

Identification and referral of at risk pregnancies and associated factors in Kilombero district, Morogoro region, Tanzania

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**IDENTIFICATION AND REFFERAL OF AT RISK PREGNANCIES AND
ASSOCIATED FACTORS IN KILOMBERO DISTRICT, MOROGORO REGION,
TANZANIA**

By

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**A dissertation submitted in partial fulfillment of the Requirements for the
Degree of Master of Science in Applied Epidemiology of the**

**Muhimbili University of Health and Allied Sciences
October, 2018**

CERTIFICATION

The undersigned certify that she has read and hereby recommend for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled *Identification and referral of at risk pregnancies and associated factors in Kilombero district, Morogoro region, Tanzania* in (partial) fulfillment of the requirements for the MSc (Applied Epidemiology) of Muhimbili University of Health and Allied Sciences.

Dr. Rose Mpembeni

(Supervisor)

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DEDICATION

This work is dedicated to my beloved parents Dr. Leonard C. Mwenesi and Mrs. Ekilia Mwenesi, who have guided, supported and encouraged me throughout my academic carrier to do my best. Also I dedicate this work to my beloved husband Mr. Mitangu Adam Fimbo and our beloved Sons; Jonathan, Gerald and Noel for their sacrifices, support and being deprived of my presence in the period of study.

ABSTRACT

Background: The identification and referral of women with risk pregnancies is recognized as one of key interventions during antenatal care. In Tanzania, the Reproductive and Child Health card number 4 (RCH4 card) is a guideline used in screening of pregnancy in order to identify risk pregnancies early and refer to hospital where emergency care can be provided to the woman. Women's awareness of pregnancy risk factors and proper use of the RCH4 card can lead to early identification of risk pregnancies and hence timely and appropriate referral. Late or no referral due to missed risk factors has been associated with high maternal mortality.

Main Objective: To assess identification and referral of at risk pregnancies and associated factors in Kilombero district, Morogoro Region, Tanzania.

Methods: The study design was a cross-sectional facility-based. It involved 418 pregnant women who were attending ANC in randomly selected health facilities in Kilombero district. A two stage cluster sampling technique was used to select the study sample. In the first stage, 27 dispensaries were selected randomly using simple random sampling technique and all health centres and the only hospital in the district were included. The sample size was calculated using Leslie's formula for a single proportion. For the second sampling stage, the sampling frame was the list of pregnant women registered in the facility Antenatal Clinic (ANC) register. A questionnaire with structured questions was used to interview women. Data was collected from RCH4 cards on risk factors identified and women were re-examined by the investigators to identify missed risk factors. The referral advice given was also noted. Data collected was analyzed using SPSS version 20 software where by descriptive, bivariate and multivariable analysis was done to determine independent factors influencing identification and referral of high risk pregnancies.

Results: A total of 418 women were recruited into the study with age range of 17- 43 years. About 32% of the women had pregnancy risk factors identified in the current pregnancy and recorded in their RCH4 cards. On re-examination, the proportion of women with pregnancy risk factors was found to be 55%. Around 44% of women had pregnancy risk factors missed. Age below 20 years and height less than 150 cm were the most missed pregnancy risk factors. Category C pregnancy risk factors were not assessed because they were not measured in most health facilities. Women who had no pregnancy risk factors during previous pregnancies had higher odds of having missed risk factors (OR=3.57, 95%CI=1.35-3.92). Similarly women with less than 4 antenatal visits had higher odds of having missed risk factors (AOR=1.51; 95%CI=1.26-4.97). Respondents with no formal education

had 3.53 higher odds of having missed pregnancy risks (95%CI=1.24-9.98) as compared to those who had primary or secondary education. Out of 132 women who were identified with risk factors on their RCH4 cards, only 44(33.3%) were provided with appropriate referral advice. Majority of women, who were identified to be at high risk during ANC visits with either age below 20 years, or five or more pregnancies and previous caesarian section delivery, were not provided with appropriate referral advice. Women with pregnancy of ≥ 24 weeks had higher odds (AOR=3.40; 95%CI=1.60-19.14) of receiving appropriate referral advice as compared to those with lower gestation age. Respondents with 3 or more antenatal visits had almost 5-fold higher odds of being provided with appropriate referral advice (95%CI=1.26-10.21) as compared to those with 2 antenatal visits. Compared to women with no formal education, those who had secondary level education had significantly higher odds (AOR=8.12; 95%CI=1.40-16.99) of receiving appropriate referral advice. Attending ANC at dispensary level had higher odds (AOR=1.37; 95%CI=1.17-1.79) of being provided with appropriate referral advice as compared to those seen at Health centres.

None of the 30 health facilities visited had all essential equipment and supplies required for antenatal care services. Less than 50% of facilities had Hemoglobin level test, grouping and Rhesus factor, VDRL for syphilis or sugar for urine test available. Only 15(50%) of all facilities had urine albumin test available and 14(47%) of all facilities had an ambulance or an emergency transport for referred cases.

Conclusion: There is a significant proportion of missed risk pregnancies in Kilombero district. Moreover, referral advice for women identified with risk factors is not being provided according to RCH4 guideline, with only a small proportion provided with appropriate referral advice. Antenatal Clinics do not have adequate essential equipment and supplies needed for provision of quality Antenatal care services which will include diagnosis of the risk factors.

Recommendations: Women should be made aware of the importance of communicating personal characteristics/obstetric history which is used to identify risk status to the health care providers. The MoHCDGEC should ensure that health providers are trained on risk screening and referral of at risk pregnancies and conduct further studies to assess the effectiveness of the RCH4 card as a guideline used to identify and refer women with pregnancy risks. The MoHCDGEC should also ensure that health facilities are well equipped and have essential supplies to enable provision of quality antenatal care risk screening services.

TABLE OF CONTENTS

CERTIFICATION	i
DECLARATION OF COPYRIGHT	ii
ACKNOWLEDGEMENT	iii
DEDICATION	iv
ABSTRACT	v
LIST OF TABLES	ix
LIST OF FIGURES	x
LIST OF ABBREVIATIONS	xi
DEFINITION OF KEY TERMS	xii
CHAPTER ONE	1
1.0 INTRODUCTION	1
1.1 Background of the Study	1
1.2 Statement of the Problem	3
1.3 Rationale of the Study	5
1.4 Research Questions	6
1.5 Theoretical Framework	6
1.6 Study Objectives	8
1.6.1 Broad objective	8
1.6.2 Specific objectives	8
CHAPTER TWO	9
2.0 LITERATURE REVIEW	9
CHAPTER THREE	13
3.0 RESEARCH METHODOLOGY	13
3.1 Study Design	13
3.2 Study Area	13
3.3 Study Population	13
3.4 Inclusion criteria:	14
3.5 Exclusion criteria:	14
3.6 Sample Size Calculation	14
3.7 Sampling Techniques	15
3.8 Data Collection Techniques	15
3.8.1 Recruitment and training of Research Assistants	16
3.8.2 Data collection tools	16
3.8.3 Pre-testing of the questionnaire	16
3.9 Data analysis	16
3.10 Ethical Considerations	17

3.11 Study limitation	17
CHAPTER FOUR.....	18
4.0 RESULTS	18
4.1 Descriptive characteristics of the study	18
4.2 Proportion of women identified with risk factors	20
4.3 Number of women with pregnancy risk factors who were given appropriate referral	23
4.4 Distribution of essential equipment and supplies.....	26
CHAPTER FIVE	28
5.0 DISCUSSION	28
5.1 Proportion of women with pregnancy risk factors	28
5.3 Proportion of women with appropriate referral advice	29
5.5 Availability of Essential ANC equipment.....	31
CHAPTER SIX.....	32
6.0 CONCLUSION AND RECOMMENDATIONS.....	32
6.1 Conclusion.....	32
6.2 Recommendations	33
REFERENCES	34
APPENDICES	39
Appendix 1: Summary of distribution of pregnancy risk factors recorded on RCH4 card, Risk factors picked during examination, Risk factors recorded from ANC but not picked during examination and missed risk factors among women who were studied.	39
Appendix 2: Proportion of essential equipment and supplies for Antenatal risk screening available in the selected health facilities in Kilombero District, Morogoro region	40
Appendix 3: Checklist for identified risk factors and referral indication given from RCH4 card by the healthcare provider	41
Appendix 4: Checklist for risk factors identified during re-examination of the woman	43
Appendix 5: Questionnaire for mothers attending ANC (English Version)	45
Appendix 6: Questionnaire for mothers attending ANC (Swahili Version)	49

LIST OF TABLES

Table 1: Socio-demographic characteristics of pregnant women seen at Antenatal care clinics in selected health facilities in Kilombero district, Morogoro Region, 2018.....	18
Table 2: Obstetric characteristics of pregnant women seen at Antenatal Clinics in selected health facilities in Kilombero district, Morogoro Region, 2018.	19
Table 3: Factors associated with missed risk factors among women seen in Antenatal Clinics in selected health facilities in Kilombero District, Morogoro region, 2018	21
Table 4: Factors associated with provision of appropriate referral advice among women identified with pregnancy risk factors in Antenatal Clinics in selected health facilities in Kilombero District, Morogoro region, 2018.....	24
Table 5: Proportion of health facilities with essential equipment and supplies for Antenatal risk screening in the selected health facilities in Kilombero District, Morogoro region, 2018.....	27

LIST OF FIGURES

Figure 1: Theoretical framework showing factors that potentially influence the identification of pregnancy risk factors and provision of appropriate referral advice for women attending Antenatal Clinics.....	7
Figure 2: Proportion of pregnancy risk factors recorded on RCH4 cards and risk factors identified during re-examination among women attending Antenatal Clinics in selected health facilities in Kilombero district, Morogoro region, 2018.....	20
Figure 3: Number of women with pregnancy risk factors provided with appropriate referral advice as per the ANC guidelines in selected health facilities in Kilombero district, Morogoro region, 2018	23

LIST OF ABBREVIATIONS

ANC	Antenatal Clinic
DHIS 2	District Health Information System 2
EMOC	Emergency Obstetric Care
FANC	Focused Antenatal Care
GA	Gestational Age
HCP	Healthcare Provider
MNH	Muhimbili National Hospital
MoHCDGEC	Ministry of Health Community Development Gender Elderly and Children
MUHAS	Muhimbili University of Health and Allied Sciences
MMR	Maternal Mortality Rate
PO-RALG	President's Office – Regional Administration and Local Government
RCH	Reproductive and Child Health
RCH4 card	Reproductive and Child Health card number 4
TDHS	Tanzania Demographic and Health Survey
WHO	World Health Organization

DEFINITION OF KEY TERMS

Pregnancy risk factor: - Pregnancy related health threat that increases a woman's chance of developing pregnancy related complications.

