who were trained by the government

Majority of the key informants mentioned that women and the community as a whole have high confidence in TBAs and that's why they did not seek delivery care services in health facilities. They mentioned that TBAs did a good job and they were the main delivery care providers in the community. It is only when they fail to deliver the woman when she is sent to the health facility. The following is an example of many similar statement from the key informants:

> *"Majority of the women give birth at home assisted by a TBA. It's only when the TBA fails to deliver them that they are taken to the health facility" (Female age 35, navikole village).*

Another key informant said:

> *TBAs provide good service to the women. They stay with the woman until she delivers the baby, if she fails, she takes her to a health facility for more skilled attendance.*(Male aged 57: Imekuwa village).

This belief is however in contrast with the findings of women interviews which showed that of the women who delivered at home, only 46.3% were attended by TBAs. The majority (50.1%) were assisted by relatives or neighbours and 3% were delivered by health personnel.

TBAs were reported to deliver even at risk women who were referred to hospital for delivery and according to the key informants, they do their job well as the following statement shows:

> *"Some women are told to go to the hospital for delivery but they still deliver safely here with TBAs. When other women see this they decide not to go to Ligula hospital" (Male respondent aged 51, Namgogoli village).*

One key informant commented as follows:

"Some of the referred women give birth at home with TBAs. I have never seen any one who had delivery problems" (Female respondent, aged 56 yrs from Mpondomo village).

It was clearly revealed by the key informants that women have a perception that the government wants them to utilize the TBA services because they were trained by the government and were given the task of delivering mothers. The mentioned that they could not evade TBAs services and go to receive care from the health facilities because the government brought TBAs to them. The following statement is a selected example which testify this:

"Majority of the women give birth at home assisted by TBAs. This TBA was brought to us by the government – we don't want to go against the government" (Male respondent aged 52, Kivava village)

Interviews with TBAs who were key informants revealed that they also felt that they were given the task to provide delivery care by the government and so all women should consult them first and its only when they fail, that the women should be referred to a health facility. One TBA had this to say:

"All women were informed that pregnant women in labour should first consult the TBA, it is only when she fails to deliver, when the woman should be taken to a health facility. It's the government which gave us this job after we were provided with training" (TBA, age unknown, Nkunwa village).

Furthermore, it was noted that the training of TBA's and providing them with some equipment and consumables for delivery and baby care made them very powerful and highly acceptable as seen in the following statement.

"The TBA is very confident because she was provided with consumables for delivery such as gloves and she is accepted by the government as a delivery attendant. If the woman delivers at home she has to take a special card given by the TBA when she goes to weigh the child in the health facility. Without this TBA

card the baby will not be registered" (Female respondent 46 years old, Kivava village).

3.4.1.5:Its Husbands and Parents who Decided where women should Go for Delivery.

It was reported by the key informants that since women depended on their husbands and parents to decide where they should seek delivery care, even if the woman wanted to deliver in the health facility she may not manage to go. The following is a statement from one of the key informants which support this:

"The parents of the woman or her husband are the main decision makers on place of delivery. The role of the woman is just to announce that she is in labour" (Male respondent aged 57 years, Lipwidi village).

This was said to be because it was men who have economic power when it comes to issues that will require money as the following statement shows:

"It is men who have money to pay for transport or other requirements for their wives and for unmarried women, their parents or other family members pay so it is up to them to decide" (Male respondent aged 47 years, Miuta village).

3.4.1.6 ***Weaknesses in the Health Facilities such as Lack of Midwives and Their Poor Attitudes Towards Pregnant Women.***

A. Perceived Lack of Qualified Midwives

Key informants expressed their view that lack of a "midwife" in the health facility is a major barrier to skilled care attendance. In facilities where there are no midwives, women do not go for delivery even if there are other health personnel in the facility. A midwife in this sense is a person with midwifery training of any sort. As it was seen in the previous chapter, Maternal and Child Health Aids (MCHA) are the main service providers in the rural health facilities. This is a statement from one respondent:

"At the nearby dispensary there is no midwife. The provider who is there does not have the skills to attend women during delivery. So majority of the women give birth at home with a TBA. Only when the TBA fails to deliver the woman, she is referred to Mtwara" (Female respondent, age unknown, Msanga Mkuu village).

If in a health facility there is no midwife but there is a female clinical officer, women will go there for delivery care but if a clinical officer is a male, women would not go. They clearly stated that women are not comfortable to be attended during delivery by a male attendant. The following statements show this:

> *"In the previous two years the midwife in our dispensary went for further training. Her husband who is a doctor (clinical officer) was not providing delivery care services because women were not coming. Recently our midwife has returned from studies and women now go to deliver in the dispensary"* (Male respondent, Age 56, Mnima village).

B. Attitude of Health Providers

The issue of poor staff attitude was also mentioned as a barrier to use skilled care attendance at delivery. If the midwife in the health facility is not friendly, women would not go for delivery. The following statement from a key informant testifies this:

> *"The midwife who was in Mbawala dispensary was very rude and used to shout to the women, so they were not going for delivery there. The day she was transferred, people celebrated with traditional dancing. The one who came to take over is very nice and when women go there even if she is eating she would stop and go to attend them" (Male respondent, 62 years old Nachenjele village).*

CHAPTER 4: REFERRAL COMPLIANCE AND THE IMPACT OF A MODIFIED REFERRAL CRITERIA ON COMPLIANCE

4.1 Prevalence of Risk Factors and Referral Compliance

To determine the risk status of women during their last pregnancy, respondents were asked whether they were informed by the health worker during ANC that they had any pregnancy risk factor. Those who answered a yes, were asked about the kind of risk factor they had. This information was counter checked in the ANC clinic cards where they were made available. Seven hundred and ninety one (81%) women had their ANC cards for the last pregnancy.

4.1.1 Prevalence of Pregnancy and Delivery Risk Factors

A total of 503 (51.6%) respondents reported to have been told during ANC that they had at least one pregnancy risk factor based on the Tanzania Ministry and Social Welfare ANC risk screening guideline [29]

Risk factors which were commonly reported included age < 20 yrs, history of a still birth or 3 consecutive abortions, greater than 4 pregnancies and first pregnancy (Table 4.2). A higher proportion of women (37.2%) had risk factors falling in category B and these were required to go to hospital level for delivery.

About a half (46.7%) of women reported that they delivered in a health facility of which 16.3% delivered in a hospital level. Only a quarter (25.4%) of women who were identified to be at high risk delivered in a hospital. Thirty one women (7%) who were identified to be at low risk and hence were not referred to hospital for delivery delivered in a hospital (self referrals). Use of hospital level for delivery was significantly higher among women identified to be at a high risk of obstetric complications compared to those identified to be at low risk (P=0.00001). (Table 4.1)

Table 4.1: Place of Delivery by Risk Status of Respondents

PLACE OF DELIVERY	AT HIGH RISK		TOTAL
	NO	YES	
Home	266 (56.5)	253 (50.3)	519 (53.3)
Dispensary/Health centre	174 (36.9)	122 (24.3)	296 (30.4)
Hospital	31 (6.6)	128 (25.4)	159 (16.3) ***
Total	**471 (48.4)**	**503 (51.6)**	**974**

***p=0.00001

4.1.2 Referral and Referral Compliance Rates by Risk Categories

As it has been mentioned, the MoHSW ANC referral guideline specifies three risk categories (A, B and C) for pregnant women. Those women found to have risk factors falling in category A are supposed to be referred to hospital level for further investigations, those in risk category B are supposed to be referred to hospital level for delivery while those in risk category C should be referred to hospital level immediately. We analysed how referral compliance varied by risk categories.

4.1.2.1 Risk category A

A total of 205 (21.1%) respondents had at least one category A risk factor and hence were supposed to be referred to a hospital level care for further investigations (Table 3.12). Respondents who reported that they had these risk factors were asked whether they were referred by a health care provider to a higher level of care for further investigation. Only seventy six (37.1%) respondents reported that they were advised to go to hospital for further investigations. Of them, only 25 (33%) did comply with the referral advice and went to a hospital level for further investigations (Table 4.2).

Table 4.2 Compliance to Referral Advice by the Type of Risk Factor

Risk Category	Women who had the risk factor n (%)	Women who were referred n (%)	Referral compliance n (%)
RISK CATEGORY A.			
Age < 20yrs	121 (12.4)	47 (39)	19 (40.4)
Previous CS	11 (1.1)	4 (36)	3 (75)
History of a still birth or 3 consecutive abortions	69 (7.1)	25 (37)	4 (16)
Total for Risk group A	**205 (21.1)**	**76 (37.1)**	**25 (33)**
RISK CATEGORY B			
Gravidity >4	160 (16.4)	157 (98)	19 (12)
Previous CS	11 (1.1)	11 (100)	8 (73)
Short stature	62 (6.4)	61 (98)	16 (26)
Pelvic deformity	3 (0.3)	3 (100)	1 (33)
History of PPH/retained Placenta	3 (0.3)	2 (66.7)	2 (100)
1st Pregnancy	147 (15.1)	140 (95)	53 (38)
Total for risk group B	**362 (37.2)**	**344 (95)**	**86 (25.0)**
RISK CATEGORY C			
BP >140/90	6 (0.6)	4 (67)	2 (50)
HB< 8.6gm/dl	16 (1.6)	13 (81.3)	7 (54)
Urine albumin	4 (0.4)	3 (75)	2 (67)
Abnormal lie at 36 wks	16 (1.6)	14 (88)	9 (64)
Pedal Oedema	8 (0.8)	7 (88)	2 (29)
IUFD	13 (1.3)	4 (30.8)	2 (50)
Bleeding during pregnancy	3 (0.3)	3 (67)	2 (100)
Gestation >40 wks	1 (0.1)	1 (100)	1 (100)
Total for Risk group C	**65 (7)**	**46 (71)**	**25 (54.3)**
All risk factors	**503 (51.6)**	**402 (79.9)**	**115 (28.6)**

Compliance to advice to go for further investigations was below 50% for all risk factors in category A except previous operative delivery with about 75% compliance. Women who were aged less than 20 yrs had a compliance rate of 40.4%. (Table 4.2)

Compliance to referral advice for category A risk factors was seen to vary with socio demographic characteristics as shown in Table 4.3. For example women who reside more than 60kms away from the hospital had the lowest proportion (16.7%) who complied with the referral advice compared to those women who reside within 40 km of a hospital (36.1%) but the difference was not statistically significant (P=0.076).

Again single women had a higher rate of referral compliance for category A risk factors (53.8%) compared to their married counterparts (22.0%) although the difference was not statistically significant (P=0.020).

While half of women with moderate knowledge of risk factors complied with the referral advice, only one third of those with low knowledge complied but the difference was not statistically significant (P=0.73) (Table 4.3).
Compliance to advice to go for further investigation decreased with increasing age from almost 44% among women who are under 20 yrs to only 27% among those aged over 35 years but the difference was not statistically significant (p=0.158).

The more the number of years the woman spent in school, the higher the chance of her complying with the advice of going for further investigations. Thirty six percent of women with more than 7 years of education complied with the advice to go for further investigation compared to 31% among those with no formal education (P=0.905) (Table 4.3).

Socio-economic status was seen to have no significant influence on referral compliance for category A risk factors although it was found that higher proportions of those who had very low socio-economic status complied to the advice than those with high socio-economic status (P=0.879).

Table 4.3 Determinants of Referral Compliance:

Variable	Risk category A % Complied	Risk category B %Complied	Risk category C	All risk factors %Complied
Age				
15-19	17 (43.6)	28 (37.8)	0	30 (30.0)
20-35	5 (20.8)	41 (27.5)	19 (63.3)	61 (27.2)
>35	3 (27.3)	11 (14.7) *	3 (33.3)	15 (13.8)
Education level				
None	11 (30.6)	40 (22.6)	10 (50.0)	52 (21.4)
Primary	5 (33.3)	19 (40.4)	3 (50.0)	22 (30.6)
Post Primary	9 (36.0)	27 (22.5) **	12 (60.0)	41 (23.8)
Marital status				
Single	7 (53.8)	19 (41.3)	1 (100)	22 (36.7)
Married	11 (22.0)	54 (21.2)	22 (55.0)	78 (21.1)
D/W/S	7 (53.8)**	13 (30.2) **	2 (40)	15 (25.9)
Knowledge of Risk factors				
No Knowledge	18 (32.7)	48 (20.6)	10 (41.7)	61 (9.8)
Low Knowledge	5 (29.4)	24 (28.9)	11 (64.7)	36 (12.8)
Moderate Knowledge	2 (50.0)	14 (50.2) **	4 (80.0)	18 (25.0) **
Socio-Economic Status				
Very Low	7 (46.7)	15 (21.1)	6 (60.0)	23 (22.1)
Low	3 (25.0)	11 (15.7)	5 (55.6)	15 (16.7)
Moderate	3 (30.0)	15 (23.4)	2 (50.0)	18 (20.9)
Highr	5 (21.4)	20 (29.9)	5 (50.0)	27 (29.0)
Very High	6 (31.6)	21 (34.4) **	6 (54.5)	27 (27.9)
Discussed with Partner				
Yes	13 (37.1)	42 (31.8)	18 (52.9)	61 (29.5)
No	11 (28.2)	44 (21.2) **	7 (58.3)	53 (19.3)*
Parity				
0-4	24 (35.3)	69 (34.8)	24 (61.5)	97 (29.7)
>4	1 (12.5)	17 (11.6)**	1 (14.3)	18 (11.3)***
Gestational Age at ANC booking	14 (31.8)	42 (27.6)	17 (65.4)	60 (27.5)
<20 wks	11 (34.4)	43 (23.1)	8 (42.1)	54 (20.6)
20 wks +				
Number of ANC visits				
<4	10 (41.7)	29 (24.4)	9 (50.0)	44 (25.0)
4+	15 (28.8)	56 (25.5)	15 (57.7)	74 (22.9)
Distance to the hospital				
0-40	13 (36.1)	57 (46.0)	9 (40.9)	69 (40.8)
41-60	8 (50.0)	16 (24.6)	5 (71.4)	22 (25.0)
>60	4 (16.7)	13 (8.4)**	11 (64.7)	24 (10.4)***

Note: * P<0.05 ** P<0.01 ***P<0.001

The number of children the woman had was also seen to influence compliance to referral for category A risk factors. A higher proportion of women with fewer children (<=4) complied compared to those with more than four children. Antenatal care use variables i.e.

age at booking and number of ANC visits did not show any significant influence on referral compliance for this category of risk factors (Table 4.3).