Risk Pregnancy: - Pregnancy in which the mother or fetus is or may be at increased risk of morbidity or mortality before, during or after delivery. Women presenting with one or more of the risk factors mentioned in the RCH4 card were considered as high risk group.

Appropriate referral advice is defined as: - Women who were given a referral advice as per the RCH4 card guideline.

Inappropriate Referral advice Means: - Women who had antenatal risk/risks, but the referral advice does not comply with what is spelt out in the RCH4 card guideline.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the Study

Middle income countries have been able to reduce dramatically the rate of maternal mortality but on contrary, most of the low income countries still have unacceptably high maternal mortality. Maternal mortality rate is highest in sub-Saharan Africa as compared to other parts of the world where a woman's risk of dying from complications arising during pregnancy, at delivery or soon after delivery over a course of her life time is 1 in 16, as compared to 1 in 3,800 in the developed world (1).

In Tanzania maternal mortality ratio currently stands at 556 for every 100,000 live births and the risk of dying during childbirth faced by Tanzanian women is 100 times greater than that faced by women in the high income countries (2). This rate has remained high despite National and International efforts to reverse the trend. A number of causes are linked to this persistently high maternal mortality rate in low income countries. Missed at risk pregnancies at primary health facilities during antenatal care and hence late or no referrals to higher levels of care when complications arise are among the reasons that eventually result into maternal death in Tanzania (3)(4). Early identification and hence timely referral of women, who are likely to get complications, so that they can access emergency obstetric care timely, is key to reduction of maternal mortality.

Antenatal care services are meant to provide an opportunity for screening for conditions likely to cause adverse effects in the index pregnancy. One of the main objectives of these clinic visits is to identify risk factors in pregnancy and deal with them or refer the woman to a district hospital for specialized care. In 2000, Focused Antenatal Care (FANC) which was a new WHO antenatal model was introduced in Tanzania. The FANC involves early detection and management of diseases, counseling on health promotion, counseling on birth preparedness and complication readiness, and development of an individual birth plan (4). FANC reduced the antenatal visits to four, for those without any risk, as compared to previous Antenatal Clinic attendance which was

done monthly up to 28 weeks of gestation, thereafter once a fortnight until 36 weeks of gestation then weekly until delivery for all pregnant women regardless of presence or absence of any risk factor.

The Reproductive and Child Health Card 4 (RCHC4 card) of the Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDGEC) of Tanzania shows the guidelines for referral of pregnant women with risk factors. . The RCH4 card is designed to facilitate detection of important and clearly defined conditions, which in turn can result in well defined and beneficial actions. The card is not only used as a tool for good antenatal care but also a link between antenatal and delivery care.

The RCHC4 card is divided into three sections; Pregnancy care, delivery and immediately after delivery care, and postnatal care. In the first part, the prenatal care, there are three categories of referral indications named A, B and C. A woman with one of the indications in category A should be referred to a higher level of care for further investigations while one with indication in category B, should be referred to a higher level facility for delivery. A woman with risk factors defined in category C is supposed to be referred immediately to hospital.

Women are screened for referral indications in category A and B during their first visit. For those identified as in need of referral, a tick is made on a specific box on the antenatal card and the woman is informed of the need to go to hospital for further assessment or for delivery. During the subsequent antenatal care visits, women given referral advice should be emphasized on the referral advice given. Those referred for delivery are advised to stay near the hospitals at the late weeks of pregnancy. If a woman develops any of the indications for referral in category C during her prenatal care, she is referred immediately to hospital. (*See Appendix 3*)

In developing world, the proportion of women receiving ANC has increased from 60% to more than 80% in most countries from 2005 to 2016(5). According to the TDHS of 2015-16, 98% of women who gave birth in the 5 years before the survey received antenatal care from a skilled provider and 51% had four or more ANC visits. Good quality ANC care and women participation during antenatal period is very important in the identification of at risk pregnancies and hence provide appropriate plan for place of delivery of woman with pregnancy risk factors.

The effectiveness of risk identification, especially those of category A and B highly depends on the woman being able to provide the required information. Adherence to Reproductive and Child health card 4 by the health providers is important in order to identify record and appropriately refer at risk pregnancies to higher levels of the healthcare system for delivery.

1.2 Statement of the Problem

Deaths from maternal causes represent the leading cause of death among women of reproductive age in most developing countries. It is estimated that the majority of deaths occur in Africa, which has 20% of world births but with more than 40% of the world maternal deaths (6). The risk of maternal deaths in developing countries is 1 in 61, while in developed countries is estimated at 1 in 2800 (1)(7).

In Tanzania, Maternal Mortality Ratio (MMR) stands at 556/100,000 live Birth (2). Direct causes of deaths which are preventable complications during pregnancy and childbirth are the leading cause of death and disability among women in developing countries (6). Timely access to Emergency care is therefore a key intervention to reduce maternal mortality. The coverage of ANC in Tanzania is very high (98%) and hence if effective screening can be done during antenatal care, this can promote timely access to Emergency Obstetric Care services (EOCs) for women with high risk pregnancies. The Ministry of Health has designed the RCH4 card to guide the health care providers in screening for high risk pregnancies during ANC visits. However, it has been reported that, there are risk pregnancies which are either not identified or are identified but not given proper referral advice.

A study done in Zimbabwe by Majoko et al, reported 32% of women with previous complications recommended for hospital assessment were either missed or not referred (3). These results coincide with findings of a study done in southern Tanzania by Pembe et al (2008) which showed that despite the referral system in our country being well established and appear to be effective; there is significant number of high risk pregnant women who do not reach the referral level(4)

Pruhal et al (2000), showed that important physical, clinical and laboratory investigations for screening for risk pregnancies were not done in more than 40% of pregnant women attending ANC (8). A study done in Southern Tanzania also showed that the sensitivity of antenatal screening is low and that only 2 of the 8 twin pregnancies and 3 of the 14 breech presentations delivered in hospital were recognized during ANC (9).

There is scarcity of information on identification and referral of at risk pregnancies and associated factors. This study, therefore aimed to identify women, health care provider and facility factors influencing the identification of these risk factors in the current pregnancy and hence provision of appropriate referral advice during ANC visits.

1.3 Rationale of the Study

Failure to identify women at risk and timely refer them to higher levels of care for specialized obstetric emergency services is among the factors that contribute to many maternal deaths in Tanzania and in other developing countries (10)(11)(12). In developing countries where most women deliver outside formal healthcare system and emergency transport is often difficult or impossible to obtain, the ability to identify women who are at risk of developing complications and refer them to deliver in hospital would be very valuable. Such referrals could improve access to emergency Obstetrics care and greatly reduce the number of preventable maternal deaths.

Progress towards achieving sustainable development goals of reducing perinatal and maternal mortality can be observed if ANC is provided in such a way to improve timely access to emergency obstetric care services. Proper use of the ANC card by health care providers and women providing the required information will lead to identification of risk pregnancies and hence appropriate and timely referral. (7).

This study assessed the identification and referral of at risk pregnancies and associated factors in Kilombero district, Morogoro region. As the country is striving to reduce maternal mortality this study has generated important information which can be used to improve antenatal risk screening and provision of appropriate referral for women with risk pregnancies.

1.4 Research Questions

1. What is the proportion of women with missed pregnancy risk factors among those attending Antenatal Clinics in Kilombero district?
2. What factors influence identification of pregnancy risk factors in Kilombero district?
3. What is the proportion of ANC attendees with identified pregnancy risk factors who are not given appropriate referral advice in Kilombero district?
3. What factors influence provision of appropriate referral advice to at risk pregnant women attending Antenatal Clinics in Kilombero district?
5. What proportion of health facilities have adequate equipment and supplies required for provision of ANC services?

1.5 Theoretical Framework

Identification of Risk factors during pregnancy among women who attend Antenatal Clinic is one of the main interventions of reducing maternal mortality in Tanzania. Factors that influence screening for risk factors and provision of appropriate referral advice in our health facilities can be related to the healthcare provider, health facility or the pregnant woman herself. Lack of knowledge and skills on FANC, low qualifications and poor attitudes are among healthcare provider factors that could directly influence the proper identification of risk factors and referral among women attending Antenatal Clinics. Health facility factors include poor infrastructure, unavailability of supplies and equipment needed to do risk screening or unavailability of RCH4 cards. Inadequate ANC staff with high client load, results to less time being spent by the healthcare provider to identify risk factors. Knowledge and awareness of pregnant women on risk factors could also influence the identification of pregnancy risks as the health worker relies on the information provided by the women to identify most of the risk pregnancies and hence provide appropriate referral advice. The woman's education level, age, gravidity, her previous obstetric history, number of antenatal visits and her gestation age highly determine the identification of risk factors and the type of referral advice provided.

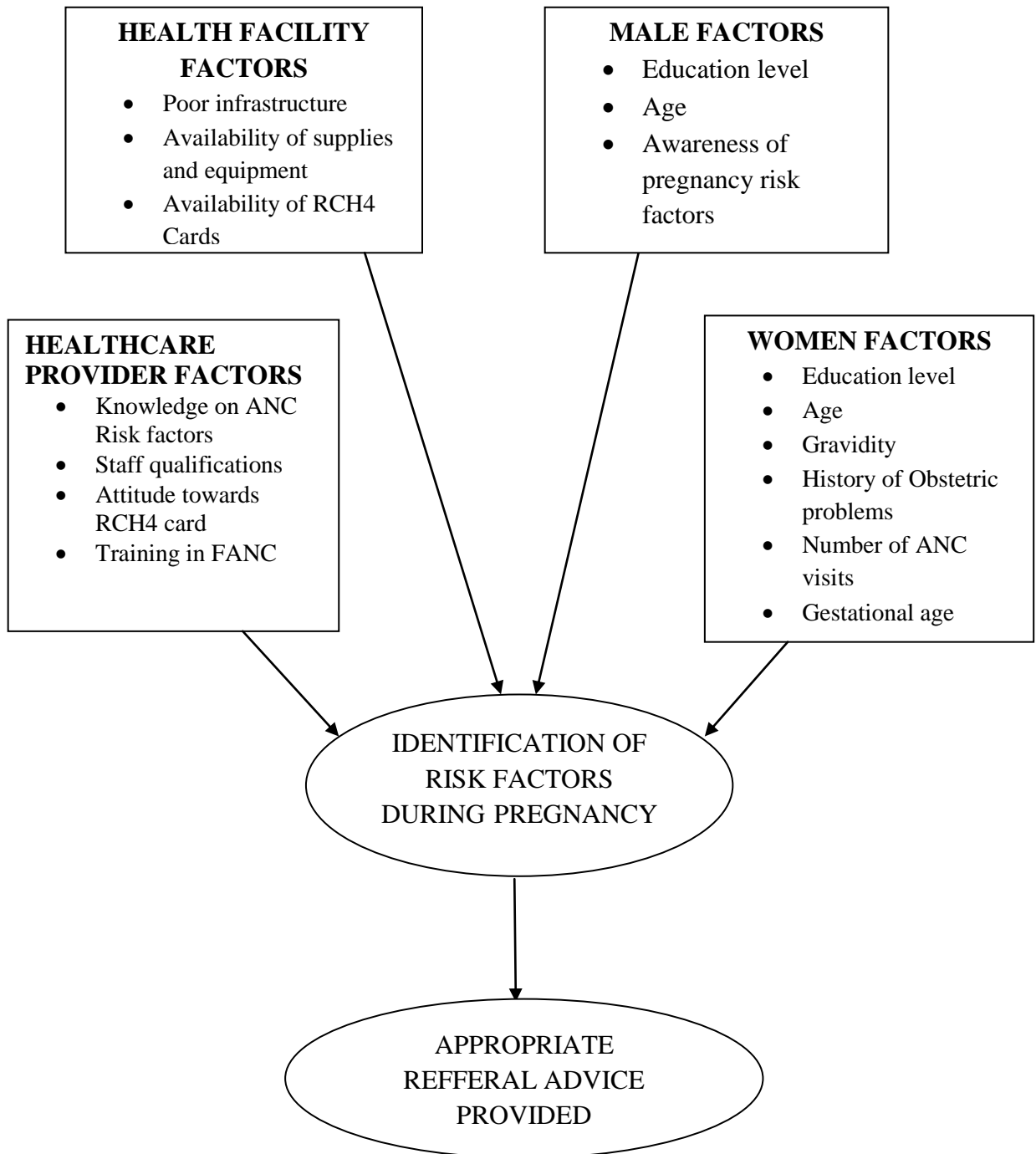


Figure 1: Theoretical framework showing factors that potentially influence the identification of pregnancy risk factors and provision of appropriate referral advice for women attending Antenatal Clinics

1.6 Study Objectives

1.6.1 Broad objective

To assess the identification and referral of at risk pregnancies and associated factors in Kilombero district, Morogoro Region, Tanzania.

1.6.2 Specific objectives

1. To determine the proportion of pregnant women identified with risk factors among those attending Antenatal Clinics in Kilombero district, Morogoro region.
2. To determine the proportion of women with missed risk factors among those attending Antenatal Clinics in Kilombero district, Morogoro region.
3. To determine factors associated with missed risk factors among women attending Antenatal Clinics in Kilombero district, Morogoro region.
4. To determine the proportion of women with risk factors who are given appropriate referral advice as per the RCH4 guideline in Kilombero district, Morogoro region.
5. To determine the factors influencing provision of appropriate referral advice to at risk pregnant women in kilombero district, Morogoro region.
6. To assess the availability of essential equipment and supplies for Antenatal risk screening in health facilities in Kilombero district, Morogoro region.

CHAPTER TWO

2.0 LITERATURE REVIEW

Maternal mortality remains one of the most daunting public health problems in resource poor settings. Reduction of maternal mortality has been identified as a prominent component of the United Nations Sustainable Development Goals. The United Nations estimated that 303,000 women died in 2015 from pregnancy related causes, and almost all of these deaths occurred in developing countries. The maternal mortality ranges between 511- 652 per 100,000 live births in sub-Saharan Africa, compared to 11 to 14 per 100,000 live births in high income countries (13). The 2015-16 Tanzania Demographic Health Survey (TDHS) report on Adult and Maternal Mortality showed that the maternal mortality ratio was estimated at 556 maternal deaths per 100,000 live births. Access to quality health care during pregnancy and at delivery is a crucial factor in explaining the disparity in maternal mortality and morbidity between the developing and the industrialized world (14)(15).

2.1 Proportion of women with missed pregnancy risk factors among those attending Antenatal Clinics

Effective identification of risk pregnancies and timely referral of pregnant women with risks to higher level of care has been identified as one of the critical steps in preventing unnecessary maternal death. Successful risk screening of pregnant women at Antenatal Clinics depends on the ability and skills of the health care provider to predict and diagnose the conditions effectively and manage them timely and successfully. High risk groups need more specialized techniques for diagnosis and hence require specialized health professionals and equipment. Studies show that in most cases successful screening procedure can well be achieved through use of classical risk markers such as past obstetrics history, parity, age, height etc which if well recorded provide important source of information on the obstetrics risk (8)(16). However studies show that significant risk factors are not captured or recorded during Antenatal visits (17).

It has also been observed that, in some countries the proportion of women with identified pregnancy risk factors is as high as 70%(11). A study done in India states of Andhra Pradesh, Mavalankar found that the proportion of pregnancy risk factors detected at Antenatal Clinics was around 42 %, which was very low compared to the number of women who presented with complications at delivery which could be detected during pregnancy period(18). In another study

done by Majoko et-al in Gutu district in south-eastern part of Zimbabwe 32% of women with previous complications recommended for hospital assessment were either missed or not referred(3). These findings coincide with those found in a study done in Southern Tanzania which showed that the sensitivity of antenatal screening is low and that only 2 of the 8 twin pregnancies and 3 of the 14 breech presentations delivered in hospital were recognized during antenatal care(9).

2.2 Factors associated with missed risk factors among women attending Antenatal Clinics

A study done by Prual A, et al in Niger showed that pregnant women who had no formal education were more likely not to attend all four antenatal visits and hence present with missed pregnancy risks at delivery(8). Another study done in Rufiji southern Tanzania revealed that women who had attended Antenatal Clinic more than three times during the period of pregnancy were more likely to have a chance of risk factors being picked at early stages of pregnancy (8). A study done in Ngorongoro district, Northern Tanzania reported that unavailability of basic ANC equipment and laboratory supplies for provision of ANC services was associated with significant under detection of high risk pregnancies(19).

2.3 Proportion of women with risk factors who are given appropriate referral advice

Risk screening will only be effective if women identified to be at high risk receive appropriate referral advice and they comply with the advice. A retrospective study done in Bagamoyo Tanzania on maternal deaths and their associated risk factors showed that referrals to higher level of care for pregnant women found to have risk factors was low even in the preliminary stages of maternal care such as the Antenatal Clinics. In this district hospital it was found that 76.4% of the women were found to have at least one or more risk factors identified in their RCH4 cards, but only 34.6% of them were referred (20). This study also highlighted the importance of improving antenatal care services. A study by Jahn A. and De Brouwere V on referral in pregnancy and child birth found that, only 35% of those who needed emergency obstetric care accessed the service(16). This shows that, there are many pregnant women in need of emergency obstetric care services but do not access it for various reasons which may include missed risk factors or lack of appropriate referral advice.

A study done in Mtwara region in southern Tanzania showed that majority of women opting for referral level care base their decision on general consideration of safety and perceived better

survival chances of themselves and their babies regardless of their professionally defined risk pregnancies. There was very low rate (3.4%) of antenatal referral in contrast to the expected 20% if there was full implementation of official referral guidelines (9). and most of these antenatal referrals were self referrals i.e. triggered by symptoms experienced by patients themselves rather than institutional triggered referral.

The above study also indicated that there was very low rate of emergency referrals of only 0.3% as compared to the expected 10% if there was proper use of RCH4 card (9). Improvement in identification of risk factors and timely referral of these at risk pregnancies is also a critical factor to be looked at in reduction of maternal deaths. Improvement in the utilization of the RCH4 card is therefore needed at primary levels of maternal care if maternal deaths are to be prevented (20)(21)(22).

Detection of any risk factor calls for specialized attention and further examination of the woman. Referral to a higher level of care such as district hospital for specialized management may be necessary. Close and frequent follow-up of the patient at the clinic is also necessary and hence the patient may require more visits to clinic. Frequent attendance to the clinic and thorough risk assessment improves risk detection and provision of appropriate referral advice(18) .

2.4 Factors influencing provision of appropriate referral advice to at risk pregnant women

Studies have found that full implementation of the antenatal care referral guideline would result in more than 50% of all pregnant women being referred either antenatal or for delivery. A study done in Kivu district, Democratic republic of Congo showed that women with higher number of Antenatal Clinic visits were more likely to receive referral as compared to those with less visits(23). However, previous studies in Tanzania have shown very low number of referrals (24)(5). A study done in Tanzania reported that among women given Antenatal referral advice, only half of them arrived at the hospitals (5). Facility related factors such as unavailability of essential antenatal equipment including an ambulance for emergency transfers and low skilled health providers was significantly associated with provision of inappropriate referrals(19).

There is no doubt that due to multiple factors, many patients who would benefit from referral are either not appropriately referred or not referred at all. Women at risk must therefore be provided with appropriate referral advice so that they can be able to reach a referral facility without delay.

2.5 Availability of essential equipment and supplies for provision of antenatal care services

Delivery of quality health services requires availability of functioning equipment and availability of basic medical supplies. Detection of pregnancy risk factors requires an effective ANC package, competent health care providers in a functioning health system with availability of referral services. The MoHCDGEC has developed a list of basic equipment and supplies that should be available at a health facility to guarantee its readiness to deliver antenatal care services (See appendix 2).

The 2014-2015 Tanzania Service Provision Assessment survey showed that, with the exception of HIV testing, the basic laboratory tests important for ANC are lacking in most facilities that offer antenatal care services; the range is from 52 percent having the capacity for syphilis testing to just one percent able to do blood grouping and Rhesus factor. Furthermore hemoglobin testing was available, on average, in only three of ten ANC facilities(25). In Rural Southern Tanzania findings from another study were not different; it was observed that only 50% of women who attended ANC were clinically checked for anaemia and only 36% for oedema. Urine was tested in 7% of the women during their current visit (26).

With the above evidence, it is very clear that the structure for antenatal care service delivery in most countries including Tanzania is well defined and guidelines are available but the screening and identification of risk factors and provision of appropriate referral advice to those women with pregnancy risks is influenced by a myriad of factors. This study aims to determine these factors and provide recommendations to improve the current situation.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Study Design

The design of this study was Cross-sectional health facility based.

3.2 Study Area

The study was conducted in Kilombero District in Morogoro region of southern Tanzania. It is located on the western side of Morogoro Region and lies between latitudes 70⁰40' and 9⁰21' South of the Equator and between longitudes 35⁰20' and 37⁰48' East of Greenwich. It borders with Kilosa and Morogoro Rural District to the North East, Mufindi and Njombe to the Southwest and Kilolo District to the North, Ulanga District to the South East (along Kilombero River) and Songea Rural District of Ruvuma Region to the South (23).

The district covers an area of 14 918 km². Most of the people of this district are subsistence farmers, with a very low overall family income. According to the 2012 National Population and Housing census, the district had a total population of 301,456 whereas 151,654 were males and 149,802 were female. The total number of women of reproductive age is 79,933. The average population growth rate stood at 2.7 % per annum. The district projected population in the year 2018 was 301,656 (27).