4.1.2.2 Risk Category B

A total of 362 (37.2%) respondents had at least one category B risk factor. Common risk factors in this category included gravidity >4 (16.4%), Short stature (6.4%) and first pregnancy (15.1%). Women with these risk factors are supposed to be advised to go to hospital for delivery. A large majority 344 (95%) reported to have been advised to go to the hospital for delivery. The overall referral compliance for this group was found to be 25% and this was the lowest when compared to other risk categories. The highest compliance rate was for women with a previous caesarean section (73%), first pregnancy (38%) and short stature with a compliance rate of 26% (Table 4.2).

Referral compliance for women who reported to have risk factors in category B were influenced by a number of factors as shown in Table 4.3. For example referral compliance rate decreased from 37.8% among women aged under twenty years to only 14.7% among those aged over 35 years and the difference was statistically significant ($p<0.05$). Respondents with completed primary education had a higher compliance rate (40.4%) compared to those with less education (23%) ($P=0.0001$). Respondents who have moderate knowledge of risk factors had a higher compliance rate (50.2%) compared to those with low knowledge (20.6%) ($P=0.032$). Higher rates of referral compliance were seen for women with high socio-economic status compared to those placed in the lower socio economic status but the difference was not statistically significant($P=0.138$). Respondents who reported that they ever discussed with their husbands on place on delivery during pregnancy had a significantly higher compliance rate compared to those who never discussed with their husbands ($p=0.019$).

The distance to the referral hospital (Ligula) was also seen to influence significantly the referral compliance rate. While women residing within 40 kms of the hospital had the highest compliance rate (46%), compliance fell significantly to levels below 10% for those residing at a distance of more than 60 kms from the hospital ($P=0.0001$) (Table 4.3).

4.1.2.3 Category C Risk Factors (Danger Signs)

There were 65 (7%) women who reported that they had category C danger signs during pregnancy. Common danger signs reported include, anaemia (HB < 8.6gm/dl) (1.6%), abnormal lie after 36 weeks of gestation (1.6%) and suspected intra uterine foetal death (1.3%). Women with category C risk factors need to be referred immediately to the hospital level of care for emergency obstetric care. Only about 46 (71%) of them reported that they were referred. Of these only 25 (54.3%) complied (Table 4.2).

4.1.2.4 Referral Compliance to all Risk Categories

The overall referral compliance (for all risk factors) was found to be 28.6% (Table 4.2). Four variables showed a significant association with referral compliance at this level which are Knowledge of danger signs, discussion with partner, parity and distance to hospital. Moderate Knowledge of danger signs, discussion with male partner during pregnancy on place of delivery, low parity and short distance to the hospital were found to be significantly associated with higher rates of referral compliance.($p<0.05$) (Table 4.3).
Knowledge of Danger signs, Parity and distance to hospital showed a significant association with referral compliance even after controlling for other variables in a multiple logistic regression model. (Table 4.4), Women with moderate knowledge of danger signs were almost three times more likely to comply with the referral advice compared to those with no knowledge of danger signs (OR=2.86 (1.26-6.5). Those women with more than 4 children were less likely to comply to the referral advice compared to those with fewer children (OR= 0.25 (0.12-0.59) and those women residing within 40 kms of the hospital were almost 5 times more likely to comply with the referral advice compared to those residing more than 60 km of the hospital (OR 4.89 (2.66-8.96)) (Table 4.4).

The low referral compliance was also reported by maternal health care workers. The great majority (96%) of health care workers interviewed felt that most of the women who were given referral advice due to pregnancy or delivery risk factors do not comply.

Table 4.4 Factors Influencing Referral Compliance for all Risk Factors

Variable	Unadjusted OR (95% CI)	Adjusted OR (95%CI)
Age		
<20yrs	1	1
20-35yrs	0.96 (0.57-1.59)	2.89 (0.89-3.09)
>35 yrs	0.513 (0.25-1.03)	1.52 (0.54-4.22)
Education Level		
No Education	1	1
1-7 yrs of Schooling	(0.86 – 2.76)	1.01 (0.49 – 2.09)
>7 yrs of Schooling	1.22 (.77 – 1.96)	1.13 (0.64 – 1.97)
Marital Status		
Single	1	1
Married	0.54 (0.30 – 0.95)	0.65 (0.31- 1.38)
Divorced/Widowed/Separated	0.67 (0.31 – 1.45)	0.94 (0.37 – 2.38)
Socio Economic Status		
Very Low	1	1
Low	0.67 (0.32- 1.37)	0.67 (0.29 – 1.52)
Medium	0.91 (0.45 – 1.81)	0.89 (0.39 – 2.02)
High	1.58 (0.83 – 3.03)	0.99 (0.44 – 2.24)
Very High	1.38 (0.73 – 2.62)	1.51 (0.37 – 6.15)
Parity		
<=4	1	1
>4	0/32 (0.18 – 0.54)	0.25 (0.12 – 0.59)*
Number of ANC visits		
<4	1	1
4+	0.93 (0.6 – 1.45)	0.73 (0.42 – 1.27)
Knowledge of Danger signs		
No Knowledge	1	1
Low Knowledge	1.76 (1.09 – 2.83)	1.72 (0.95 - 3.1)
Moderate Knowledge	3.18 (1.63 – 6.23)	2.86 (1.26 – 6.50)*
Distance to hospital		
0-40 kms	5.23 (3.14 – 8.91)	(2.66 – 8.96)*
41-60 kms	2.89 (1.37 – 4.91)	(1.01 – 4.29)
>60 kms	1	1
Ever Discussed with Husband on place of delivery		
No	1	1
Yes	1.84 (1.20 – 2.81)	1.53 (0.89 – 2.66)

4.2 Barriers and Facilitating Factors to Referral Compliance

Different data collection methods were used to determine the barriers and facilitating factors to referral compliance. Key informants were interviewed on what they thought are the barriers and facilitating factors to referral compliance. In the household quantitative survey, women who were given a referral advice were asked to give their reasons for not complying/complying with the advice. Also maternal health care workers in the selected health facilities were interviewed on what they thought are the reasons for women at high risk not to comply with referral advice. Findings from qualitative survey are presented as narrative summaries and verbatim quotes whereas findings from the household quantitative survey of women and health care workers are as shown in Table 4.5.

4.2.1 Barriers to Referral Compliance

The main issues which were mentioned as barriers to referral compliance in both qualitative and quantitative studies were:

1. Lack of money for upkeep while in hospital,
2. The fact that majority of women referred to hospital due to risk factors can deliver safely at home
3. Lack of reliable means of transport
4. The emergency nature of labour.

4.2.1.1 Lack of Money for Upkeep while in Hospital

Lack of money for upkeep while in Mtwara or lack of a close relative where the woman will stay while awaiting to start labour was the reason which was most commonly mentioned by both key informants, women respondents in quantitative survey and maternal health care workers. Since Mtwara is an urban area with a high cost of living compared to their home villages, respondents felt that one needed to have enough money for meals and accommodation. The following statement was common among the key informants:

> *"The main issue that make women not to go is lack of funds for upkeep while in Mtwara, what is one going to eat while in Mtwara if she does not have money"* (TBA age 61 yrs, Imekuwa village).

Another respondent said:

> *"It is not a problem taking the woman to the nearest dispensary but if she is referred to Ligula hospital it is a problem because of the bus fare and meals while in hospital" (* Male respondent aged 58yrs, Hinju village).

Others mentioned that since the hospital does not provide meals for inpatients, an assistant who prepares and takes the food to the hospital is necessary and she will also need somewhere to sleep and bus fare to and from the hospital. One female key informant had this to say:

> *"My daughter was told to go to Ligula hospital for delivery. We could not take her there because we did not have money. She needed someone to escort her to Mtwara to cook and take care of her because we have no relatives in Mtwara and the hospital does not provide meals. She was taken there after she developed problems and she ended loosing her baby" (*Woman respondent, age 54, Miuta village).

Although the health services at the hospital were perceived to be of good quality and provided free of charge, lack of meals for inpatients was considered a big barrier as the following respondent mentioned:

> *"Delivery care services are provided free of charge and are of good quality. The problem is the cost of meals while in Mtwara for the woman and a close relative who sent her to Mtwara" (* Male respondent age 56 yrs old, Miuta village).

Similarly, in the quantitative survey, more than two thirds (69%) of at risk women respondents who did not comply with the referral advice mentioned lack of money for upkeep while in hospital as a major reason why they did not go to deliver in the hospital as advised. In interviews with maternal health care providers more than half (54%) also mentioned lack of funds for upkeep while in hospital as major reason for low compliance to referral advice as it is shown in Table 4.5.

Table 4.5 Barriers to Referral Compliance as Mentioned by Women and Health Care Workers

	Women respondents n= 97	Health care workers n=28
Lack of a reliable means of transport	13 (13.4)	6 (21.4)
Lack of funds for upkeep while in Mtwara/No where to stay	67 (69.1)	15 (54.0)
Fear of overstaying in Mtwara/Emergency nature of labour	8 (8.2)	0 (0)
Women referred due to risk factors can deliver safely at home/referral to Ligula is unnecessary	51 (52.5)	12 (43)
Lack of referral information to the decision makers	0	7 (25)
Others	2 (2)	3 (10.7)

Note: More than 1 response was allowed

4.2.1.2 Majority of at Risk Women Referred to Hospital do Deliver Safely at Home

Key Informants responded that women do not comply because majority of those who are referred to deliver in Ligula hospital do deliver at home without any complications. Due to this fact women do not see the importance of going to Ligula hospital. The following are some of common statements to show this:

> *Some of the women who are advised to go to Ligula for delivery do go but some do not go because even if they deliver at home they do not get any problems. Those who go to Ligula do so just because they were advised to go by health care providers (*TBA aged 61 yrs, Imekuwa village).

Another respondents had a similar feeling and she said:

> *Some women are just referred to Ligula without any good reason. Majority of them do deliver safely here at home. Women therefore decide not to go (*Woman respondent age 54 years, Miuta village).

The policy that women identified to be at high risk should be referred to hospital for delivery was not accepted since according to the key informants, such women do deliver safely in dispensaries or on the way to the hospital. The following is a statement from one of the key informants which testifies this:

" Many pregnant women are told to go to Ligula Hospital for delivery, we start off, when we reach the next village dispensary, the woman is put under observation and after few minutes she delivers. Is that dispensary not the same as this one in our village?" (Male respondent age 58 years, Mpondomo village).

The fact that some of the referred women gave birth on the way before reaching the health facility complicated this issue further. Giving birth on the way was considered a shame due to the fact that passers by can see the women delivering and this was not acceptable as one of the respondents stated.

"Most of women who are referred to Ligula give birth on the way at, Libobe village, It is a shame to give birth on the way as many people see you. So women decide not to go to Ligula" (Male respondent age 49 yrs Lipwidi village).

Others said that it's the faulty of the health worker that he/she does not want to attend the women when they come to deliver in the lower level health facility because if they deliver safely at home or on the way to hospital they can also deliver in the health facilities. The following is a statement from one respondent:

*Women with risk factors are referred to Ligula even before the health worker at the dispensary waits and see that she is not able to assist. We start going to the hospital and before we are far away she delivers on the way and we come back. If they can deliver safely on the way why not at the health facility?. We are tired of this and we have decided to give birth here at home (*Female respondent aged 41 yrs, Lipwidi village).

Key informants also expressed the feeling that health workers refer women to hospital just because they are lazy and do not want to attend them. The following is a statement from one key informant to support this perception:

*"Health workers in the nearby health facility are lazy,(wazembe), they tell us to go to Ligula hospital even when they are there and able to attend us. Why cant they assist us?" (*Female respondent age 45, Mbembaleo village*).*

Similar finding were seen in the quantitative survey where more than half (53%) of women who responded on reasons for non compliance to referral advice gave the reason that they did not feel that it is necessary to go to Ligula hospital because majority who are referred do deliver safely at home (Table 4.5).

Most of the health workers interviewed also mentioned that many risk factors specified in the MoHSW ANC card are not necessary as majority of women with these factors do deliver without any problems. Forty three percent of them mentioned this as abarrier to referral compliance (Table 4.5). The demographic risk factors in particular were thought as unnecessary by more than 90% of the workers interviewed. They mentioned that although they still give referral advice to all women with risk factors specified in the ANC card it is because they are required to do it. The following is a statement from one of the maternal health care provider:

> *"We do refer all women with any of the risk factors specified in the ANC card. But frankly speaking we can still manage most of these women here at the dispensary level but the guideline requires us to refer them. If we don't refer and anything happens to the woman, we will be in trouble"* (Female provider age 38 yrs.).

4.2.1.3 *Lack of Reliable Transport*

Lack of transport as a barrier to referral compliance was commonly mentioned by key informants who said that although they knew the importance of complying if one is advised to go to Ligula, lack of transport especially in emergency situations made compliance very difficult. The following statement was given by one of the key informants:

> *"The main problem which make women not to go to Ligula hospital is transport problems. There is no reliable means of transport here and sometimes even when we call the ambulance we are told that it has no fuel. If it*

is an emergency then people have to look for any other means of transport and this takes rather long" (Woman respondent age 43 yrs, Miuta village).

In addition, the fact that the hospital is located far away from the villages requires that there is a reliable means of transport. The following statement was common among key informants:

"The hospital is located far away from this village and we do have transport problems here. A vehicle is the best means of transport required to Ligula but we don't have any. We need to be provided with a means of transport to use incase of an emergency" (Male respondent aged 65 yrs, Navikole village).

Key respondents mentioned that although the district council has one ambulance, it is not enough as it is common to find a situation where the vehicle is needed in two different directions. For example when two emergencies have occurred simultaneously in two different facilities, it can not cope. The fact that sometimes there is a breakdown of radio communication system which is used to call the ambulance complicates the situation as the following statements mentioned commonly by the key informants:

"The district council ambulance is not always available when it is needed and sometimes even the radio communication is not functioning" (Woman respondent age 47 yrs, Nachenjele village).

Lack of means of transport was also reported as a barrier in quantitative survey with women respondents and health care workers. In this surveys, 13% of women respondents mentioned that they could not go to Ligula hospital as advised by health care workers due to lack of transport. Twenty one percent of health care workers intervewed mentioned that women do not comply with the referral advice due to lack of a reliable means of transport (Table 4.5).

4.2.1.4 The emergency nature of labour.

Key Informants expressed their views that women normally do not intend to deliver at home but since it is not known when exactly labour will start, they find themselves in labour before they have travelled to the hospital. The following is a statement from one key respondent:

> *"Home deliveries for referred women are unintended. Some women deliver before their expected dates and hence cannot travel to the hospital"* (Male respondent age 60 yrs, Utende village).

A similar statement from another key respondent:

> *"Women who are advised to go to Ligula hospital for delivery do go. Those who do not go is just bad luck that they deliver before the expected date of travelling to the hospital" (* Female respondent 63 yrs, Mpondomo village).

The same fact made them fear that they will have to wait for a long time in Mtwara before labour starts and since they have no where to stay this becomes a problem. The following statements confess this.

> *"Women say, I don't know when exactly labour will start and if I go to Mtwara I may need to wait for a long time , some stay waiting for a month before labour starts. I have no close relatives who live in Mtwara and before labour starts I will not be admitted in the hospital. Where will I stay while waiting?" (*Male respondent age 60 yrs Miuta village).

Another respondents with similar reasons said:

> *"I don't have labour pains, if I go to Mtwara where will I stay and what will I eat? They tell us to go to Mtwara during the ninth month, some do not give birth until the tenth month, where are they going to stay?"* (Woman respondent aged 47 yrs. Mtopwa village).

In quantitative survey, eight percent of women who failed to comply with referral advice, mentioned that they did not go to Ligula hospital because they gave birth

before their expected date of delivery. None of the health care worker mentioned this as a barrier to referral compliance (Table 4.5).

Key informants were also interviewed on what really happens when there is an emergency which requires immediate transfer of the woman to the hospital. All key informants said that all women with delivery complications and who had been proven unable to deliver in the nearby health facility are sent to the hospital by any means. This may involve the entire village population collaborating and looking for the means of transporting the woman being pushing her on the bicycle or looking for a vehicle for hire. The cost of transporting the woman however remains with the husband or her immediate family. The following is a statement from one key informant:

> *"Most of the referred women do go and those who do not go they can be taken to hospital when they get problems. They can be transported in the cycle ambulance or the midwife in Madimba calls the ambulance and she is rushed to the hospital"* (Female respondent age 67 yrs, Mngoji village).

Another respondent from a different village had this to say:

> *"All women with delivery complications are taken to the hospital. It is not agreeable just to look at the woman with problems without taking them to the hospital"* (Male respondent age 65 yrs, Mngoji village).

4.2.2 Facilitating Factors to Referral Compliance

Key informants were asked on what are the factors which they thought facilitated referral compliance and also women who reported to have complied with referral advice during the household survey were asked to mention the main reasons which made them to comply. Responses from key informants are presented as narrative summaries and verbatim quotes whereas those from women respondents are presented in Table 3.16.

Common factors mentioned by both key informants and women who responded to the questionnaire are: Free services and good quality of care at the hospital, the early referral advice given by the health care personnel during ANC clinic, need of further investigations, seeking care for a known health problem and fear of future complications.

4.2.2.1 Free Services and Good Perceived Quality of Care at the Hospital.

Maternal health care services are provided free of charge in all public health facilities in Tanzania. This is one of the commonly mentioned reasons by key informants to favour referral compliance in that women do not need to pay for hospital charges but only travelling fare. The following selected statement was common from the key informants:

> *"We only pay travelling costs to the hospital but delivery care services are provided free of charge both at the dispensary level and at the hospital while TBAs charge a fee ranging from 200 to 1000 shillings. This encourages women to go"* (Male Respondent, age 58 yrs, Mpondomo village).

In the quantitative survey, over a third of women respondents who complied with referral advice mentioned that they went to hospital because the services are good and are provided free of charge (Table 4.6).

Table 4.6: Facilitating Factors for Referral Compliance as Mentioned by Women Respondents

Factor	n (%)
The service are good and free at the hospital	25 (35)
A referral advise given by the health care worker during ANC	24 (34)
Need of further investigations/ Existing health problem	16 (22)
For own and babies safety	6 (8)
Total	71 (100)

4.2.2.2 Early Referral Advice by Health Care Workers

The, key informants also felt that advice by the health worker and especially if it is done early in pregnancy influences referral compliance. Under normal circumstances, women are informed of their risk status during their first ANC visit or in follow-up visits when ever a risk factor is noticed. Since majority of them book for ANC before 6 months of

gestation, the information is made early enough to give time for preparations for hospital delivery. The following is a quotation from one key informant:

> *"At risk women are informed quite early in pregnancy and this gives enough time to prepare for travelling fare and money to use while at the hospital"* (Male respondent, age 58 at Mpondomo Village).

Others said that the health worker should also communicate the referral information to the husband/partner of the woman so that he knows and can do preparation for the woman to go to the hospital. As it was mentioned above, some women fail to go to the hospital for delivery because they informed their husbands too late for them to make transfer preparations. The following was a common statement from the key respondents:

> *"It's the role of the health care provider to inform the husband that his wife has a danger sign and so she will need to deliver in a hospital. This will give him enough time to prepare for the bus fare and other requirements".* (Male respondent, age 63 yrs, Kivava village).

Similar finding was found in quantitative interviews where a third (34%) of women respondents mentioned that they went to the hospital because they were advised by a health care worker to go (Table 4.6).

4.2.2.3 Perceived Safety at the Hospital

Key informants mentioned that people are confident that the hospital is a safe place for delivery because if a woman gets any complication she can easily be assisted. The following are examples of statements form the key informants.

"When the Dr. (Clinical officer) at the health facility says that the woman should deliver in Ligula she should go. Majority of those who go there come back safely"

(Male respondent, age 65 yrs, Mnima village).

Another respondent had this to say:

"All who are advised to go to Ligula should go if they don't go they might loose their lives or those of their unborn babies while if they are in hospital they can easily be assisted"

(Female respondent, age 61yrs Mkunwa village).

In the quantitative survey findings, only about 8% of women who complied with referral said they went to hospital because they wanted to deliver safely and have live babies. One fifth (22%) of women respondents who complied with the referral advice mentioned that the main reason they complied was because they had existing health problems and so they needed further investigations (Table 4.6).

4.3 The Effectiveness of the Modified ANC Referral Criteria Compared to the MoHSW ANC referral criteria in Improving Referral Compliance

Following completion of the baseline survey, an intervention was designed and implemented. The intervention was started in September 2004 and consisted of the following components:

1. Training of health care providers of maternity care services in the health facilities selected for the study on the new WHO ANC model (Focussed ANC). This was done to staff of both control and intervention health facilities
2. Introduction of a modified ANC card to the intervention health facilities.

Eighteen months after the intervention was started, a post intervention assessment was conducted in order to measure the impact of the modified ANC referral criteria on referral compliance and assess its validity in predicting adverse pregnancy outcomes when compared to the MoHSW ANC referral criteria. The impact evaluation was done using two different methods:

1. Through quantitative survey of a random sample of women who gave birth within the previous one year. These are women who booked for ANC after the commencement of the intervention.
2. Through analysis of data which was recorded in the special register books for the study. This was the followup data recorded for each woman who booked for ANC in the health facilities selected for the study after the commencement of the intervention and who agreed to be included in the study.

4.3.1 Findings of the Quantitative Survey

A total of 695 women who gave birth within the previous one year were interviewed. These were women who booked for ANC after commencement of the intervention and who had already given birth at the time of the survey. Of these 74 (10.6%) were under 20 yeras of age, and 96 (13.4%) were aged over 35 years. The mean age for these women respondents was 27.4± 6.8 years. Seventy five (10.8%) did not know how old they are and efforts to estimate their ages using local calendar of events was unsuccessful.

Majority of respondents were Muslims (94%) and of Makonde ethnic group (92%).
The number of children ever born to the women ranged from 1 to 11 with a median of 3. Three hundred and nineteen women (46%) had never been to school, 274 (39.4%) completed primary education or more (Table 4.7).

Comparing this sample with the baseline assessment sample it is found that there is no significance difference on socio demographic characteristics among the two samples except for parity where the post intervention sample had a higher proportion of women with more than 5 deliveries (Table 4.7).

The pre and post intervention populations were therefore similar with regard to most of the socio- demographic characteristics.

Table 4.7 Comparison of Pre and Post Intervention Assessment Samples

Variable	Pre Intervention	Post Intervention	P-value
Age			
14-19	120 (12.3)	74 (10.6)	
20-34	625 (64.1)	450 (64.7)	0.709
35+	125 (13.0)	96 (13.8)	
Unknown age	103 (10.6)	75 (10.8)	
Religion			
No religion	12 (1.2)	2 (0.3)	
Christian	48 (4.9)	43 (6.2)	0.064
Muslim	914 (93.8)	650 (93.5)	
Tribe			
Makonde	915 (93.9)	639 (92.0)	0.23
Makua	17 (1.7)	19 (2.7)	
Other	42 (4.3)	37 (5.3)	
Years spent in School			
0	482 (49.5)	319 (45.9)	0.297
1-6	125 (12.8)	102 (14.7)	
7+	367 (37.7)	274 (39.4)	
Occupation			
Subsistence farming	932 (95.7)	673 (96.8)	0.423
Other	34 (3.5)	19 (2.7)	
Not Stated	8 (0.8)	3 (0.4)	
Marital Status			
Single	98 (10.1)	77 (11.1)	0.511
Married	752 (77.2)	541 (77.9)	
Divorced/widowed/separated	124 (12.7)	77 (11.1)	
House hold size			
0-5	632 (64.9)	415 (59.7)	0.069
6+	334 (34.3)	276 (39.7)	
Missing	8 (0.82)	4 (0.6)	
Parity			
1-4	793 (81.4)	515 (74.1)	0.0003
5+	181 (18.6)	180 (25.9)	
Total	974 (100)	695 (100)	

4.3.*1.1 Comparison of Control and Intervention Study Samples*

Half (51%) of the women who were interviewed during the post-intervention assessment were from the control area.

Comparison of the intervention and control populations indicated that there were no statistically significant differences in socio-demographic characteristics except socio-economic status (Table 4.8). There was a higher proportion of respondents in the control area who were in low socio-economic status compared to those in the intervention area ($p=0.023$).

Table 4.8: Comparison of Socio demographic Profiles of Control and Intervention Samples

Variable	Control Area	Intervention Area	P value
Age			
14-19	36 (10.2)	38 (11.2)	
20-34	226 (64.2)	223 (65.0)	0.644
35+	54 (15.3)	42 (12.2)	
Unknown age	36 (10.2)	40 (11.7)	
Religion			
No religion	2 (0.6)	0	
Christian	28 (8.0)	18 (5.3)	0.053
Muslim	329 (92.4)	321 (94.7)	
Tribe			
Makonde	323 (91.8)	316 (92.1)	
Makua	8 (2.3)	11 (3.2)	0.47
Other	21 (6.0)	16 (4.7)	
Years spent in School			
0	171 (48.6)	148 (43.1)	
1-6	49 (13.9)	53 (15.5)	0.356
7+	132 (37.5)	142 (41.4)	
Occupation			
Subsistence farming	340 (97.4)	333 (97.2)	
Other	7 (2.0)	10 (2.9)	
Not Stated	2 (0.6)	0	0.279
Marital Status			
Single	46 (13.1)	31 (9.0)	
Married	265 (75.3)	276 (80.5)	0.187
Divorced/widowed/separated	41 (11.6)	36 (10.5)	
Parity			
1-4	261 (74.1)	254 (74.1)	
5+	91 (25.9)	89 (25.9)	0.977
Distance to health facility			
0-5	318 (90.3)	304 (88.6)	
6+	34 (9.7)	39 (11.4)	0.462
Socio Economic status			
Low	135 (38.0)	97 (28.5)	
Medium	106 (29.9)	125 (36.8)	
High	114 (32.1)	118 (34.7)	0.023
Total	352	343	

4.3.1.2 Use of Delivery Care Services in the Control and Intervention Areas

Respondents were interviewed on their place of delivery and type of the birth attendant during their most recent delivery. As previously mentioned, due to shortage of skilled

attendants, a woman may deliver in the health facility but be assisted by an unskilled attendant (Medical attendants) but also there are few women who delivered at home with skilled assistants. A total of 339 (48.8%) women reported that they gave birth in a health facility during their last pregnancy. Use of health facilities (dispensaries, health centres and hospitals) for delivery was low in both the control (48.5) and intervention areas (49.1%) (Table 4.9). Although the difference in use of health facilities for delivery between the control and intervention areas was not statistically significant, at risk women in the intervention area had a higher proportion (55.2%) of use of health facility delivery care services compared to the control area where only (49.7%) reported to have delivered in a health facility.

Table 4.9: Place of Delivery by Risk Status of Respondents in the Control and Intervention Areas

PLACE OF DELIVERY	MoHSW ANC CARD (CONTROL) GROUP			MODIFIED ANC CARD (INTERVENTION) GROUP		
	RISK STATUS		TOTAL	RISK STATUS		TOTAL
	NO	YES		NO	YES	
Home	106 (52.5)	77 (50.3)	183 (51.1)	143 (52.4)	30 (44.8)	173 (50.9)
Dispensary/ Health Centre	81 (40.1)	45 (29.4)	126 (35.5)	91 (33.3)	22 (32.8)	113 (33.2)
Hospital	15 (7.4)	31 (20.3)	46 (13.0)	39 (14.3)	15 (22.4)	54 (15.9)
Total	202 (56.9)	153 (43.1)	355	273 (80.3)	67 (19.7)	340

A total of 54 (11.4%) low risk women delivered in a hospital level. These are self referrals because they were not given a referral advice but they went to deliver in a hospital anyway. Of these 39 (72%) were from the intervention group. Overall use of hospital level for delivery was also found to be higher in the intervention group compared to the control group although the difference was not statistically significant (P=0.05).

It was noted that in both the control and intervention areas there had been an increase in use of health facility for delivery compared to the pre intervention proportion of 47% and 46% in the control and intervention areas respectively to 48.5% and 49.1% in the control and intervention areas respectively. However even though the increase was bigger in the intervention area, the difference was not statistically significant (P>0.05). (Table 4.10).