Antenatal Clinic services are offered in 61 health units, 1 hospital, 2 health centers, and 58 dispensaries. There are 28 health facilities which are public facilities and 33 are owned by FBO's, private for profit or parastatal organizations. The district lacks a government hospital(28). According to Ifakara Health and Demographic Surveillance System report (HDSS) of 2012, total fertility rate of the region stands at 4.4, Antenatal care coverage stands at 90%, Neonatal mortality rate per 1000 live births is 22.7 and under five mortality rate per 1000 live births stands at 66.6. Of all deliveries 40.4% are facility deliveries (29). MMR for Morogoro region for the year 2015 -2016 stands at 415 per 100,000 live births (27).

3.3 Study Population

The study population was pregnant women who were attending Antenatal Clinics in the selected health facilities.

3.4 Inclusion criteria:

- Pregnant women who attended ANC in the selected health facilities during the time of study and consented for participation.

3.5 Exclusion criteria:

- Women with serious complications who needed immediate referral
- Women who were unable to communicate due to illness or other reasons

3.6 Sample Size Calculation

The sample size was determined using the following formula of a single proportion,

$$n = \frac{z^2 p(100-p)}{\epsilon^2}$$

Where n = the required minimum sample size

p = prevalence of missed risk factor in a study that was done in Zimbabwe was 32%

ϵ = margin of error on p (set at 0.05)

z = standard normal deviate corresponding to 95% confidence level (=1.96)

$$n = \frac{(1.96)^2 32(100-32)}{(0.05)^2} \approx 334$$

With expected response rate of 90%, $n = 334/90\%$. The Total number of women to be involved in the study is 370.

3.7 Sampling Techniques

Kilombero district in Morogoro region was selected conveniently because it is one of the districts reporting high numbers of maternal deaths in the region (DHIS 2). A two stage cluster sampling technique was used to select the study sample. In the first stage, a list of all public health facilities providing antenatal care services from the district (dispensaries and health centers) was obtained. A random selection of 27 dispensaries was done. All (two) health centers and the only hospital were included into the study. For the second stage, the sampling frame was the list of pregnant women registered in the facility Antenatal Clinic register. The total number of pregnant women included from each Antenatal Clinic was determined proportionately. A sampling fraction was calculated (Sample size divided by total number of ANC attendees in all the selected health facilities). The sampling fraction was employed in each of the selected health facilities. All women who attended Antenatal Clinic during the study period were included in the study consecutively and data collection continued in the facility until the required number was reached.

3.8 Data Collection Techniques

Quantitative data collection approach was used, whereby the women's RCH4 cards after receiving antenatal care were reviewed and extraction of data on risk factors identified and any referral advice given was collected using a checklist. This was followed by re-examination of the women and independent risk screening was done, to identify if there are any risk factors that were missed during her routine ANC visits. A checklist was used and any missed risk factor was noted and recorded. Category C risk factors were not assessed because they were not measured in most health facilities (See Appendix 3 for more details). A questioner was used for interviews with the women on exit to determine if they were given any advice regarding risk factors or referral advice. A checklist with list of essential equipment and supplies for ANC was used to assess their availability and functional status in each health facility included in the study.

3.8.1 Recruitment and training of Research Assistants

One research assistants i.e. a nursing officer, nurse midwife or a medical doctor assisted the principal investigator in the process of data collection. The principal investigator assisted by one research assistant interviewed and extracted data obtained from the RCH4 cards. The risk factors identified in each category for each RCH4 card were noted in the prepared checklist. Referral indication for the risk pregnancies was documented.

3.8.2 Data collection tools

Kiswahili language questionnaires with closed ended questions were used to collect information from the women in the selected clinics. A checklist with RCH4 card antenatal risk factors was used to collect information on risk factors and referral advice and those picked during re-examination of the women at the time of data collection. A checklist with list of recommended supplies and equipment for antenatal care from the MoHCDGEC was used for assessing the clinics. (See appendix 7)

3.8.3 Pre-testing of the questionnaire

Pretesting of data collection tools was done in order to test the study instrument for clarity of questions, feasibility and study logistics. The pretest assisted the research assistants to practice the wording of questions and use of the prepared checklist for the Quantitative data collection tools. This exercise was carried out in one of the health centres in the nearby Coast region. The health center was randomly selected from the list of health centers present in the region. Result of the pilot study was used to modify content and wording of the questions. The general purpose and usefulness of the findings of the study was clarified and made to be understood by the respondents before interviews were conducted.

3.9 Data analysis

Data collected from the RCH4 cards, re-examination of the women and interviews with the women was coded, entered, cleaned and analyzed using SPSS version20 software. Social demographic description of the study population was done. Frequency distribution and two way tables were used to summarize the data. Chi square test was used to test association between dependent variables (Identification of risk factors and provision of appropriate referral advice) and independent variables (Age of the mother, Education level of mother, Gravidity, Gestational

Age, History of obstetric problems, Number of ANC visits, Level of health facility and education level of healthcare provider). Multiple logistic regressions was used to assess independent predictors of the dependent variable. The statistical significance was set at 5%.

3.10 Ethical Considerations

Ethical clearance to conduct the study was obtained from MUHAS Research Ethics committee before conducting the research. Further permission and approval was obtained from the Morogoro Region Administrative Secretary (RAS), The Regional Medical Officer and the District Medical Officer. Only those women who consented were interviewed and re-examined and were informed that they were free to withdraw from the study at any point in time. To assure confidentiality participants were assigned numbers instead of names and only the researcher and research team had access to the questionnaires. During data collection period those women who were found to have risk factors category A or B were counseled and treated. Women who had category C risk factors indicated on their RCH 4 cards were referred to hospital for further management.

3.11 Study limitation

Category c risk factors were not assessed due to unavailability of laboratory supplies and equipment needed to perform the required tests in almost all visited health facilities.

CHAPTER FOUR

4.0 RESULTS

4.1 Descriptive characteristics of the study

A total of 418 pregnant women attending ANC in the selected health facilities were enrolled into the study. The median age was 25 years with a range 17 to 43 years. More than two thirds of respondents 286 (68.4%) were in the age group 20-34 years. More than two thirds of women 284 (67.9%) had primary education and 371 (88.8%) were peasants. Most 338 (80.9%) of the women interviewed were married and 353 (84.4%) lived less than 5 kilometers from a facility providing Antenatal care (Table 1).

Table 1: Socio-demographic characteristics of pregnant women seen at Antenatal care clinics in selected health facilities in Kilombero district, Morogoro Region, 2018.

VARIABLE	NUMBER	PERCENT
Age Group		
<20	73	17.5
20-34	286	68.4
≥35	59	14.1
Level of Education		
No Formal	39	9.3
Primary	284	68.0
Secondary	95	22.7
Occupation Status		
Peasant	371	88.8
Business	36	8.6
Employed	11	2.6
Marital Status		
Married/Cohabiting	338	80.9
Single	80	19.1
Religion		
Muslim	131	31.3
Christians	271	64.8
Others	16	3.9
Distance From ANC		
<5 km	353	84.4
≥5 Km	65	15.6
Distance to Referral Hospital		
<10km	129	30.9
10 -50km	156	36.3
>50 km	133	32.8

Obstetric Characteristics of the study sample

Table 2 below shows obstetric characteristics of the respondents. More than half of the respondents 231 (55.3%) were gravida 2 to 4 and most 272 (65.1%) had delivered between 1 and 4 children in their lifetime. About a third, 148 (35.4%) of the women had two antenatal visits and more than two thirds 287 (68.7%) had their first ANC visit at GA between 13 and 24 weeks. Three hundred and fifty eight (80.1%) reported to have had no identified risk factors during their previous pregnancy. More than half of the women 245 (58.6%) were in third trimester of pregnancy during the period of data collection.

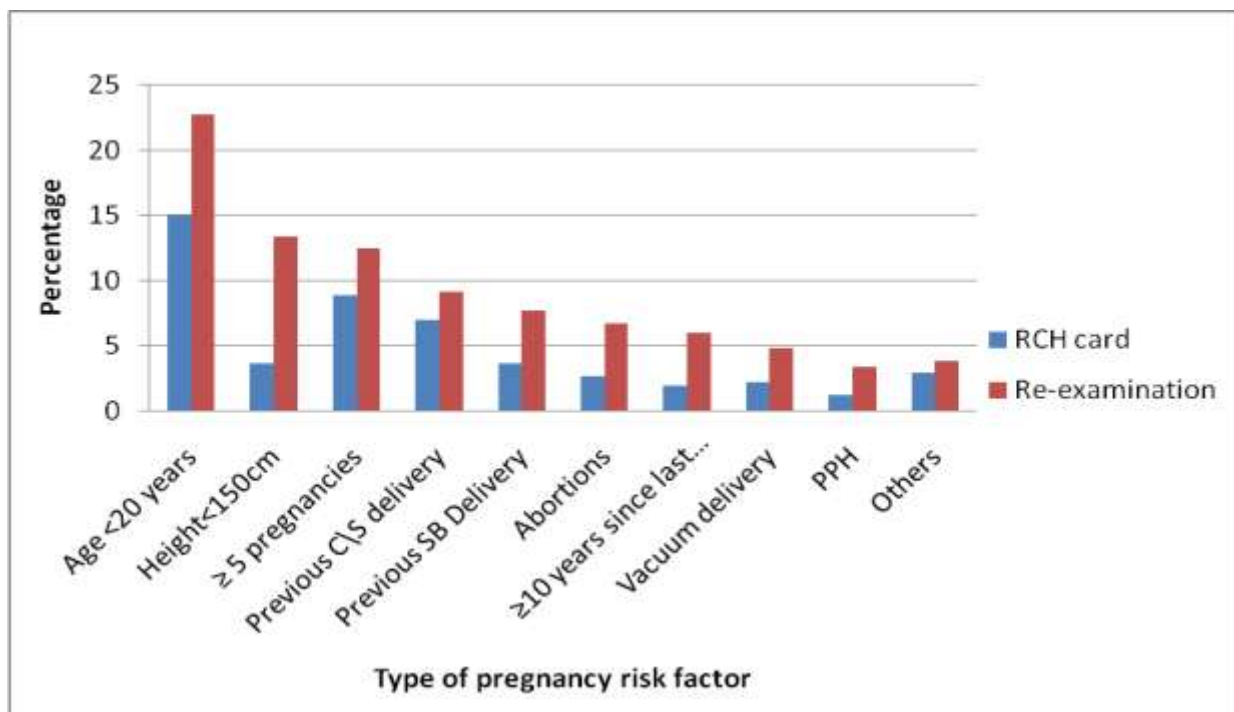
Table 2: Obstetric characteristics of pregnant women seen at Antenatal Clinics in selected health facilities in Kilombero district, Morogoro Region, 2018.