Type of delivery attendants by ANC card group:

Findings of the study show that use of skilled attendants during delivery increased in both areas from 44% to 47% post intervention in the control area and from to 47% to 51% in the intervention area. A bigger increase in the use of skilled care during delivery was observed in the intervention area of the study compared to the control area, but the difference was not statistically significant (P=0.277) (Table 4.10).

Table 4.10: Use of Delivery Care Services Pre and Post Intervention in the control and Intervention Areas

	Control Area		Intervention Area	
	Pre intervention n=487	Post Intervention n=355	Pre Intervention n=450	Post Intervention n=340
Place of delivery				
Home (%)	53.1	51.5	53.6	50.9
Health Facility (%)	46.9	48.5	46.4	49.1
Delivery Attendant:				
Skilled (%)	44.1	46.7	47.0	50.9
Unskilled (%)	55.9	53.3	53.0	49.1

*

4.3.1.3 Referral and Compliance Rates

In this study respondents were asked whether they were alerted of any risk factors during ANC which required referral to a higher level of care, whether they were referred and whether they complied with the referral advice. Table 4.11 shows proportion of women who were identified to have risk factors in the control and intervention areas by risk categories.

A total of 220 (31.6%) respondents reported to have been warned of having pregnancy risk factors. Of these 153 (69.5%) were from the control area. The most commonly reported risk factors were the demographic factors of age <20 or >35yrs, 5 or more pregnancies and first pregnancy. The proportion of women identified to be at high risk in the intervention

Table 4.11: Prevalence of Risk Factors and Referral Compliance by Risk Categories in the Control and Intervention Areas

Risk factor category	Control Area			Intervention Area		
	No. with risk factors in the category n (% of total)	Referral rate n (% of total with risk)	Referral compliance n (% of total referred)	No. with risk factors in the category n (% of total)	Referral rate n (% of total at risk)	Referral compliance n (% of total referred)
Category A : Refer to hospital for further investigations						
Post Intervention	56 (16)	37 (66%)	12 (32)	18(5)	10 (56)	8 (80)
Pre Intervention	103 (20.4)	55 (53.9)	16 (34.8)	102 (21.7)	69 (69.0)	9 (30.0)**
Category B: Refer for delivery in a facility providing EOC						
Post Intervention	132(38)	100 (76)	24 (24.5)	43(13)	32 (74)	8 (25.0)
Pre Intervention	194 (38.4)	185 (97.9)	49 (26.5)	168 (35.7)	159 (96.4)	37 (23.3)
Category C: Refer to hospital which provides EOC immediately						
Post Intervention	20(6)	13(65)	10(77)	15(4)	9(60.0)	7(78)
Pre Intervention	35 (6.9)	23 (65.7)	11 (47.8)	30 (6.4)	23 (76.7)	14 (60.9)
All risk categories						
Post Intervention	153(43.1)	121(79)	31 (25.6)	67(19.7)	51(76)	19 (37.3)
Pre Intervention	258 (51.1)	217 (84.1)	62 (28.5)	227 (48.2)	187 (82.4)	53 (28.3)*

*p<0.05.**p<0.01, ***p<0.001

health facilities was statistically significantly lower (19.7%) compared to the proportion at high risk in control health facilities (43.1%) (p=0.0001) (Table 4.11).

This difference is mainly due to the reduced list of risk factors in the modified ANC card which tended to reduce the number of referrals in the intervention health facilities where it was used. It can be seen from Table 4.11 that in the intervention area, proportion of women with risk factors in Category A and B were significantly reduced post intervention.
The proportion of at risk women who mentioned that they were given a referral advice was similar in both groups for all categories of risk factors.
Findings of this study show that for all risk categories, post intervention referral compliance rate was higher in the intervention group than in the control group although the difference was only significant in category A (p=0.005). Also the overall (all risk factors) referral compliance rate was higher in the intervention group (37.3%) compared to the control group (25.6%) and the difference was statistically significant (P=0.0009).

A significant difference in the reported referral compliance rate was observed in the risk category A where there was a high proportion identified to be at risk (16%) and a high proportion of referrals (66%) in the control health facilities, but with low referral compliance (32%). In the intervention area only 5% were identified to have risk factors

in this category, of which 56% were referred and the compliance rate was 80% (Table 4.11).

In Table 4.11 it can be seen that there was no statistical significant differences in the referral compliance rates before and after the intervention for all risk categories in the control group where as in the intervention group there was an increase in referral compliance rates in all risk categories but which was significant in risk category A and in the overall (all risk factors) ($P<0.05$).

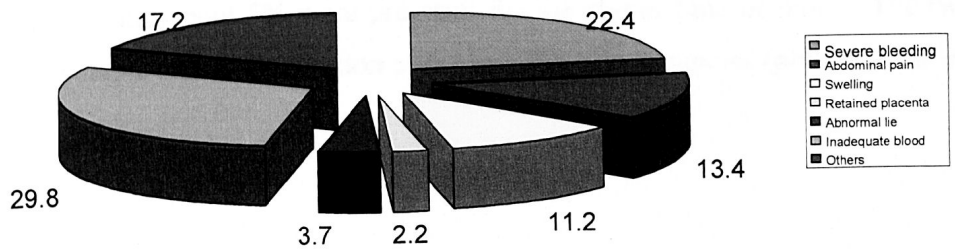
4.3.1.4 Mode of Delivery in Control and Intervention Area

Caesarean section or forceps delivery was conducted in only 19 (2.7%) of the women while the rest had normal deliveries. The proportion of women who had caesarean section was significantly higher in the control group (3.9%) compared to women in the intervention group (1.5%) and the result was borderline significant ($p=0.048$)

4.3.1.5 Occurrence of Complications During Pregnancy, Delivery and Post Delivery in the Control and Intervention Areas

A total of 127 (18.3%) reported that they experienced at least one problem during pregnancy, delivery or post delivery. Of these 68 (53.5%) were from the control area. Fifty nine women (17%) in the intervention area reported to have experienced complications compared to 19% in the control area. The difference in occurrence of obstetric complications between the intervention and control areas was not statistically significant ($p>0.05$). Fifty five (7.9%) respondents reported a complication during pregnancy, 55 (7.9%) during labour and delivery and 24 (3.5) reported a complication after delivery. Common complications reported were: Severe bleeding during and after delivery (29.8%), inadequate blood (29.8%) and abdominal pain (13.4%) (Figure 4.1). Other illnesses during pregnancy which were reported include malaria, diarrhoea and backache.

Fig 4.1: REPORTED PREGNANCY AND DELIVERY COMPLICATIONS



4.3.2 Findings From the Women Follow-up Data Recorded in Special Register Books in Health Facilities

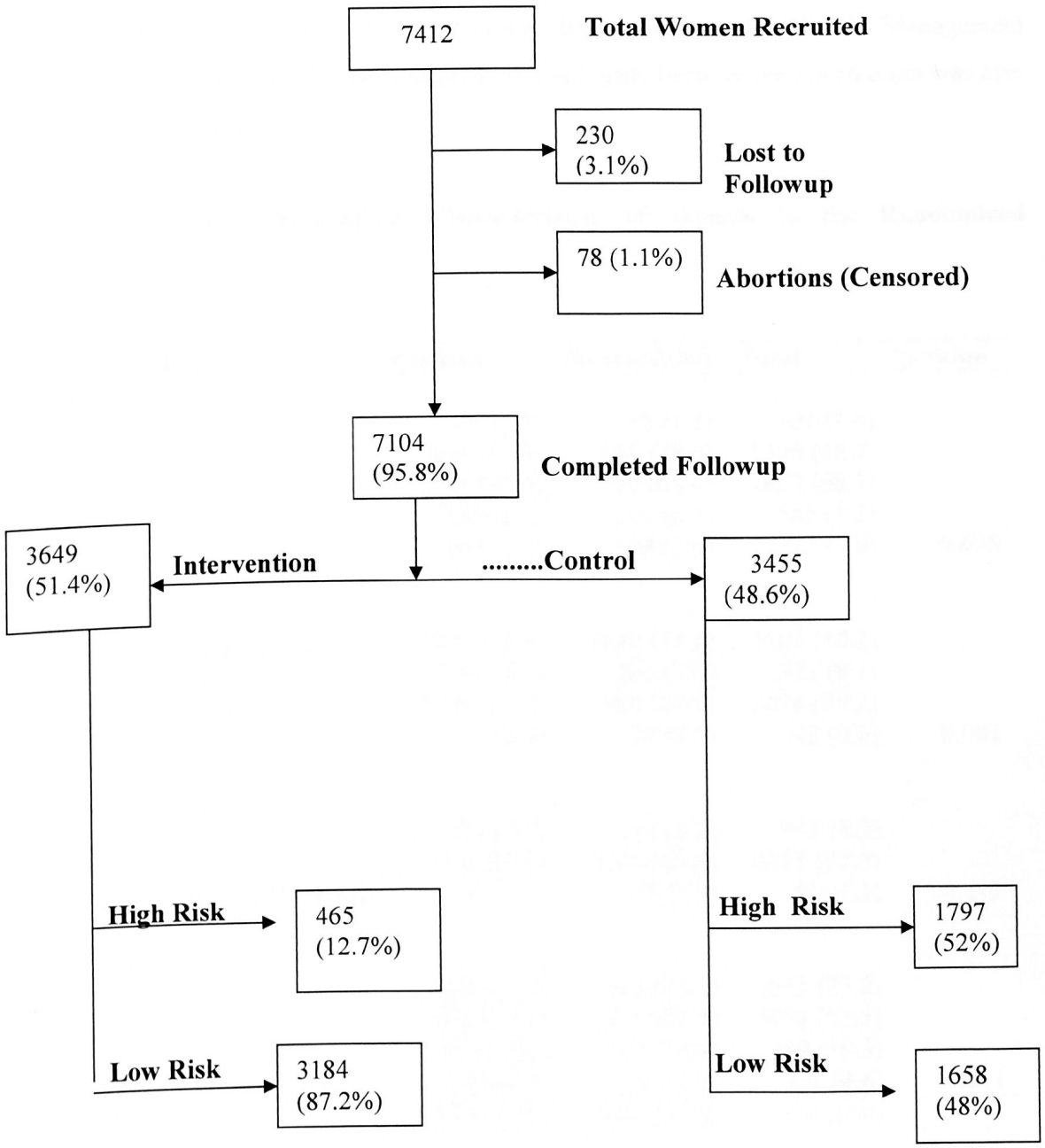
All pregnant women who booked for antenatal care in the selected health facilities between September 2004 and February 2006 were recruited into the study. In total there were 7412 women who gave their consent to participate in the study. Of these, 3874 (52.3%) were recruited in the intervention group (Modified ANC card) group and the rest were in the control (MOHSW ANC card) group. Two hundred and thirty women (3.1%) were lost to follow up. Seventy eight women (1.1%) had abortions and so their data was censored, thus only 7104 (95.8%) women remained for further analysis (Fig 4.2).

4.3.2.1 Socio-demographic Characteristics of the Control and Intervention Study Sample

The majority (68.1%) of the women recruited into the trial were aged between 20 and 35 years. One hundred and one (1.4%) were aged less than 16 years whereas 3% were over 40 years of age. The mean age was 26±7.03 years. There was no significant difference in age distribution between the control and intervention groups (P>0.05). About half of the women (50.2%) had no formal education and less than 1% had secondary or higher

education. However there was a higher proportion of women with no formal education in the intervention group (51.8%) compared to the control group (48.6%) the difference being statistically significant ($p<0.05$). At the time of this study, the majority of the women had had between 2 and 4 pregnancies. Twenty three percent of the women were pregnant for the first time and about 5% were pregnant for the eighth time or more. The two groups were comparable on the distribution of the number of pregnancies ($p>0.05$) (Table 4.12).

Figure 4.2: Number of Women Recruied for the Randomized Controlled Trial



It can be noted that there was a large number of women with missing information on education level (12%). This resulted from the fact that in some health facilities, midwives errorneosly skipped some variables when drawing columns on new pages in the followup registers. Search for misssing information from the official Health Management Information System (HMIS) ANC registers proved futile because the information was also missing in those registers.

Table 4.12 Socio-demographic Characteristics of Women in the Randomized Controlled Trial:

Characteristic	Control	Intervention	Total	p-value
Age				
<16yrs	46 (1.3)	55 (1.5)	101 (1.4)	
16-19	669 (19.4)	657 (18.0)	1326 (18.7)	
20-35	2344 (67.8)	2495 (68.4)	4839 (68.1)	
36-39	276 (8.0)	307 (8.4)	583 (8.2)	
40+	104 (3.0)	108 (3.0)	212 (3.0)	0.626
Education level				
No formal Education	1679 (48.6)	1889 (51.8)	3568 (50.2)	
Primary Incomplete	291 (8.4)	282 (7.7)	573 (8.1)	
Primary Complete	1090 (31.5)	988 (27.0)	2078 (29.2)	
Secondary+	17 (0.5)	25 (0.7)	42 (0.6)	0.001
Marital Status				
Single	284 (8.2)	353 (9.7)	637 (8.9)	
Married	2969 (85.9)	3249 (89.0)	6218 (87.5)	
Divorced/Separated/Widowed	39 (1.1)	42 (1.2)	81 (1.1)	0.311
Gravidity				
1	810 (23.4)	842 (23.1)	1652 (23.2)	
2-4	1839 (53.2)	1875 (51.4)	3714 (52.3)	
5-7	642 (18.6)	727 (19.9)	1369 (19.3)	
8+	149 (4.3)	181 (5.0)	330 (4.6)	0.211
TOTAL	3455 (48.6)	3649 (51.4)	7104 (100)	

4.3.2.2 ANC Utilization Characteristics

About 43.3% of the women booked for ANC before or at 16 weeks, which is the time recommended to start ANC in the focused ANC model. However one thousand three hundred and fifty eight women (19.1%) booked for ANC after twenty weeks of gestation with higher proportion in the intervention group (22.3%) than in the control group (15.7%) the difference being statistically significant ($p<0.05$). Almost two thirds of women (64.6%) made less than the recommended minimum of four ANC visits for a normal pregnancy. The proportion of women with less than 4 ANC visits was higher in the control group (67%) compared to the intervention group (62%) but the difference was not statistically significant ($p>0.05$), (Table 4.13). In both groups the median number of ANC visits was 3 indicating further that the groups were comparable with regard to number of ANC visits.

Table 4.13: Gestational Age at Booking, and Number of ANC Visits in the Control and Intervetion Groups

Characteristic	Control	Intervention	Total	p-value
Age at 1st ANC visit (wks)				
<=16	1485 (43.0)	1590 (43.6)	3075(43.3)	
17-20	1127 (32.6)	1225 (33.6)	2352 (33.1)	
21+	544 (15.7)	814 (22.3)	1358 (19.1)	0.00001
Number of ANC visits				
1-3	2325 (67.3)	2268 (62.1)	4593 (64.6)	
4+	901 (26.1)	934 (25.6)	1835 (25.8)	0.27
Total	3455 (48.6)	3649 (51.4)	7104 (100)	

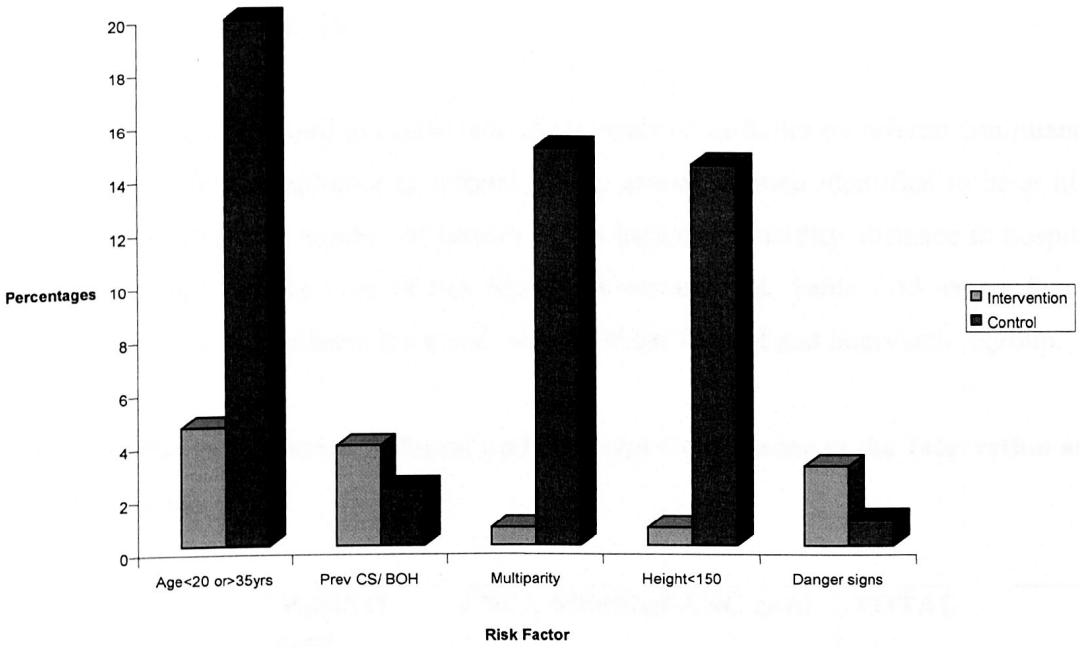
4.3.2.3 Distribution of Risk Factors for Referral

A total of 2262 (31.8%) women had at least one risk factor which required referral to hospital level care as per the referral guidelines shown in both ANC cards. These women

were referred to go to hospital level either for further investigation or for delivery. A significantly higher proportion of women in the control group (52%) were identified to be at high risk compared to those in the intervention group (13%) as shown in Fig 4.3. Demographic risk factors (age less than 20 or greater than 35 yrs and multigravidity) and height less than 150cm were the most common risk factors in the control group and constituted a high percentage of women who were referred (94.1%). In the intervention group demographic risk factors constituted only 46.2% of high risk women. It should be remembered at this stage that in the modified ANC card cutoff points of demographic risk factors were changed to age less than 16 yrs or greater than 40 yrs and eight or more pregnancies. Therefore referrals due to demographic risk factors were cut by more than 50% in the modified ANC card group.

Most of the women (94%) in the high risk group were identified during the first ANC visit while 138 (6%) women developed high risk factors during the followup period. A proportion of women identified to be at high risk on first visit was higher in the control group (98%) compared to the intervention group (79%) the difference being statistically significant ($P<0.05$).

Figure 4.3: Common Risk Factors Identified in the Intervention and Control Groups



As it can be seen in Figure 4.3, common risk factors identified in control group included age less than 20 or age greater than 35 yrs (19.8%), more than 4 pregnancies (14.9%), Height less than 150 cm (14.3%) and previous operative delivery or a history of an adverse pregnancy event (2.20%). In the intervention group, common risk factors included age less than 16 or greater than 40yrs (4.5%), Previous operative delivery/History of an adverse pregnancy event (3.8%) and the problems in the current pregnancy (danger signs) specified in category C of the MoHSW – RCH4 card where the commonly identified included fundal height too big or too small for gestational age (0.7%) and abnormal lie of the foetus (0.5%).

4.3.2.4 Referral Compliance by Type of Card Used

Findings of this study show that referral compliance rate (percent of referred women who actually gave birth in a hospital) was very low. Of the 2262 women at high risk who were referred for hospital delivery, only 542 (24.0%) delivered in the hospital (Table 4.14). One thousand one hundred and seven women (49.0%) delivered at home assisted by unskilled attendants and the rest gave birth in lower level health facilities. The rate of referral

compliance was significantly higher in the intervention group (36.6%) compared to the control group with only 20.7% of women at high risk complying with the referral advice given (P=0.015) (Table 4.14).

Logistic regression was used to assess individual effect of variables on referral compliance. Results showed that compliance to referral advice among women identified to be at high risk was influenced by a number of factors which included gravidity, distance to hospital, type of card used and the type of risk factor the woman had. Table 4.15 shows factors influencing referral compliance for at risk women in the control and intervention group.

Table 4.14 Post Intervention Referral and Referral Compliance in the Intervetion and Control Groups

Type of Risk	**MoHSW ANC card**		**Modified ANC card**		**TOTAL**	
	No. at risk	No. Complied n (%)	No. at risk	No. Complied n (%)	No. at risk	No. Complied n (%)
Demographic risk factors	1184	235 (19.8)	187	43 (23.0)	1371	278 (20.3)
Height < 150cm	496	90 (18.1)	24	9 (37.5)	520	99 (19.0)
Problems in Previous Pregnancies	81	37 (45.7)	145	58 (40.0)	226	95 (42.0)
Problems in Current Pregnancy	36	10 (27.8)	109	60 (55)	145	70 (48.3)
Total	1797	**372 (20.7)**	465	**170 (36.6)****	2262	542 (24)

Table 4.15 shows that the type of ANC card used was a significant factor influencing compliance to referral advice. Women in the intervention group where the modified ANC card was used, were almost twice as likely to comply with the referral advice compared to those in the control group (OR=1.88 (1.32-2.68)). The level of education was seen to influence significantly women's compliance to referral advice.

Table 4.15 Determinants of Referral Compliance in the Control and Intervention Groups Post Intervention :

Factor	Control OR (95% CI)	Intervention OR (95% CI)	Total OR (95%CI)
Type of ANC card			
MoHSW ANC Card	NA	NA	1
Modified ANC Card			1.88 (1.32-2.68)*
Education level			
None	1	1	1
Primary	1.13 (0.72-1.78)	1.10 (0.49-2.47)	1.18 (0.8-1.76)
Secondary+	1.28 (0.94-1.76)	3.07 (1.79-5.26)*	1.59 (1.23-2.08)*
Gravidity			
1	3.65 (2.22-6.01)	1.99 (0.76-5.25)	3.16 (2.06-4.85)*
2-4	1	1	1
5-7	1.46 (0.86-2.47)	0.29 (0.13-0.67)*	0.84 (0.55-1.26)
8+	2.93 (1.43-6.02)	0.22 (0.09-0.62)*	1.09 (0.62-1.94)
Distance to hospital			
<=40	8.71 (5.55-13.64)	2.40 (1.41-4.13)*	4.77 (3.52-6.48)*
41-60	2.18 (1.23-3.86)	0.78 (0.34-1.76)	1.09 (0.83-1.93)
61+	1	1	1
Type of risk factor			
Demographic risk factor (Age, gravidity)	1	1	1
Height<150cm	1.56 (1.03-2.44)*	1.16 (0.30-4.49)	1.23 (0.85-1.79)
Problems in previous Pregnancies	5.34 (2.73-10.5)*	2.23 (0.81-6.19)	3.19 (1.95-5.24)*
Current pregnancy problems	1.12 (0.41-3.03)	3.12 (1.17-8.32)*	3.49 (2.08-5.81)*

The influence of education was more pronounced in the intervention group where women who reported to have completed secondary education or higher were three times more likely to comply with referral advice compared to those with no education (OR=3.07 (1.79-5.26)). In both groups, women who were pregnant for the first time were more likely to comply with referral advice compared to those who already had between 2 and 4 pregnancies (OR= 3.65 and 1.99) for the control and interventions groups respectively (Table 4.15).

Distance to hospital remained to be a significant factor influencing referral compliance in both groups. The effect of long distance to the hospital was very pronounced in the control group where women who reside within 40 kilometers to the hospital were 8 times more likely to comply compared to those residing more than 60 km from the hospital (OR= 8.71(5.55-13.64). In the intervention group, the effect of distance was much reduced such that women residing within forty kilometers of the hospital were only twice more likely to comply with the referral advice compared to those residing more than sixty kilometers from the hospital (OR= 2.40 (1.41-4.13)).

The type of risk factor was another variable which was found to be highly associated with referral compliance. When compared to women with demographic risk factors (Age<20 or above 35yrs, 5+ pregnancies), it is noted that in the intervention group, women with any other types of risk factors were more likely to comply. In the intervention group, women who had problems identified in the current pregnancy, were three times as likely to comply with the referral advice (OR=3.12 (1.17-8.32) compared to those with demographic risk factors. In the control group, its women who experienced problems previously who were significantly more likely to comply with the referral advice (OR= 5.34(2.73-10.50) compared to those with demographic risk factors (Table 4.15).

4.3.2.5: Skilled Assistance by Type of ANC Card

Only about 3225 (45.4%) women delivered with a skilled Assistant. Of these 1441 (44.7%) were from the control group (MoHSW ANC referral criteria). Use of skilled assistants during delivery was significantly higher in the modified ANC referral criteria (48.9%) than in the MoHSW ANC referral criteria (41.7%). The difference in utilization of skilled care at delivery between the two groups was statistically significant (P<0.05).

4.4 The Validity of the Modified ANC Referral Criteria in Predicting Adverse Pregnancy Outcomes

4.4.1 Occurrence of Complications

A total of 568 (8.0%) reported at least one problem before, during or after delivery including 19 maternal deaths. There was almost equal number of maternal deaths in both

groups with 10 deaths in the intervention area and 9 in the control area giving maternal mortality ratios of 269/100000 live births and 284/100000 live births in the control and intervention areas respectively. Reported causes of maternal deaths included severe bleeding during and after delivery (APH/PPH) (32%), Anaemia (16%), severe malaria (5%) and ruptured uterus (5%). In eight maternal deaths, there was insufficient information to attribute the causes of death. The maternal deaths could not be attributed to any factors related to the ANC referral criteria models employed. Other complications which commonly occured among the women included excessive bleeding before or after delivery (APH/PPH) (12%), labour pains lasting longer than 12 hours (12.8%), Labour lasting for more than 12 hours due to CPD (7.6%), breech delivery (5.3%), retained placenta (5.8%), premature birth (4%) and eclampsia fits (3.7%).

The occurrence of delivery complications was found to be similar in the intervention group (8.3%) and in the control group (7.6%) and the difference was not statistically significant (P=0.28) (Table 4.16).

4.4.2 Mode of Delivery

The proportion of women who had operative deliveries (Caesarean section and Vacuum delivery) were similar in both the intervention (2.4%) and the control group (2.5%) and the difference was not statistically significant (p=0.08) (Table 4.16). Similar findings were noted when considering the ability of the referral models to distinguish those women who would need surgical interventions during delivery from those who will have a spontaneous vaginal delivery. Of the total of 83 women in the control group who had a surgical delivery, 40 (48%) were in the high risk group whereas in the modified ANC card group, 90 women had a surgical delivery of which 36 (40%) were in the high risk group and the difference was not statistically significant (P=0.16). Therefore although the Sensitivity and negative predictive values are similar in the two groups, there were significant differences in their specificity and positive predictive values. (Table 4.16).

Table 4.16 Occurrence of Complications, Mode of Delivery and Delivery Outcome in the Control and Intervention Groups

	REFERRAL CRITERIA		P-Value
	MoHSW ANC Referral Criteria (Control group)	Modified ANC Referral Criteria (Intervention group)	
Had Complications	264(7.6)	304 (8.3)	0.28
Surgical Deliveries	83(2.4)	90 (2.5)	0.8
Adverse birth Outcomes	108 (3.1)	139(3.8)	0.10

4.4.3 Birth Outcome

There was a total of 247 (3.5%) adverse pregnancy outcomes of which 135 (55%) were fresh still births, 69 (28%) were macerated still births , 37 (15%) were early neonatal deaths and the rest were premature babies. The major causes of foetal deaths included: Foetal distress/low score (21%), Breech delivery (4%), APH (6%) prematurity (4%), eclampsia (4%), Bigbaby/twins (4%) and cord around neck (2%). In 96 of foetal deaths, causes were not mentioned.

Occurrence of adverse birth outcomes (Still births, Early neonatal deaths and Intra uterine deaths) were similar in both the intervention (3.8%) and in the control group (3.1%) ($p>0.05$) (Table 4.16.)

On the ability of the two referral models to predict delivery complications, there were 264 (7.6%) women in the control group who had complications of which 126 (47.7%) were in the high risk group whereas in the intervention group, there were a total of 304 complications of which 125 (41.1%) were in the high risk group. Table 4.17 shows that both ANC cards had very low sensitivity which means that both referral models were weak in distunguishing women who would get complications from those who will not. However the findings show that the modified ANC referral criteria was more powerful in picking out women who will not have obstetric complication (specificity = 89.8%) compared to the MoHSW ANC referral criteria which had a specificity of 48% and the difference between the two was statistically significant ($p=0.001$). The positive predictive values of both criteria were also very low but the modified card was seen to be much better compared to

the MoHSW ANC card since over a quarter of the women identified to be at high risk truly had complications (p=0.001). Both cards had high negative predictive values (NPV) with the modified ANC card having a significantly higher NPV compared to the MoHSW card (P=0.0002) (Table 4.17).