VARIABLE	NUMBER	PERCENT
Gravidity		
1	111	26.6
2-4	231	55.3
≥5	76	18.2
Parity		
0	122	29.2
1-4	272	65.1
≥5	24	5.7
Number of ANC Visits		
1	61	14.6
2	148	35.4
3	125	29.9
4+	84	20.1
GA at First ANC visit		
≤12weeks	85	20.3
13-24 Weeks	287	68.7
>24 Weeks	46	11.0
Presence of Risk factor in the previous Pregnancy		
Yes	60	19.9
No	358	80.1
GA at time of study		
≤12 weeks	15	3.6
13-24 weeks	158	37.8
>24 weeks	245	58.6

4.2 Proportion of women identified with risk factors during routine ANC screening and during re-examination in selected health facilities in Kilombero district, Morogoro region, 2018

Among women interviewed 132 (32%) were found to have one or more pregnancy risk factors during antenatal care and the risk factors were documented in their RCH4 cards. During re-examination 230 (55.0%) women had one or more risk factors identified. About 185 (44.3%) of women had at least one risk factor missed during Antenatal Clinic visits. About 83 (20%) of the women had pregnancy risk factors recorded on their RCH4 cards which were not identified during re-examination. (See Appendix 1 for more details)

Figure 2: Proportion of pregnancy risk factors recorded on RCH4 cards and risk factors identified during re-examination among women attending Antenatal Clinics in selected health facilities in Kilombero district, Morogoro region, 2018



**Others include intrauterine fetal death, Malpresentation, Heart disease, Diabetes mellitus, Pelvic deformity, Tuberculosis and elderly Primigravida

The figure above shows all types of pregnancy risk factors were missed during the ANC visit with age below 20 years and height less than 150 cm having the highest proportion among those missed.

Table 3: Factors associated with missed risk factors among women seen in Antenatal Clinics in selected health facilities in Kilombero District, Morogoro region, 2018

Variable	Missed Risk factors		X ² (p-value)	COR(95% CI)	AOR(95%CI)
	Yes (n=185)	No (n=233)			
Gravidity					
1	45(40.5%)	66(59.5%)		1.0	
2-4	106(45.9%)	125(54.1%)	0.87(0.645)	1.24(0.79 -1.97)	-
≥5	34(44.7%)	42(55.3%)		1.19(0.66 -2.14)	
Had risk in previous pregnancy					
Yes	22(36.7%)	38(63.3%)	5.23(0.022)	1.0	1.0
No	163(45.5%)	195(54.5%)		3.44(1.82 -3.54)	3.57(1.35 -3.92)
GA at first ANC visit					
≤12weeks	40(47.1%)	45(52.9%)		1.05(0.48 -2.29)	
13-24 Weeks	122(50.0%)	165(57.5%)	0.24(0.538)	1.92(0.49 -1.95)	-
≥24 Weeks	23(42.5%)	23(50.0%)		1.0	
No. of ANC visits					
1	22(36.1%)	39(63.9%)		0.20(0.14 -2.24)	0.61(0.34 -1.99)
2	71(48.0%)	77(52.0%)	6.06(0.069)	1.96(1.60 -2.17)	1.68(1.51 -2.08)
3	58(46.4%)	67(53.6%)		1.24(1.23 -3.73)	1.51(1.26 -4.97)
≥4	34(40.5%)	50(59.5%)		1.0	1.0
Education Level of woman					
No Formal	23(59.0%)	16(41.0%)		2.58(1.20 -5.53)	3.53(1.24 -9.98)
Primary	128(45.1%)	156(54.9%)	6.26(0.040)	1.97(1.91 -2.38)	1.25(1.19 -3.20)
Secondary	34(35.8%)	61(64.2%)		1.0	1.0
Level of facility					
Dispensary	69(39.2%)	107(60.8%)		1.0	1.0
Health Centre	116(47.9%)	126(52.1%)	3.14(0.076)	1.42(0.96 -2.11)	1.77(0.25 -2.38)
Education level of HCP					
STD VII – EN	47(39.5%)	72(60.5%)		1.0	1.0
Form IV- EN	109(46.4%)	126(53.6%)	5.14(0.162)	2.57(1.20 -5.53)	1.31(0.56 -3.06)
Form IV- RN	29(45.3%)	35(54.7%)		1.47(0.91-2.38)	1.25(0.34 -1.80)

Factors associated with missed risk factors among women seen in Antenatal Clinics in selected health facilities in Kilombero District.

Table 3 shows Bivariate and multivariate analysis to determine maternal factors associated with missed pregnancy risk factors. Gravity of the mother was not associated with missed risk factors ($p=0.645$) however pregnant women who had no risk in previous pregnancy were associated with missed risk factors ($p=0.022$). Gestational age of the mother at antenatal booking was not associated with missed risk factors ($p=0.538$). In bivariate analysis, number of antenatal visits was also not associated with missed risk factors ($p=0.069$).

Results show that education level of the mother had an associated with missed risk factors ($p=0.040$). However there was no observed association between the level of facility attended by the woman and missed risk factors ($p=0.076$). Education level of healthcare provider was not associated with missed risk factors although more missed risk factors were seen among those attended by form IV enrolled nurses ($p=0.162$).

Variables with a p-value of less than 0.2 in the bivariate analysis were added into multiple logistic regression model to determine independent factors associated with missed pregnancy risk factors after controlling for confounders. The table shows adjusted odds ratios with 95% confidence intervals.

After adjusting for other factors, women who had no pregnancy risk factors during their previous pregnancies had 3.57 higher odds of having missed pregnancy risk factors (95% CI = 1.35 – 3.92) when Compared to women who had previous risk pregnancy,

Regarding number of antenatal visits, women who had two antenatal visits had higher odds of having missed risk factors as compared to those with ≥ 4 visit (AOR=1.68; 95% CI =1.51 – 2.08).

Findings also show that those women with no formal education had 3.53 higher odds of having missed pregnancy risks (95%CI = 1.24 – 9.98) as compared to those with primary or secondary education.

Results reveal that those women who were attended at Health centre level were more likely to have missed risk factors (AOR=1.77; 95% CI = 0.25 – 2.38) as compared to those who were attended at dispensary level, however this association was not statistically significant. It was also observed that women who were attended by Form four Enrolled Nurses had slightly higher odds (AOR=1.31; 95% CI=0.56 -3.06) of having missed risks compared to those seen by standard seven enrolled nurse. This association was not statistically significant.

4.3 Number of women with pregnancy risk factors who were given appropriate referral advice as per the RCH4 guideline

Out of 132 women who had risk factors documented on their RCH4 cards, only 44(33.3%) were provided with appropriate referral advice as per the National ANC guidelines. (See **Appendix 1 for more details**). **Figure 3** shows majority of women with pregnancy risk factors of age below 20 years, five or more pregnancies and previous caesarian section delivery during their Antenatal Clinic visits were not provided with appropriate referral advice. Only 6(13.6%) of women identified to have age less than 20 years were given appropriate referral advice while only 9/37 (24%) of those who had 5 or more pregnancies received appropriate referral advice.

Figure 3: Number of women with pregnancy risk factors provided with appropriate referral advice as per the ANC guidelines in selected health facilities in Kilombero district, Morogoro region, 2018

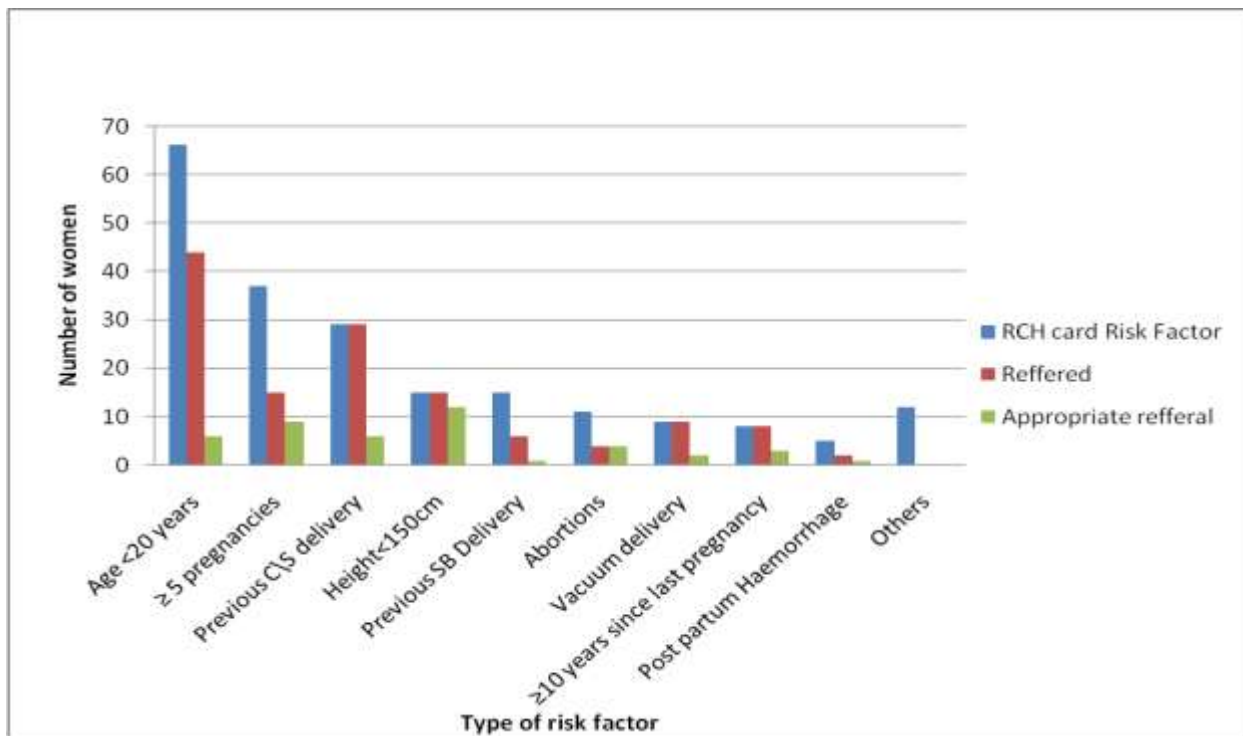


Table 4: Factors associated with provision of appropriate referral advice among women identified with pregnancy risk factors in Antenatal Clinics in selected health facilities in Kilombero District, Morogoro region, 2018