On the ability of the two referral models to predict fetal outcomes, findings revealed that both referral models had very low sensitivity below 50%. However the modified ANC card had high specificity (88%) compared to the MoHSW ANC Card (47.6%) and the difference was statistically significant (P<0.05) (Table 4.17).

Table 4.17 Predictive Values of the Modified and MoHSW Referral Criteria on Obstetric Complications, Mode of Delivery and Adverse Pregnancy Outcomes.

Test	Referral Criteria		P-value
	MoHSW ANC Referral Criteria n (%)	Modified ANC Referral criteria n (%)	
Prediction of obstetric complications			
Sensitivity	126/264(47.7)	125/304 (41.1)	0.19
Specificity	1520/3191(47.6)	3005/3345=(89.8)	0.00
PPV	126/1797=(7)	125/465(26.9)	0.00
NPV	1520/1658(91.6)	3005/3184 (94.4)	0.00
Prediction of mode of delivery (complicated vs. Normal delivery)			
Sensitivity	40/83 (48.2)	36/90 (40)	0.16
Specificity	1615/3372 (47.8)	3130/3559 (87.9)	0.00
PPV	40/1797 (2.2)	36/465 (7.7)	0.00
NPV	1615/1658 (97.4)	3130/3184 (98.3)	0.38
Prediction of Birth Outcome (Live vs. Perinatal death)			
Sensitivity	42/108 (38.9)	47/139 (33.8)	0.41
Specificity	1592/3347 (47.6)	3092/3510 (88.1)	0.00
PPV	42/1797 (2.3)	47/465 (10.1)	0.00
NPV	1592/1658 (96.0)	3092/3184 (97.1)	0.04

The positive predictive values of both models were very low as less than ten percent of the high risk women according to the MoHSW ANC card had adverse pregnancy outcomes. Generally it was found that both referral criteria are equally weak in distinguishing women who will have an obstetric complication from those who will not have. However the modified ANC referral criteria was superior in predicting women who will not have a

complication (Specificity 88% as compared to 48% in the standard MoHSW ANC card (Table 4.17).

CHAPTER FIVE: DISCUSSION OF THE FINDINGS

In this chapter, the findings of the study are critically analysed in relation to the objectives stated and the preexisting body of knowledge in this area. I will first discuss the study methodology and then the study results will be discussed following the sequence of specific objectives of the study.

5.1 Methodological issues of the Study and Limitations

The baseline and post intervention assessments were cross sectional studies using quantitative and qualitative research methods. These methods were appropriate to assess health seeking behaviour, referral compliance and barriers to utilization of services. However cross sectional studies have a problem in the random variation of variables studied. For example in assessing availability of drugs and other supplies in health facilities which receive monthly kits, a cross sectional study may fall on atypical days when the facilities have a shortage or when they are well stocked. In this study all facilities had drugs on the days of the study. Previously a longitudinal study from Tanzania reported frequent shortages of iron and folate tabs in antenatal clinics [99].

The design of the intervention was a cluster randomized controlled trial designed to evaluate the impact of the modified ANC referral criteria on referral compliance and use of skilled care at delivery. This design has been employed by others [100]. Among its advanteges is that it controls for the bias in patient selection that can occur in observational studies. Stratification of health facilities by distance to the hospital ensured homogeneity of the control and intervention group with regard to distance to the referral hospital, which has been reported to influence service utilization [27, 101].

The fact that the sampling unit was the health facility reduced the risk of treatment contamination and facilitated administrative and logical convenience in the implementation of the intervention. However, this design has a deficiency that subject responses within a cluster are not regarded as statistically independent thus reducing the effective sample size and invalidating the application of standard statistical method [100, 102]. To control for this fact, the study involved a large number of clusters (12 for each group) and the sample

size was doubled (design effect estimated at 2). It has been found that if these measures are taken, the cluster randomized trial acquires the same power to detect a given intervention effect as in a trial with individual allocation [89, 102]

The Intervention

The intervention was designed based on the findings of the baseline survey. Low utilization of skilled care during delivery and low referral compliance were mentioned to be partly due to too many risk factors for referral which are not predictive of any adverse outcomes. The list of risk factors was reviewed and only those risk factors known to be predictive of adverse outcomes which require interventions in EOC facilities were considered and formed the basis of referral in the modified ANC card. These have been reported to include bleeding during pregnancy, High BP, height for nulliparous, previous surgical delivery, previous still birth or early neonatal death, previous retained placenta or PPH, low HB, fundal height too big for gestational age, and transverse lie at 37 weeks [24, 65, 103, 104]. Use of an action oriented card with important risk factors has been reported earlier to be effective in picking the majority of women with important risk factors and also in influencing referral compliance. In DRC it was found that if the antenatal card is designed based on the most important risk factors it follows that those important conditions can not be missed [105]. Essen and colleagues (1994) after analyzing the content of the antenatal card in Nicaragua, argued that an antenatal card with many risk factors contributed to low compliance, staff frustrations in antenatal care, reduced interest in the card and its risk factors in delivery care and diminish confidence in preventive maternal care. He suggested that the ANC card design should be simple and appropriate and include only the most important and relevant factors [106]

5.2 Health Care Seeking Behaviour during Pregnancy and Delivery

It has been shown that there is a strong association between skilled care during pregnancy, delivery and post delivery and the health of the mother and the infant [10, 45]. One of the objectives of this study was to assess health care seeking behaviour among women during pregnancy and childbirth. Findings of the study showed a pattern of poor maternal health care seeking behaviour especially during delivery.

5.2.1 Antenatal Care

Antenatal care especially when sought early in pregnancy allows regular checkups for the health of the pregnant woman and early interventions incase of any complications. Findings of this study showed that almost all women (99%) sought antenatal care at least once during their last pregnancy. These findings were similar to those of the Tanzania Demographic and Health Surveys [3]. Main reasons reported earlier for this universal ANC attendance included seeking for immunizations for tetanus, prophylaxis for anaemia and malaria and the fact that women want to be assured that their unborn babies are well [39, 59]. The majority of women delayed their first ANC visit and about a third went for fewer than recommended number of visits. Late start of ANC and too few visits reduces the effectiveness of the ANC as some necessary interventions are started either very late in pregnancy or they are not completed before the time of delivery. These results also agree with a study conducted in Nigeria, where the median time for first ANC visit was found to be 23.7 weeks [107]. Women book late to avoid going for many ANC visits particularly in circumstances where the facility is far away and there are no reliable means of transport.

5.2.2 Delivery Care

Findings of the study showed that there was a high preference of home deliveries assisted by TBAs, relatives and/or neighbours who lack skills to respond to emergency obstetric situations. The fact that TBAs are within their localities, known to them and some are relatives make the women prefer them more than the modern delivery care services. Preference of women to deliver in a homely environment has been reported even in developed European countries and even in these countries referral to hospital was found to be associated with low satisfaction with delivery care services [108].

The perception that pregnancy and childbirth are natural physiological events that do not require extra care has been reported to lead to home delivery preferences in West African and Asian countries [109, 110].

Before the intervention, proportion of women who delivered in the health facility was 46.7% whereas the proportion who had skilled assistance was 44.5%. These estimates compare well with the national level rates (47% and 46% for facility deliveries and skilled

assistance respectively) observed in the most recent Demographic and Health Survey but higher compared to the rates obtained from the study region (37%) in the same survey [3]. The low coverage rate in the TDHS sample in this region may be the cause of these discrepancies. Low rates of health facility deliveries in developing countries have been reported in several other studies [48, 49, 111-115]. Long distance to health facilities, lack of reliable means of transport, fear of unnecessary referral to hospital, presence of TBAs in the community and the emergency nature of labour were mentioned to be the major causes of home deliveries. This low utilization of skilled attendants at delivery may represent the greatest challenge to achieving MDG number 5, the reduction of maternal mortality by three quarters by the year 2015.

A number of socio-demographic and economic factors were found to have a significant influence on use of skilled care at delivery. They include women's age, education level, and marital status. Younger women who are just starting child bearing and are informed that they are at high risk, may, because of the perceived risk, fear home deliveries. It is also possible that the new generation with a higher proportion of women who have formal education have different perspectives on delivery care when compared to the older generations. Education level influences the status of the woman in the society which has been found to influence decision making. A woman who is educated, single and of higher socio economic status is able to make more informed decisions about her own health than their less educated counterparts. Similar findings have been reported by others [49, 112, 114-118]. Higher utilization of services among educated women is believed to result in part from better allocation of financial and other resources, greater control over these resources, more autonomy in household decision making, greater self confidence and stronger demand for satisfactory services from health practitioners [119, 120]. It has also been reported that both economic and social dimensions of the distribution of power between spouses influence the use of services [121]. In Rwanda women with control over some expenditure categories in the household had more frequent visits to the health facilities when their children were sick compared to those with low control [122].

In this study women who were advised to deliver in a health facility during antenatal care were more likely to use skilled attendants at delivery than those who were not given any

advice. In previous studies it has been shown that routine antenatal care raises awareness about the need for care at delivery or gives women and their families familiarity with health facilities that enables them to seek care more efficiently [123, 124]. It has been suggested that one of the best things antenatal care could accomplish would be to influence women to select a trained attendant at birth [125].

Women who discussed place of delivery with their husbands during pregnancy also were more likely to use skilled attendants for delivery compared to those who did not. Similar findings have been reported earlier [3, 126]. In African settings, husbands are the main decision makers in a family and control the household income and so involving them early during pregnancy helps them be prepared for the delivery. Similar association has been reported in other studies [27, 127].

Women who were knowledgeable of risk factors were more likely to utilize health facilities for delivery compared to those with no knowledge. These findings were in line with those reported in Malawi and in Zambia [114, 128]. It is expected that a better informed individual is better placed to make reasonable decisions.

In this study distance to the health facility was found to be a significant determinant of type of delivery care. This was said to be excerbated by the lack of reliable means of transport to the facility. In the study area even in those villages where public transport was available it was very unreliable and did not operate during the rainy season. Low use of health services with increasing distance has been reported in several studies. [52, 112, 114, 129]. However, other studies have shown that the effect of distance on utilization of services is modified by other factors like level of care, quality of care and the type of illness [130-132]. Other researchers have shown that improving coverage of health facilities, if not coupled by improvements in the quality of care and reduction of other barriers to accessing care, will not have the desired impact [131, 132].

Although in the study area there were bicycle ambulances in every health facility, they seemed to have no effect on use of services. This was particularly so in areas where travel

to the health facility was through hills and or other difficult terrain which made it impossible to use the bicycles.

Women who had more than 4 ANC visits were more likely to deliver with a skilled attendant than those with fewer visits. Similar findings have been reported in other sttudies earlier [62, 112]. This may be due to the fact that women with more ANC visits also showed a higher satisfaction with the quality of care and hence more likely to use health services for delivery. Likewise, many ANC visits expose women to more health education and counseling which are both likely to increase service utilization. Previously a similar finding lead to a recommendation that although antenatal care may not be efficient in identifying women who are most in need of emergency obstetric care, if promoted it may become an effective instrument to facilitate better use of emergency obstetric care services [62].

Surprisingly women who reported illnesses/pregnancy complications during pregnancy did not have an increased chance to use health facilities. This finding is in contradiction with what was found earlier in India [115]. This may be due to incorrect perceptions of causation among women themselves or immediate family members which may lead them to seek care from traditional healers instead of modern health facilities.
In contrast to findings of several other studies, perceived quality of antenatal care was not found to influence the choice of a delivery attendant. This may be due to the fact that majority of women (85%) in this study perceived the quality of ANC care as good.

5.3 Barriers to Utilization of Skilled Care at Delivery

A number of factors were mentioned as barriers for skilled assistance during delivery and they included:

A belief that if a woman did not have problems during pregnancy then she will also have a safe delivery

Women who had an uneventful pregnancy perceived themselves to be safe even during delivery. A similar finding was reported earlier in Pakistan where it was found that during pregnancy and delivery women only sought care when they experienced problems [110].

The perception that pregnancy and childbirth are natural physiological events that do not require extra care may be the main possible explanation for this as it was also found in Uganda [20]. Jagdish and his colleague also found that women who had prenatal problems were more likely to use health facilities for delivery than those who did not have any problems [115]. However, in this study occurrence of complications during pregnancy was not associated with use of health facility delivery services. This may be due to different perception of etiology and seriousness of illness. Other studies also found that illness is interpreted according to the patient's criteria and not by medically defined criteria and that care is sought according to the perceived cause of illness, severity and amenability by a particular care [25, 54, 130, 133].

Long Distance to Health Facilities and Lack of Reliable means of transport

The relationship between geographical inaccessibility of services with low utilization of skilled delivery care is well documented [54, 115, 125, 134]. These findings suggest that health facilities in resource poor countries serve effectively only a small area surrounding the facility. This fact was reported in an earlier study conducted in Mtwara Tanzania, where more than three quarters of deliveries in the referral hospital were from Mtwara urban district which is within a radius of 10kms from the hospital [19]. However, in Nigeria it was found that there are other factors which can modify the effect of distance on service utilization which include level of service, socio-demographic characteristics, quality of care and type of illness [130]. Like wise in rural Guatemala and in Burkina Faso it was found that demographic, social and cultural factors were the most important predictors of pregnancy care and the authors were convinced that improving proximity to biomedical services was unlikely to have a dramatic impact on utilization in the absence of additional changes that improve the quality of care or reduce other barriers to access [131, 132]. Although in Mtwara rural district coverage of facilities was found to comply with the WHO standards, the nature of the terrain, lack of reliable means of transport, cost of transport and presence of wild animals posed problems for pregnant women to access skilled care especially if labour begins at night. This finding calls for appropriate indicators to measure coverage of facilities other than the currently used UN guidelines which are based on number of facilities providing specific services per a certain number of people. This problem of geographic accessibility is difficult to deal with since it cannot be solved

by the health sector alone. Integration and collaboration with other sectors such as ministries responsible for community and infrastructure development is therefore inevitable.