Variable	Appropriate referral advise		X ² (p-value)	COR(95% CI)	AOR(95%CI)
	Yes(n=44)	No(n=88)			
Age					
<20	9(31.0%)	20(69.0%)		1.0	-
20-35	27(32.1%)	57(67.9%)	0.78(0.677)	1.08(0.40 -2.94)	
>35	8(42.1%)	11(57.9%)		1.98(0.35 -2.68)	
Gravidity					
1	12(26.1%)	34(73.9%)	0.20(0.246)	1.0	-
2-4	23(34.3%)	44(65.7%)		0.84(0.46 -1.51)	
≥5	9(47.4%)	10(52.6%)		1.76(0.62- 1.76)	
Parity					
0	12(21.8%)	43(78.2%)		1.0	1.0
1-4	27(42.4%)	39(57.6%)	5.78(0.054)	2.04(0.51 -8.18)	1.71(0.36- 7.95)
≥5	5(36.4%)	6(63.6%)		1.77(0.20 -2.90)	0.82(0.35- 1.90)
Had risk in previous pregnancy					
No	5(19.2%)	21(80.8%)	2.89(0.289)	1.0	-
Yes	39(36.8%)	67(63.2%)		1.83(0.35- 1.95)	
GA of woman at first ANC visit					
≤12weeks	9(27.3%)	24(72.7%)		1.0	1.0
13-24 Weeks	28(31.1%)	62(68.9%)	8.74(0.013)	1.20(0.48 -2.99)	1.78(0.32- 9.65)
≥24 Weeks	7(77.8%)	2(22.2%)		7.15(1.81-33.28)	3.40(1.60- 19.14)
No. of Antenatal visits					
1	13(50.0%)	13(50.0%)		5.35(0.54 -6.34)	3.20(0.29 -4.93)
2	13(20.0%)	52(80.0%)	7.27(0.010)	1.0	1.0
3	12(40.0%)	18(60.0%)		4.98(1.72 -10.31)	4.80(1.26 -10.21)
≥4	6(54.5%)	5(45.5%)		8.03(2.66 – 8.22)	9.80(4.44 -10.25)
Educational Level of woman					
No Formal	2(16.7%)	10(83.3%)		1.0	1.0
Primary	29(29.3%)	70(70.7%)	9.94(0.007)	1.88(0.20 -11.78)	3.92(1.47 -10.46)
Secondary	13(61.9%)	8(38.1%)		16.52(1.20-17.64)	8.12(1.40 -16.99)
Level of facility					
Dispensary	22(47.8%)	24(52.2%)	6.67(0.010)	1.85(1.29 -2.50)	1.37(1.17 -1.79)
Health Centre	22(25.6%)	64(74.4%)		1.0	1.0
Cadre of attending HCP					
Form IV- RN	5(15.4%)	22(84.6%)	4.79(0.201)	1.0	1.0
STD VII – EN	22(36.5%)	40(63.5%)		1.58(0.29- 2.53)	0.91(0.21- 3.95)
Form IV- EN	17(39.5%)	26(60.5%)		2.38(1.12- 5.05)	1.45(0.40- 5.30)

Factors associated with provision of appropriate referral advice among women identified with pregnancy risk factors in Antenatal Clinics in selected health facilities in Kilombero District.

Table 4 above shows bivariate and multivariate analysis of factors associated with provision of appropriate referral advice among pregnant women seen in Antenatal Clinics, below is summary of the results.

In Bivariate analysis, age of the woman was not associated with receiving appropriate referral advice ($p=0.677$), likewise with gravidity ($p=0.246$) and Parity ($p=0.054$). Having had risk in previous pregnancy was also not associated with receiving appropriate referral advice ($p=0.289$), however gestational age, number of antenatal visits and education level of the mother were significantly associated with receiving of appropriate referral advice, ($p=0.013$), ($p=0.010$) and respectively ($p=0.007$). Similarly with level of facility attended by the respondents was found to be associated with provision of appropriate referral advice ($p = 0.010$), although level of education of the attending healthcare provider was not ($p=0.201$).

Results of multivariate analysis show that women with gestation age of ≥ 24 weeks had higher odds (AOR=3.40; 95% CI = 1.60 – 19.14) of receiving appropriate referral advice compared to those with lower gestation age. Findings also show that three or more number of antenatal visits had almost 5-fold higher odds of being provided with appropriate referral advice (AOR=4.80; 95% CI = 1.26 – 10.21) as compared to those with less number of antenatal visits. Compared to women with no formal education, women who had secondary level education had significantly higher odds (AOR=8.12; 95% CI = 1.40 – 16.99) of receiving appropriate referral advice.

Regarding level of facility, women who attended Antenatal Clinics at dispensary level had higher odds (AOR=1.37; 95% CI = 1.17 – 1.79) of being provided with appropriate referral advice as compared to those seen at health centres but the difference was not statistically significant. In addition women who were attended by form IV enrolled nurses had higher odds of being provided with appropriate referral advice as compared to women who were attended by form four registered nurses (AOR=1.45; 95CI = 0.40 – 5.30) , however this association was not statistically significant.

4.4 Distribution of essential equipment and supplies for Antenatal risk screening in the selected health facilities

Availability of 24 essential equipment and supplies needed for antenatal risk screening were assessed during the study. Out of 30 health facilities visited, 16(53%) had between 12(50%) and 23 (96%) of the 24 essential equipment and supplies needed for antenatal care available in their health facilities. Almost half 14(47%) of the health facilities had less than 50% of the 24 essential equipment and supplies available. None of the facilities had all 24 essential equipment and supplies for antenatal care services. **(See Appendix 2 for more details)**

Table 5 shows availability of each item, (commonly available and least available). Only 15(50%) of the health facilities visited had functioning Sphygmomanometer machines and measuring boards available. Majority of Health facilities visited had no necessary supplies needed for laboratory Investigation. Less than 50% of all facilities had Hemoglobin level test, grouping and Rhesus factor, VDRL for syphilis and sugar for urine test available. Only 15(50%) of all facilities had urine albumin test available and 14(47%) of all facilities had an ambulance or transport for referral cases.

Table 5: Proportion of health facilities with essential equipment and supplies for Antenatal risk screening in the selected health facilities in Kilombero District, Morogoro region, 2018

Distribution of equipment and supplies	N=30	% Percent of facilities with the equipment
EQUIPMENT		
Thermometer	22	73
Stethoscope	28	93
Sphygmomanometer	15	50
Weighing scale	28	93
Measuring board (Height)	15	50
Measuring tape (Fundal Height)	26	87
Foetalscope	30	100
Gloves	28	93
LAB INVESTIGATION		
Malaria parasite Test (RDT)	26	87
Hemoglobin level test	12	40
Grouping and Rhesus factors	12	40
VDRL for syphilis	6	20
HIV testing	30	100
Albumin in Urine	15	50
Sugar in Urine	14	47
DRUGS AND SUPPLIES		
Ferrous sulphate/Folic Acid	18	60
Antimalarials	22	73
Tetanus Toxoid	28	93
Mebendazole	28	93
RCH4 cards stock	22	73
Examination Bed	30	100
Examination room with privacy	25	83
Ambulance or transport for referral cases	14	47

Shortage of equipment and supplies needed for ANC in the health facilities may have contributed to poor risk screening and hence missing the risk factors. For example category C pregnancy risk factors could not be assessed due to the fact that they were not measured in most health facilities. Re-testing of risk factors that required laboratory investigations was also not done.

CHAPTER FIVE

5.0 DISCUSSION

5.1 Proportion of women with pregnancy risk factors

This study revealed that, there is high proportion of women with pregnancy risk factors which are not picked during ANC visits or are not properly recorded on their RCH4 cards. The importance of screening for risk factors during pregnancy is well known and aims to identify any pre-existing factors that could increase the risk of complications to the mother or infant during pregnancy or delivery. For screening to be effective women have a role to provide reliable information to the health care provider but also healthcare providers need to have knowledge on the risk factors and should correctly record the identified risk factors on the RCH4 card. A study done in southern part of Tanzania on quality of antenatal care found significant proportion of women were not checked for risk factors(4). The same was revealed in a study done in Zimbabwe which showed that 32% of pregnant women who were seen at antenatal clinics in rural Zimbabwe had one or more risk factors missed during their antenatal visits (3). The identification of women with obstetric risk factors is recognized as a major goal of the antenatal care especially in developing countries, but more needs to be done to make sure that all risk factors are identified during ANC and women are referred according to the RCH4 guideline(21)(30).

5.2 Factors associated with missed pregnancy risk factors

This study looked on maternal factors which may influence identification of risks among pregnant women. Findings showed that women who had no risks in their previous pregnancies were more prone to be overlooked by the healthcare providers, probably because they assumed that these women were not at risk. In this study education level of the mother was found to influence the identification of risks among the women; those women with primary or secondary level education had lower chances of being missed compared to those with no formal education. It is well known that being educated plays a major role in boosting individual's confidence, hence women who were educated stood a better chance of understanding what the healthcare provider was doing and ask questions regarding their progress, which probably prompted the provider to properly examine these women. On the other hand women with no formal education were less likely to question or even read what was documented in their antenatal cards (23)(31).

A study done in rural Gambia with majority of the respondents having no formal education showed that, only one quarter of pregnant women seen at ANC were told about the progress of their pregnancy and an even smaller proportion of clients (12.8%) asked their provider any question (32). Findings from this study also show that women who had less than four antenatal visits were more likely to have missed pregnancy risks; this could be due to the fact that those with more number of ANC visits stood a greater chance of pregnancy risk factors being picked during the subsequent visits. These findings are similar to those from a study done in Rufiji southern Tanzania which revealed that women who had attended ANC more than three times during the period of pregnancy were more likely to have a chance of pregnancy risk factors being picked at early stages of pregnancy (9).

5.3 Proportion of women with appropriate referral advice

Generally in low resource settings including Tanzania often risk factors are identified and no further action is taken which renders the whole process of risk screening ineffective (4). This was proved to be true in this study as well; results showed that there was a very low provision of appropriate referral advice to those women who were found to have pregnancy related risk factors during ANC visits. It was observed that only 33.3% of all women identified to have risk pregnancies were actually given appropriate referral advice. These findings are similar to those found in a study done in Rufiji, southern Tanzania which found that only 28% of women who were booked for antenatal care in the primary care facilities were referred to hospitals (4). This proportion is lower compared to other studies in developing countries which have shown higher proportions of women needing referred (33). Similar results have also been documented in Bagamoyo district, Tanzania, they found that 76.4% of the women had at least one or more risk factors identified in their RCH4 cards, but only 34.6% were referred (20). In this study, they reported that one way of reducing intrapartum referrals is to improve antenatal identification of risk factors and provision of appropriate referral to a place where proper intervention is available (34)(35).