Fear of Being Referred to Hospital Unnecessarily

The study findings showed that women feared that if they went to the nearest health facility for delivery, they would be referred for hospital delivery unnecessarily. A number of previous studies have shown that women prefer to give birth at home where they receive good support and services from their relatives neighbours or people they know [38, 135]. The concept of delivery in a homely environment practiced in the developed countries compares to this finding. However in developed countries expectant woman get necessary care in case of an emergency [136]. Reports from Holland show that referral to hospital for women who initially planned to deliver at home, led to low satisfaction with childbirth [108]. Similar findings have been reported in Tanzania where failure to comply with referral advice was due to fear of the strange hospital environment [19]. In developing countries, the costs associated with referral to hospital level (transport costs for the woman and her relatives accompanying her) constitutes a major barrier for referral compliance. In the study area, the MoHSW ANC referral criteria classifies more than half (52%) of pregnant women to be at high risk and are reffered to hospital for delivery. In most cases a referred high risk woman is not accepted in the referring health facility if she comes back in labour. Since the majority of women referred due to risk factors do end up with a normal delivery, women decide not to go to the hospital or any other health facility for delivery but give birth at home.

Cost

Financial inaccessibility of health services is a common feature in most of the developing countries [137-139]. In the study area maternity care services were provided free of charge therefore cost refers to transport cost and other indirect costs such as money used for upkeep while away from home. Kowalewski reported similar findings in the same study area where she found that transport cost represented about half of the total financial costs [139]. In general she found that both official and unofficial costs are acute barriers to use of maternity services. In Dhaka Bangladesh, it was also found that while maternity care

services were said to be provided free of charge, there were considerable hidden costs which contributed to low utilization of maternity care services [137]. In Argentina it was found that the indirect costs of travel and waiting time were higher than the direct costs for maternity care [138].

Presence of TBA's in the Community

Findings of this study showed that both women and men considered TBAs as skilled providers and acceptable by the government and so they did not see any need to go to the health facilities for delivery. Preference for TBAs during delivery has been reported in many studies [140-142]. The fact that TBAs are women, well known to the women and care for one woman at a time are considered to provide more psychological comfort than the health providers in the health facilities. TBAs social skills have been reported to be the main reasons that influence the women to utilize them. [59, 140]. Convenience and courtesy at home environment has also been found to lead to the preference of home deliveries in Tunisia and Morocco [143]. However despite these positive attributes, TBAs have been reported to continue using harmful delivery practices and to have very low referral rates even after being trained [140, 142, 144-147]. This has been attributed to weak supervision and a lack of connections between the TBA and the formal health system [140, 145].

Because TBAs are renumerated by the women's families, it is an economic conflict of interest for them to refer women, even those with complications, out of fear that they will lose their income. Field experience in Tanzania shows that provision of basic equipment and supplies for delivery to TBAs done by some NGOs to trained TBAs has been perceived as legalizing their practice and hence making women to evade use of skilled assistance in health facilities.

Decision Making Process

Findings of this study showed that women could not decide for themselves where to seek delivery care. In the social and cultural environment of our study area and other parts of Tanzania, decision making in the family is male dominated. This may be due to the fact that most women are economically dependent on their husbands and relatives and hence it is normally the financier who takes decisions. In this study area even if women were

willing to go for delivery in a health facility, their husbands could object on grounds of lack of funds and force their wives to give birth at home like majority of other women. A similar finding was also found in Sudan where it was reported that even if health care providers made recommendation to refer a woman, the husband usually makes the final decision whether a patient will be referred [135]. Service providers should take these features into consideration so that provision could be made for husbands to participate in activities related to maternity services and health talks starting quite early in pregnancy. This may improve the quality of decision made and subsequently enhance service uptake in the community.

Health Facility Factors

Respondents in this study revealed that women could not go for delivery in health facilities where there were no qualified midwives or where the skilled assistant was a man. In Uganda it was found that, lack of skilled staff at primary health care level explained the unwillingness of women to deliver in health facilities and to seek care for complications [20]. Our findings indicate that women are aware of who is a skilled midwife and are unlikely to use the services if they know that the person who is going to attend them is a not a midwife. We noted that shyness and fear of exposing oneself to strangers especially a male during delivery makes women hesitate to use health facility delivery care services where the birth attendant is a male.

5.4 Prevalence of Risk Factors, Referral Rates, Barriers and Facilitating Factors to Referral Compliance

According to Carroli et al, (2001) the following conditions among others need to be met in order for the risk screening to be effective as a public health strategy:

a) For women detected to be at an increased risk, appropriate referral or other action must be taken
b) Women at risk must be able to reach the referral level facility and be motivated to do so [103]

5.4.1 Prevalence of risk factors and Referral rate

This study assessed these aspects of ANC risk screening in Tanzania. Findings showed that a large proportion (52%) of women had at least one risk factor which required referral. High proportions of women who need to be referred due to risk factors during pregnancy has been reported earlier in other studies [33, 106, 135, 148-152]. However the observed prevalence of risk factors in Mtwara is much higher than what was found in Eastern Zaire, where only 6.4% women were identified to be at risk and referred to hospital level for delivery (Dujardin et al, 1995). This difference in proportion of women identified to be at high risk and referred may be due to differences in risk catalogues used in Zaire and in Tanzania. Many risk factors specified in the Tanzanian MoHSW ANC referral criteria account for this high prevalence of risk factors. In the study area, the high rate of ANC referral due to risk factors with low predictive values have led the communities to doubt the knowledge base of maternal health care workers working in the dispensaries and health centres.

A high prevalence of demographic risk factors (age<20yrs or age>35yrs, gravidity>4) and anthropometric risk factors (Height<150cm) was observed both during the pre intervention assessment and post intervention in the control health facilities. Also in Nepal it was found that if health workers refer all women with age<=19 and those with parity >4, then they would classify as high risk about 57% of the pregnant women [76]. Too early, too many and too late child bearing is common in most countries in Sub-Saharan Africa and Asia and this may explain this high prevalence of demographic risk factors.

However despite this high prevalence, it was noted that referral rates were low for demographic and anthropometric risk factors. This may be due low predictive values associated with these risk factors which may cause health care providers to hesitate to give referral advice to this group. A similar finding was reported in Eastern Zaire where it was observed that health workers were reluctant to give a referral advice for risk factors perceived to be non predictive of adverse outcomes by health workers [27]. Also in the DRC it was found that the personnel responsible for referral at the lower level health facilities were more willing to refer patients with prenatal complications than those with

demographic risk factors and this indicated problems in the application of the referral strategy [148].

This high proportion of women (52%) identified to be at high risk, is too large a group for referral and to the health system to manage. The predictive powers of the individual risk factors need to be assessed to form a basis for revising the referral criteria.

5.4.2 Referral Compliance

Despite very high prevalence of risk factors and high referral rate found in this study, referral compliance was found to be very low. Low referral compliance rates associated with risk screening during ANC have been reported earlier [25, 27, 57, 76, 148, 153].

Demographic and anthropometric risk factors which had highest referral rate, had no effect on compliance to referral. Similar finding was reported in the DRC where it was found that high proportion of referrals in the hospital were cases of prenatal complication and obstetric antecedents where as only very low proportion had demographic or anthropometric risk factors [27, 148]. These risk factors are too frequent and hence too many women are referred thereby decreasing the referral acceptability by women.

High referral compliance (>75%) was found for women with previous caesarean section, retained placenta in previous pregnancies and problems in the current pregnancy which included bleeding during or after delivery and gestational age > 40 wks. Category C risk factors in the MoHSW ANC card has generally been found to have higher referral compliance rates compared to other categories. All these are risk factors which have been reported to be highly predictive of adverse pregnancy outcome [154] and have also been reported earlier to be associated with higher referral compliance rates [27, 148]. It is therefore necessary to put more emphasis on these risk factors which have high predictive values and which are also best accepted.

Non compliance to referral advice was mentioned to be partly due to the perception that the predictive value of the risk factors is low. A number of studies have shown the overall efficiency of prenatal risk factors for predicting negative delivery outcomes to be low [65,

125, 149, 155]. This raises the problem of perceiving as equal risk factors which differ in their predictive values and the risk of rejecting the entire strategy of risk screening. An increasing number of studies have stressed that certain risk factors including previous CS, breech presentation, multiple pregnancy, high BP, are effective predictors of poor maternal and neonatal outcomes [46, 65]. Screening for these factors should therefore be intensified to ensure that women with these conditions are not missed.

In DRC it was found that the demographic and anthropometric risk factors were not associated with any of the adverse outcomes [148]. Since the vast majority of women referred go on to have normal deliveries, the authors felt that these risk factors are both a waste of time and that they reduce the credibility of the health worker who must refer to the hospital many women who fall into the risk categories. Mushi in a study conducted in Mtwara found that the current MoHSW ANC referral criteria are counterproductive to the very purpose of ANC as it drives away women from health facilities instead of attracting them [156]. At the same time these risk factors have been perceived to divert attention from many low risk women who do go on to develop complications and comprise 50% or more of all maternal deaths [154]. Bhatia in his study in rural India found that about 55% of maternal deaths occurred in the low risk group [115]. In the DRC it was found that the frequency of low birth weight or neonatal deaths was similar among women who were referred and those who were not referred ([148]. This means that ANC risk factors have a high false positive predictions and a poor sensitivity but early signs of complication identify individuals who are complications and their predictive value is very high.

The fact that demographic and anthropometric factors do not appear to be discriminating shows that the presence of any one of these risk factors may be insufficient for direct referral to the hospital for delivery but it could lead health care professionals to insist that the woman gives birth with a skilled attendant to facilitate early referral if necessary. This suggest that there is a need to rationalize the referral grid. Such rationalization could re-establish confidence in the referral process both among the health care personnel that refer the women and among the women referred and could thus help to remedy the observed deficits in referral compliance rates.

Occurrence of prenatal complications either in the previous or current pregnancy was associated with a high referral compliance rate. This confirms that these factors are considered to be more predictive of negative outcomes by pregnant women. Similar findings were also reported in South India where women with prior fetal loss and primgravida were more likely to use maternal health care services than those without prior losses and multiparas [115].

Reasons for non compliance were mentioned to be, lack of money for transport, lack of money for upkeep while away from home, the woman did not feel the need to go or did not understand the importance of going to hospital, and facility too far away. Similar findings were reported eralier in Bangladesh [140].

5.5 Women's Knowledge and Perceptions on Pregnancy and Delivery Danger Signs

Many authors agree that the knowledge of danger signs and maternal complications are important in influencing utilization of obstetric care. In line with other studies elsewhere, findings of this study showed that women had very low knowledge of risk factors a findings which is common in literature [25, 114, 128]. Common risk factors mentioned by women included abnormal lie, too young and primigravidity. It is noted that these were the most common reasons for ANC referrals in the clinics and so majority of women were informed about them. Primigravidity and too young are also perceived as risk factors by the women because first experiences of child bearing are associated with fear and anxiety.

Although women expressed the need to comply with the referral advice for any risk factor, there were risk factors which were perceived as more important than others and they included excessive bleeding after delivery, eclampsia fits, previous CS, labour lasting more than 12 hours and inadequate blood. These are already complications which require intervention at the hospital level. Similar findings were also reported earlier where the same risk factors were found to be perceived by women as risk factors and they also had a high referral compliance rate [25, 27].

5.6 Availability of Qualified Personnel, Essential Equipment and Supplies for Obstetric Care in the Health Facilities

A minimum level of inputs is required to provide meaningful level of care. Donabedian states that without a favorable health facility, qualified personnel and essential equipment and supplies quality health care will not be achievable [157]. The study area had a shortage of skilled personnel to provide maternal health care services at all levels. This finding has been reported earlier in other regions in Tanzania and also in other developing countries [76, 98]. The study area is located in a remote region where many workers do not like to be deployed. Also the two years training course to upgrade MCHA to PHNB created gaps in health facilities while the MCHA was pursuing further training. Lack of skilled personnel was mentioned as a barrier to use of skilled delivery care in this study as was also earlier reported in other studies [54, 76, 158]. Employment, deployment coupled with motivation to work in remote areas should be considered inorder to attract maternity care providers in these areas.

In this study most of the essential equipment were found to be in place during the study a situation finding which is uncommon in most settings particularly in Sub-Saharan Africa. This was due to facility refurbishment and procurement of all essential equipment done by an International Donor Agency in the study district just before the start of this study. Inadequacy of essential supplies reported is a common finding which has been reported in literature [76, 98, 158, 159]. This was caused by the fact that the drugs and other supplies were provided in monthly kits once per month. The contents of the kits had not being reviewed to keep pace with growing catchment populations and hence they got depleted within few days. Frequent stock out of drugs and other essential supplies in the health facilities was mentioned to be one of the reasons for women not to seek care from the health facilities. This finding was also reported earlier in rural Kenya where availability of drugs was found to be a significant determinant of demand for medical care [160]. A system of ordering drugs and expendable supplies which estimates demand as per the catchment population should be instituted.

5.7 The Effectiveness of the Modified ANC Referral Criteria Compared to the MoHSW ANC Referral Criteria in Improving Referral Compliance.

The aim of risk screening in antenatal care is to identify women who are likely to experience obstetric complications and refer them to deliver in a facility with emergency obstetric care facilities. For the risk screening strategy to be effective as a public health strategy women detected to have an increased risk of an obstetric complication, appropriate referral or other action must be taken [103]. In this study referral compliance for women identified to be at a high risk of a complication in both referral models was assessed.

Findings of this study showed that referral compliance rate was low in both the interventions and control areas although comparatively, it was significantly higher in the intervention group. Low referral compliance rates for women identified to be at high risk during ANC has been reported earlier [25, 27]. This shows that there are also other factors which influence compliance as predicted by the Health Belief Model (HBM) that individuals are likely to adopt a particular behaviour if they believe themselves to be susceptible (perceived susceptibility), if they consider the condition to be a serious health threat (perceived severity) and believe that the benefits of taking a recommended action outweigh the costs (perceived barriers). The model also talks of cues to action which is a range of prompts that trigger an individual to adopt the available preventive actions. These may be internal (physical symptoms of a complication) or external (eg mass media campaigns, or advice from others) to the individual [161]. Therefore intervention to increase utilization should target these components of the Health belief model.

In both the intervention and control groups, compliance to referral advice was highly related to the type of risk factor the woman had. Demographic risk factors and height less than 150cms had low referral compliance rates compared to those risk factors related to woman's obstetric history and problems in the current pregnancy. This finding was also reported earlier by Dujardin in his study in Zaire where he found that compliance rate was only 25% and 26% for primiparity and length < 150cm respectively where as it was 43% and 48% for previous still birth and previous difficult labour respectively [27]. Dujardin also found that the rare factors (transverse lie, previous cs) which had lower referral rates yielded the higher compliance rate compared to the common risk factors. This finding explains the difference in referral compliance in the two referral models compared in this

study. The MoHSW ANC referral criteria with many risk factors known to be non predictive of adverse pregnancy outcomes lead to decrease in acceptability of referral advice where as the modified ANC referral critera with few risk factors mostly known to have high predictive values had higher referral compliance rate.