5.4 Factors influencing provision of appropriate referral advice

Among factors that were found to be associated with provision of appropriate referral advice was gestational age of pregnancy. Women with gestation age of more than 24 weeks had a higher proportion which received appropriate referral advice than others. Most pregnancy complications are usually noted as the pregnancy advances, hence healthcare providers tend to be extra vigilant to take action, although most of the women don't comply unless they have clinical symptoms(4). Findings also show that three or more number of antenatal visits had an influence of being provided with appropriate referral advice as compared to those with less number of antenatal visits. Our results are consistent with another study done in Kivu district, Democratic republic of Congo which showed that women with higher number of antenatal clinic visits were more likely to receive referral as compared to those with less visits (23). According to the ANC guideline in Tanzania, women are screened for risk factors in every visit and hence the more visits the woman have, the more likely that the risk factors will be picked and referred appropriately. In this study education level of the mother was also found to have influence on the provision of appropriate referral advice by the healthcare providers. It was observed that women who were educated were more likely to be provided with appropriate referral advice as compared to those with no formal education. This finding might be due to the fact that women who are educated are more aware of the risk factors, hence more likely to provide information regarding their pregnancy experience or complications. Women with no education on the other hand would most likely depend on what the healthcare provider will ask. This is in accordance with studies done in other parts of the Tanzania which revealed same results (4) (8) (9).

This study revealed that women who attended Antenatal clinics at dispensary level had slightly higher chance of being provided with appropriate referral advice as compared to those seen at Health centres and the reason could be due to the low number of clients seen at dispensary level compared to health centre. This may contribute due to the fact that healthcare providers at dispensary level may have extra time to examine and provide appropriate referral to their clients(32) as the workload is much less compared to those attending at the health centre. A study done by Claudia Von Both et al, which analyzed the time healthcare providers spend on provision of antenatal care per client supports our findings, they observed that, the higher the number of clients in the antenatal clinic the shorter the time a health care provider spends with each client (36).

5.5 Availability of Essential ANC equipment

Essential supplies and equipment are needed to identify some of the risk factors. Findings showed a lack of key equipment and supplies for ANC in the health facilities. For example risk factors which require laboratory investigations were not done for most of women interviewed. We speculated that this could probably explain for the low proportion of women with such risk factors. It has been observed that, in countries where laboratory services are available, women with identified pregnancy risk factors is as high as 70% (11)(37). The same findings are also observed in other studies as well. A study done in Rufiji district in Tanzania revealed that few women were referred from antenatal clinics to hospital because of anemia (2.7%) and elevated blood pressure (2.3%) in spite of the high prevalence of anemia in pregnancy in the region. It was speculated that it could be due to lack of capacity of the health facility to screen for these conditions. It was further noted that 52% of women with elevated blood pressure ($\geq 140/90$ mmHg) were not detected (24). Tanzania Service Provision Assessment (TSPA) 2014-2015 also revealed that with the exception of HIV testing, the basic laboratory tests important for ANC are lacking in most facilities that offer ANC; the range is from 52 percent having the capacity for syphilis testing to just one percent able to do blood grouping and Rhesus factor. Furthermore Hemoglobin testing is available, on average, in only three of ten ANC facilities(25). In another study by Mpembeni et al, the same was observed, reagents for laboratory tests and drugs as outlined in the focused ANC guidelines were often out of stock in most facilities(38). Results from our study also revealed only 47% of all facilities had an ambulance or emergency transport for referral cases. This could probably explain for the very low number of women who were given referral. Studies show that provision of referral advice is associated with availability of essential antenatal equipment and an ambulance. Facilities that have an ambulance are more likely to refer clients to higher levels of care for more specialized management(16).

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

This study found a high proportion of women with missed risk pregnancies in Kilombero districts. This renders antenatal care services to be ineffective in ensuring that women who are likely to have complications are picked early and referred to facilities with emergency obstetric care services. Identification of the risk factors was influenced by the number of antenatal visits the woman attended, her education level and History of having risks in previous pregnancies. Level of health facility and the cadre of the Healthcare provider had no influence on missing of the pregnancy risk factors. A higher proportion of missed risk factors were demographic characteristics like age below 20 years and parity which may indicate the preference of health care providers in specific risk factors. Moreover the study found that a relatively low proportion of those identified are given appropriate referral advice. Level of facility attended by the woman, gravidity, number of antenatal visits and education level of the woman were associated with being provided with appropriate referral advice. Furthermore this study revealed that health facilities in the district do not have adequate essential supplies and equipment to provide proper antenatal care services, a condition which may be contributing greatly to failure to diagnose the risk factors and hence missing the risk pregnancies.

6.2 Recommendations

1. The MoHCDGEC and PORALG should ensure that health providers providing antenatal care are trained on FANC in order to ensure that they have skills on risk screening and referral of at risk pregnancies
2. Women should be made aware of the importance of communicating personal characteristics/obstetric history which is used to identify risk status to the health care providers
3. The MoHCDGEC may consider conducting further studies to assess the sensitivity of the risk factors listed in the RCH4 card and maintain only those which are likely to lead to complications
4. Further studies need to be conducted to assess the effectiveness of the RCH4 card as a guideline used to identify and refer women with pregnancy risks in Antenatal clinics across the country
5. The MoHCDGEC should ensure that health facilities are well equipped and have essential supplies to enable provision of quality ANC risk screening services

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APPENDICES

Appendix 1: Summary of distribution of pregnancy risk factors recorded on RCH4 card, Risk factors picked during examination, Risk factors recorded from ANC but not picked during examination and missed risk factors among women who were studied.

Distribution of Risk factors	Number of risk factors recorded on RCH4 card	Number of risk factors picked on Examination	Number of risk factors recorded on ANC but not picked on re-examination	Number of Missed Risk Factors
Age below 20 years	66	95	40	69
Ten or more years since last pregnancy	8	25	6	23
Previous caesarean section delivery	29	38	20	29
Previous stillbirth/perinatal death (within one week)	15	32	11	28
Three or more consecutive abortions	11	28	6	23
Heart disease	3	1	3	1
diabetes mellitus	2	2	2	0
Tuberculosis	3	3	3	0
≥5 pregnancies	37	52	18	33
Height <150 cm	15	56	10	50
Pelvic deformity	1	4	0	3
First pregnancy at 35 or more years	2	2	2	0
Previous caesarean section or vacuum delivery	9	20	8	19
Postpartum hemorrhage in previous delivery	5	14	4	13
Retained placenta in the previous delivery	1	6	1	6
Total risk factors picked	207	376	134	297
Total women with at least one risk factor	132	230	83	185
% of women with at least one risk factor	31.5%	55.0%	19.8%	44.3%

Appendix 2: Proportion of essential equipment and supplies for Antenatal risk screening available in the selected health facilities in Kilombero District, Morogoro region

S/N	Name of health facility	Number of Functioning Essential ANC equipment and supplies available out of 24 required.	Percentage (%) of Functioning Essential ANC equipment and supplies available
1	Namwawala Dispensary	6	25
2	Ngalimila Dispensary	8	33
3	Taweta Dispensary	8	33
4	Sonjo Dispensary	9	38
5	Katulukila Dispensary	9	38
6	Mpanga Dispensary	10	42
7	Udagaji Dispensary	10	42
8	Mchenga Dispensary	10	42
9	Sanje Dispensary	10	42
10	Signalil Dispensary	10	42
11	Mkangawalo Dispensary	11	46
12	Mwaya Dispensary	11	46
13	Sagamaganga Dispensary	11	46
14	Ipinde Dispensary	11	46
15	Chita Dispensary	12	50
16	Ilovo Dispensary	12	50
17	Kiberege Dispensary	12	50
18	Kidatu Dispensary	12	50
19	Mchombe Dispensary	12	50
20	Idete Dispensary	13	54
21	Ikule Dispensary	13	54
22	Kisegese Dispensary	13	54
23	Katulukila Dispensary	14	58
24	Mbingu Dispensary	14	58
25	Kisawasawa Dispensary	16	67
26	Mgeta Dispensary	16	67
27	Mkamba Dispensary	17	71
28	Mlimba H/C	19	79
29	Ikwambi H/C	19	79
30	Ilovo Hospital	23	96

Appendix 3: Checklist for identified risk factors and referral indication given from RCH4 card by the healthcare provider

Date [__ __] – [__ __] – [2018]

Respondents ID #

Interviewer's initial [__ __]

Name of the facility [_____]

Level of facility [_____]

Location [_____]

Facility ownership [_____]

Distance (km) to the referral facility [_____]

Instruction: Please fill in the empty blanks or Tick on the box for the right answer.

SECTION ONE.

Background characteristics.

SN	Indicator Assessed	Record the indicator as written on the RCH4 card
1	Age	
2	Height	
3	Education	
4	Marital status	
5	occupation	
6	gravidity	
7	parity	
8	Number of children alive	
9	Gestational Age	
<i>Category A Risk factors: Tick on the right hand side box if any of the below listed risk factors detected on the mothers RCH4 card</i>		
10	Age below 20 years	
11	Ten or more years since last pregnancy	
12	Previous caesarean section delivery	

13	Previous stillbirth/perinatal death (within one week)	
14	Three or more consecutive abortions	
15	Heart disease	
16	diabetes mellitus	
17	Tuberculosis	
If one or more of these risk factors are identified write the referral advice provided		
<i>Category B risk factors: Tick on the right hand side box if any of the below listed risk factors detected on the mothers RCH4 card</i>		
18	≥5 pregnancies	
19	Height <150 cm	
20	Pelvic deformity	
21	First pregnancy at 35 or more years	
22	Previous caesarean section or vacuum delivery	
23	Postpartum hemorrhage in previous delivery	
24	Retained placenta in the previous delivery	
If one or more of these risk factors are identified write the referral advice provided		
<i>Category C risk factors: Tick on the right hand side box if any of the below listed risk factors detected on the mothers RCH4 card</i>		
25	Blood pressure ≥140/90 mmHg	
26	Hemoglobin less than 60% (8.5 gm/dl)	
27	Albumin in urine	
28	Sugar in urine	
29	Gestational age more than 40 weeks	
30	Intrauterine foetal death	
31	Abnormal lie after 36 weeks	
32	Oedema of the legs, face and hands	
33	Suspected twin pregnancy	
34	Fundal height too big or too small for gestation age	
If one or more of these risk factors are identified write the referral advice provided		
Where has the mother been advised to deliver? (Record)		
Qualification and cadre of attending Healthcare provider		

Appendix 4: Checklist for risk factors identified during re-examination of the woman

Date [__ __] – [__ __] – [2018]

Respondents ID #

Interviewer's initial [__ __]

Name of the Health facility [_____]

Level of facility [_____]

Location [_____]

Facility ownership [_____]

Distance (km) to the referral facility [_____]

Instruction: Please fill in the empty blanks or Tick on the box for the right answer.

Background characteristics.

SN	Indicator Assessed	Ask/Re-examine the woman and Record the indicator
1	Age	
2	Height	
3	Education	
4	occupation	
5	gravidity	
6	parity	
7	Number of children alive	
8	Gestational age	
<i>Category A Risk factors: Tick on the right hand side box if any of the below listed risk factors detected during re-examination</i>		
9	Age below 20 years	
10	Ten or more years since last pregnancy	
11	Previous caesarean section delivery	
12	Previous stillbirth/perinatal death (within one week)	
13	Three or more consecutive abortions	
14	Heart disease	

15	diabetes mellitus	
16	Tuberculosis	
<i>Category B risk factors: Tick on the right hand side box if any of the below listed risk factors detected during re-examination</i>		
17	≥5 pregnancies	
18	Height <150 cm	
19	Pelvic deformity	
20	First pregnancy at 35 or more years	
21	Previous caesarean section or vacuum delivery	
22	Postpartum hemorrhage in previous delivery	
23	Retained placenta in the previous delivery	
<i>Category C risk factors: Tick on the right hand side box if any of the below listed risk factors detected during re-examination</i>		
24	Blood pressure ≥140/90 mmHg	
25	Hemoglobin less than 60% (8.5 gm/dl)	
26	Albumin in urine	
27	Sugar in urine	
28	Gestational age more than 40 weeks	
29	Intrauterine foetal death	
30	Abnormal lie after 36 weeks	
31	Oedema of the legs, face and hands	
32	Suspected twin pregnancy	
33	Fundal height too big or too small for gestation age	

Appendix 5: Questionnaire for mothers attending ANC (English Version)

Date [__ __] - [__ __] - [2018]

Respondents ID # □□□

Interviewer's initial [__ __]

Name of the health facility [_____]

Level of facility [_____]

Location [_____]

Facility ownership [_____]

Distance (km) to the referral facility [_____]

Instruction: Please fill in the empty blanks or circle the right answer.

Ask if the mother has an antenatal card before proceeding.

SECTION ONE**DEMOGRAPHIC AND SOCIOECONOMIC CHARACTERISTICS**

Let us start our discussion by getting important information about you

1. Date of birth _____ Age in year's [__ __] (Record right age)
2. Religion
 - 1 = Muslim
 - 2 = Christian
 - 3 = other, specify
3. What is your marital Status?
 - 1 =Married/Cohabiting
 - 2 =Single
 - 3 =Separated/divorced
 - 4 = Widowed

4. What is your highest education level?

- 1 = never attended school/no formal education
- 2 = did not complete primary school education
- 3 = completed primary school education
- 4 = did not complete secondary school education
- 5 = completed secondary school – ordinary level
- 6 = did not complete high school – advance level
- 7 = completed high school- advance level
- 8 = Post-secondary/tertiary education

5. Main Occupation

- 1 = Housewife
- 2 = Peasant
- 3 = Business
- 4 = Employment
- 8 = other, specify

6. How far is your home from the Antenatal Clinic?

(Interviewer circle district applicable)

- 1 = within one km distance
- 2 = less than 5 km distance
- 3 = more than 5 km distance

7. How far is your home from the Referral Hospital?

(Interviewer circle district applicable)

- 1 = Less than 10 km
- 2 = Between 10 and 50 km
- 3 = More than 50km

SECTION TWOREPRODUCTION HISTORY

5. What is the gestational age of this pregnancy?

1= Less than 3 months pregnant

2= between 3 and 6 months pregnant

3= More than 6 months pregnant

6. How many Antenatal visits have you had in this pregnancy?

1= 1

2= 2

3= 3

4= 4

5= >4

7. When did you start attending Antenatal Clinic in the index pregnancy?

1= less than 3 months pregnant

2= between 3 and 6 months pregnant

3= more than 6 months pregnant

8. How many pregnancies have you had in your life time?

1= 1

2= 2-4

3= ≥ 5

9. How many children have you delivered?

1= 1

2= 2-4

3= ≥ 5

10. Do you have history of abortion?

1= Yes

2= No

11. Do you have history of bleeding in the recent pregnancy?

1= Yes

2= No

12. Do you have history of bleeding in previous pregnancy?

1= Yes

2= No

13. Do you have any pregnancy related health problems in this pregnancy?

1=Yes

2=No

If yes proceed to Qn. 14, if no, proceed to Qn. 16.

14. Where the health problems diagnosed during your antenatal visits?

1=Yes

2=No

If yes, go to Qn. 15, if No, Proceed to Qn. 16

15. Did the health providers explain to you regarding health problems which were diagnosed during your antenatal visits?

1=Yes

2=No

16. Did you receive any referral advice or document from the Antenatal Clinic to higher level of care?

1=Yes

2=No

17. What were the reasons of referral provided by the Antenatal Clinic staff?

1= Presence of risk factors

2= Lack of delivery services at the attended clinic

3= I don't know

Appendix 6: Questionnaire for mothers attending ANC (Swahili Version)

Tarehe [__ __] - [__ __] - [2018]
 Namba ya utambulisho ya mshiriki □□□
 Herufi za majina ya mwanzo ya msaili [__ __]
 Jina la Hospitali [_____]

.Maelekezo:Tafadhali jaza sehemu iliyo wazi au zungushia jibu lililo sahihi

Muulize mama kama ana kadi ya kliniki kabla ya kuendelea.

SEHEMU YA KWANZA**TAARIFA ZA KIDEMOGRAFIA NA UCHUMI**

Tafadhali naomba tuanze mazungumzo yetu kwa kupata taarifa muhimu kuhusu wewe binafsi

1. Mwaka wa kuzaliwa _____ Umri (miaka) [__ __] (Umri sahihi)
2. Je wewe ni Dini gani?
 1 = Muislamu
 2 = Mkristo
 3= Dini nyingine, taja
3. Hali yako ya ndoa ni ipi?
 1 =Nimeoa/olewa, naishi na mwenzi wangu wa jinsia tofauti nyumba moja
 2 =Sijaoa/sijaolewa
 3 =Mtalaka/tumetengana
 4 = Mjane

4. Kiwango chako cha juu cha elimu ni kipi?

1 = Sijaenda shule kabisa

2 = Sikumaliza elimu ya msingi

3 = Nimemaliza elimu ya msingi

4 = Sikumaliza elimu ya sekondari

5 = Nimemaliza elimu ya sekondari

6 = Sikumaliza elimu ya juu ya sekondari

7 = Nimemaliza elimu ya juu ya sekondari

8 = Elimu ya juu/chuo

5. Chanzo chako kikuu cha mapato ni nini?

1 = Mama wa nyumbani

2 = Mkulima

3 = Mfanyabiashara

4 = Mwajiriwa

8 = Nyingine, taja

6. Je kuna umbali gani kutoka nyumbani mpaka kliniki ya wajawazito unayohudhuria?

1 = kilomita tano

2 = chini ya kilomita tano

3 = zaidi ya kilomita tano

7. Je kuna umbali gani kutoka nyumbani mpaka hospitali ya rufaa?

1 = chini ya kilomita kumi

2 = Kati ya kilomita kumi na kilomita hamsini

3 = zaidi ya kilomita hamsini

SEHEMU YA PILI**HISTORIA YAKO YA UZAZI**

8. Je ujauzito wako una miezi mingapi ?

1 = chini ya miezi mitatu

2 = Kati ya miezi mitatu na miezi sita

3 = zaidi ya miezi sita

9. Je katika ujauzito wako huu, umeshahudhuria kliniki ya wajawazito mara ngapi?

1= 1

2= 2

3= 3

4= 4

5= >4

10. Je ni katika umri gani wa mimba yako hii ulianza kliniki ya wajawazito?

1= chini ya miezi 3

2= Kati ya miezi 3 na 6

3= zaidi ya miezi sita

11. Je ni mimba ngapi ambazo umeshawahi kupata katika maisha yako?

1= 1

2= 2-4

3= ≥ 5

12. Je umeshawahi kuzaa mara ngapi?

1= 1

2= 2-4

3= ≥ 5

13. Je una historia yoyote ya mimba kuharibika?

1= ndio

2= hapana

14. Je una historia yoyote ya kutokwa na damu wakati wa ujauzito huu?

1= ndio

2= hapana

15. Je una historia yoyote ya kutokwa na damu katika mimba zilizopita?

1= ndio

2= hapana

16. Je katika ujauzito wako huu, umepata matatizo yoyote ya kiafya kwasababu ya ujauzito?

1= ndio

2= hapana

Kama jibu ni Ndio, nenda swali namba 17, kama Hapana nenda swali namba 20

17. Je matatizo haya ya kiafya katika ujauzito huu yaligundulika wakati unahudhuria kliniki?

1= ndio

2= hapana

Kama jibu ni Ndio, nenda swali namba 18, kama Hapana nenda swali namba 20

18. Je wahudumu wa afya walikuelezea kuhusu matatizo haya ya kiafya yanayohusianana na ujauzito huu, ambayo yaligundulika wakati unahudhuria kliniki?

1= ndio

2= hapana

Kama jibu ni Ndio, nenda swali namba 19, kama Hapana nenda swali namba 20

19. Je ni matatizo gani ya kiafya yanayohusiana na ujauzito huu ambayo wahudumu wa afya walikuelezea?

20. Je ulipewa/umepewa rufaa kutoka kliniki kwenda Hospitali kwa matibabu zaidi?

1= Ndio

2= Hapana

21. Je, ni sababu zipi ulizoelezwa na watumishi wa afya zilizosababisha upewe rufaa?

1= Matatizo ya kiafya yanyohusiana na ujauzito huu

2= Kukosekana kwa huduma za kujifungua katika kliniki uliyohudhuria

3= Sijui

Appendix 7: Checklist for Availability of Essential ANC equipment and supplies

Date [__ __] - [__ __] - [2018]

Respondents ID # □□□

Interviewer's initial [__ __]

Name of the health facility [_____]

Level of facility [_____]

Location [_____]

Facility ownership [_____]

Distance (km) to the referral facility [_____]

Instruction: Please tick in the box for the right answer.

FOCUSED ANTENATAL CARE CHECKLIST FOR EQUIPMENTS AND SUPPLIES		
EQUIPMENTS	AVAILABLE	NOT AVAILABLE
Thermometer		
Stethoscope		
Sphignometer		
Weighing scale		
Measuring board (Height)		
Measuring tape (Fundal Height)		
Foetalscope		
Gloves		
LAB INVESTIGATION		
Malaria parasite Test (RDT)		
Hemoglobin level test		
Grouping and Rhesus factors		
VDRL for syphilis		
HIV testing		
Albumin in Urine		
Sugar in Urine		
DRUGS AND SUPPLIES		
Ferrous sulphate		
Folic acid		
Antimalarials		
Tetanus Toxoid		
Mebendazole		
RCH4 cards stock		
Examination Bed		
Examination room with privacy		
Ambulance or transport for referral cases		