It is also noted that in the modified ANC referral criteria, most of the women identified to be at high risk had risk factors falling under problems in the current pregnancy (Category C risk factors) such as abnormal lie, suspected twins and bleeding during pregnancy unlike in the MOHSW ANC referral criteria group where most of the high risk women had demographic, anthropometric risk factors and problems in previous pregnancies of which the referral advice is given on the first ANC visit. This indicates that once a woman is given a referral advice during the first visit, health care workers no longer concentrate to do followup and monitoring of the woman to examine and detect any other problems which might require referral on the follow-up visits. Since in the modified ANC card group, the focus was to detect problems in the current pregnancy , continuous monitoring of the progress of pregnancy was performed.

Distance to the hospital was a major determinant of referral compliance in both intervention and control areas. This finding was also earlier reported by Dujardin in his study in Kasongo who found compliance rate of 56% among women residing near the facility to only 21% among those residing far away from the hospital [27]. However the effect of distance was found to be weak in the intervention area compared to the control area a findings which is thought to be due to the sensitivity of the risk factors detected. Such findings were also reported in Zaire where it was found that the distance factor was not significant for highly predictive risk factors like transverse lie and history of an obstetric complication [27]. These findings are consistent with what was found in Nigeria that there are factors which modify the effect of distance in health care seeking behaviour which included the severity of the condition, the level of care and quality of care [130]. For example women who experienced a problem earlier, or those with highly predictive risk factors have fears for their own life and this may increase referral compliance.

Number of antenatal visits was not associated with referral compliance in either group which was at odds with Dujardin's findings in Kasongo province. He found that

compliance to referral advice was highly related to the number of times the woman attended ANC [27]. In Tanzania since majority of women attended for more than 2 ANC visits, and individual counseling on birth preparedness and place of delivery was given in every visit, the influence of number of contact visits to the facility on compliance may have been offset.

5.8 Ability of the ANC Models to Predict Adverse Pregnancy Outcomes

One way to measure the effectiveness of a risk screening system is its ability to identify women who are likely to experience complications from those who will not [103]. In this study, 8% of women were reported to have delivery complications. This proportion is much less than what has been reported earlier by UNICEF that at least 15% of women end up with complications which require EOC facilities [13]. This low proportion of women reporting complications may be due to the fact that a large proportion of women delivered at home and these complications were not documented, it is likely that women who experienced non life threatening complications underreported complications. The problem of underreporting of complications is widely documented [162].

The rate of occurrence of complications was slightly higher in the modified ANC card group compared to the MoHSW ANC card group. Since a higher proportion of women in the modified ANC card delivered with skilled attendants it is likely that most of complications were reported. It may also be explained by the fact that the majority of women identified to be at high risk in the modified ANC card group had category C risk factors which are in fact problems identified during the course of the current pregnancy. Rohde mentions that high blood pressure, malpresentation, severe anaemia and IUFD are medical conditions which require treatment and are not risk factors [154].

The sensitivity and positive predictive values of both models to detect delivery complications, adverse fetal outcomes and mode of delivery were very low. Low predictive values of ANC risk factors has been reported earlier [27, 61, 103, 149, 150, 155].

The low predictive power of the demographic risk factors on delivery outcomes has also been reported in the Tanzania Demographic Health survey [3]. In the survey findings, it

was shown that mortality risk of new borns was neither high for women who are under eighteen years, neither for those aged over 34 years or those with more than 3 pregnancies. The report showed that only women who had multiple risk factors and those with shorter birth intervals had an increased risk of fetal mortality compared to those with no risk factors [3] .

These findings conform with an earlier observation that obstetric complications can neither be predicted and can not be prevented by antenatal care alone. Access to facilities with emergency obstetric care for all women should therefore be advocated for [10].

However both models were found to have a higher sensitivity in predicting obstetric complications than what has been previously reported [103, 155]. This may be due to the fact that in this study all complications which occurred were taken into consideration without judging whether the complication the woman experienced is what was expected from the risk factor the woman had.

When compared to the MoHSW ANC referral criteria, the modified ANC referral criteria had only a slightly low sensitivity in prediction of adverse pregnancy outcomes. This may be explained by inadequate screening tools for Category C risk factors. For example most of the women identified to have a foetus in an abnormal lie, had vertex spontaneous deliveries showing that diagnosis of abnormal lie was not always correct or the baby turned after the abnormal lie was diagnosed. In the absence of highly specific diagnostic tests, this is expected. It was also true that estimation of gestation age when the woman did not know the date of her last menstrual period was a problem as most women gave birth earlier than the gestational age estimated at the time of booking for antenatal care. Due to this it is also possible that conditions like transverse lie, were diagnosed much earlier than at or above 32 weeks which was too early since the position of the baby may still change before the time for delivery. None of these lower level health facilities had an ultra sound machine.

The overall rate of perinatal mortality was 35/1000 and no differences were observed in the two groups under comparison. This is slightly below the national estimate reported to be 42 per 1000 deliveries [3]. A similar finding was reported in Papua New Guinea where the perinatal mortality rate of 26/1000 was reported [163]. A high rate of perinatal mortality was also reported in Mozambique where it was 70/1000 [149].

In this study non statistically significant differences on rate of complications, perinatal mortality and proportion with surgical deliveries in the intervention and control groups shows that although the modified ANC card had fewer risk factors, it was comparable with the MoHSW ANC card in predicting women who will have adverse pregnancy outcome. Comparable adverse outcomes for mother and baby in both arms of the study can be explained by the fact that there was no intervention to address the quality of care in the health facilities. For example there was no intervention which addressed skills training and there were no management protocols in health facilities both of which address the quality of care. It is a well known fact that identifying risk does not help if the means to prevent or treat problems are not available or are not accessible [10, 103]

The fact that 56% of complication occurred in the low risk group calls for action to ensure access to emergency obstetric care for all women. Women should be encouraged to give birth in health facilities with skilled attendants who can detect complications early and be prepared for any emergencies which might require referral to a higher level of care. However it has to be ensured that the referral facilities are well equiped and staffed with skilled attendants who should also receive continuous skill updates.

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

Findings of this study showed that despite high ANC attendance, delivery with skilled assistance was still very low as more than half of all pregnant women still deliver assisted with unskilled attendants. Factors found to be associated with skilled care assistance were distance to facilities, women's socioeconomic status, discussion with partner on place of delivery, advise on place of delivery during ANC and knowledge of risk factors.

In addition, fear of referral to hospital was as a barrier to skilled care during delivery. A high proportion of ANC referrals and reluctance of health care providers working in dispensaries and health centres to receive and attend high risk women when they come in labour discourages women from using health facilities for delivery.

It was also found that knowledge of risk factors was low among women of reproductive age which negatively influenced utilization of skilled care during delivery. Although women perceived all risk factors as important, there are a few risk factors which were considered to be more important than others. The majority of these are the risk factors in Category C which were known to require interventions at the hospital level, for example Low HB and abnormal lie of the baby.

The study revealed a high prevalence of risk factors and hence high referral rate resulting from the MoHSW ANC referral criteria. Most common risk factors for referral were demographic risk factors (age<20yrs, Age >35yrs, gravida >4) and height <150cm.

It was also found that referral compliance was very low particularly for risk factors associated with high referral rates but with low predictive values like the demographic and height risk factors where as risk factors based on problems in previous pregnancies or prenatal complications were associated with high rates of referral compliance. This indicates that women are aware of which risk factors are associated with negative outcomes of pregnancy and for these factors they make efforts to comply with the referral advice.

Based on the WHO standards of Coverage of health facilities, the study area was found to have adequate coverage of health facilities which provide maternal health care services. All the required services with exception of laboratory services were available in the health facilities with exception of two which did not have a skilled attendant.

The modified ANC referral criteria with few risk factors for referral was found to be associated with a higher referral compliance rate and a higher proportion of women who received skilled care during delivery compared to the standard MoHSW referral model. With regard to their ability to predict adverse pregnancy outcomes, the two models were found to be similar on their sensitivity and negative predictive values but the modified criteria had high specificity and positive predictive values compared to the MoHSW referral crietria for all predictions assessed which included ability to predict delivery complications, adverse pregnancy outcomes and predicting deliveries which will require surgical interventions. This finding supports the hypothesis that the referral criteria with reduced risk factors is similar with the MoHSW ANC referral criteria in predicting women who are likely to have obstetric complications.

However, the modified ANC referral criteria was found to be superior interms of service utilization that is referral compliance for at risk women and use of skilled attendants at delivery. Also the modified ANC referral criteria was more effective on the ability to predict women who will not have obstetric complications or adverse pregnancy outcomes as compared to the standard MoHSW referral model, a fact which has been found to influence referral compliance.

6.2 Recommendations

The recommendations are structured according to the different levels where they can be implemented which are at the community level, first line health facilities, the referral level and at the policy making level.

6.2.1 At the Community Level

6.2.1.1. Improve Knowledge on Risk Factors and Danger Signs During Pregnancy, Delivery and Post Delivery

The findings of this study showed that levels of utilization of both skilled care during delivery and referral level care were both highly associated with knowledge of risk factors. If there is to be genuine, systematic and sustainable changes towards use of maternal health care services, the importance of the community cannot be overstated. The community should be educated about risk factors and danger signs during pregnancy, delivery and post delivery period and the dangers associated with them and the importance of early referral incase of an emergency.

Organizing for emergency means of transport should also be emphasized. This can be done through sensitizing the community to develop a local emergency fund for hiring vehicles when an emergency situation arises.

The communities should also be educated on the benefits of being assisted by a skilled attendant during delivery. IEC and BCC campaigns can be conducted at the community level on the importamce of health facility deliveries as a measure to increase use of skilled care. The community and their leaders can agree on local by-laws to penalize women who give birth at home and award those who give birth in health facilities.

6.2.1.2. Redefine the Role of TBAs in the Community.

According to WHO's standards, regardless of training, TBAs are still considered as unskilled providers. It has been found that the training of TBAs is normally too short to enable them gain midwifery skills and change their harmful traditional practices. TBAs can assist in conducting a normal delivery in the absence of a skilled attendant, but they should not be a substitute of skilled attendants where they are available. The role of TBA's should not be provision of delivery care but can counsel and convince women to go to hospital for delivery.

Where still offered, TBA training should emphasize on counselling women to use health facilities for delivery and early detection of complications and timely referral to the nearby health facility.

6.2.1.3. Economic Empowerment of Women

Education level and social economic status of women were found to be significant predictors of use of skilled delivery care services. Emphasis on girls education in Mtwara rural district should be made a priority both by the community and this shopuld be emphasised by the ministry of education and vocational training. Activities aimed at increasing the economic power of women for example provision of soft loans, micro credit and professional advice in horticulture which can lead to utilising the land appropriately should be promoted. These measures may lead to increased use of maternal health care services.

6.2.2 At First Line Health Facilities

6.2.2.1 Intensify Counseling on Individual Birth Preparedness and Emergence Readiness During ANC

Counseling for individual birth preparedness and emergency readiness should be intensified during antenatal care. Individually tailored messages with regard to dangers of the risk factor the woman is having and the benefits of early compliance to referral should be done. Husbands and/or significant others of women should be involved during the counseling so that they are taken aboard from the beginning. For women identified to be at high risk of a delivery complication, follow-up can be done with the community leaders to ensure arrangements are made for early transfer to hospital in case a complication occurs.

6.2.3 At the Referral Facility

6.2.3.1: Improve Quality of Care and Patient Welfare

Efforts should be made to ensure that services are of high quality to motivate women to to use them.

Women complained of lack of a place to stay in the town while awaiting delivery as a major barrier to referral compliance. Also other minor issues like lack of food for in patients which requires that a woman be accompanied by her relative to ensure daily supply of meals. Provision of a maternity waiting home at the referral hospital will assure woman's welfare and may improve the rate of early transfer to hospital for women detected to be at high risk.

6.3.4 At Policy Makers Level

6.2.4.1 The ANC Card should be Reviewed to Include only those Risk Factors Known to be Predictive

The list of risk factors should be reviewed so that only those risk factors reported to be highly predictive of adverse pregnancy outcomes should be included in the antenatal card. Cutoff points for the risk factors should be locally determined through research to ensure that they pick only those women falling at high risk. For example in this study it was found that there were too many women whose height was less than 150cm but they had no histories of delivery complications and not even episiotomies in their previous deliveries. Local research can be conducted to determine the cut off points of risk factors based on local contexts.

On the other hand women considered to be at low risk, should be advised to deliver in the lower level health facilities but receive intensified counseling to be ready for any emergency that might happen. By doing this majority of women will deliver assisted by skilled attendants who are able to diagnose complications early enough and refer timely.

6.2.4.2 Develop a Manual for ANC Referral and Train All Health Care Providers on the ANC Referral Criteria Using the Developed Manual

A manual explaining the ANC referral criteria should be developed so as to cut down unnecessary referrals. For example not all short women need to be referred but only those who are nulliparous or had a difficult delivery before. Also individual assessments of women need to be done rather than fully relying on the referral criteria because by doing this, other complications not listed as high risk can as well be missed.

6.2.4.3 Improve Employment and Deployment of Qualified Personnel in Health Facilities

Availabity of skilled attendants at health facilities will ensure that women who come to the facility for delivery get skilled assistance. Means to ensure that health workers are available and can be retained in the rural areas should be developed. An incentive package for health care workers deployed in health facilities located in remote areas may help to ensure availability of skilled personnel.

6.2.4.4 Improve Referral System

It is evident from the findings of this study and other previous studies that obstetric complications can neither be predicted nor prevented by antenatal care alone. Access to health facilities which provide EOC services should therefore be assured in case of a complication. Referral mechanism linking the different levels of care should be in place in order to ensure the continuum of care. Availability of means of communication and emergency transport are specifically important.

6.2.4.5 Improve Coverage of EOC facilities

Although the coverage of EOC facilities comply with the WHO standards, still accessibility to the hospital is hampered by the nature of the terrain and bad roads most of which are impassable during the rain seasons. Upgrading some of the available health centres to be able to provide emergency obstetric care services can significantly improve access to EOC.

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