Effect of Home Based Life Saving Skills education on knowledge of obstetric danger signs, birth preparedness, utilization of skilled care and male involvement

A Community-based intervention study in rural Tanzania

FURAHA AUGUST
Dissertation presented at Uppsala University to be publicly examined in Rosensalen, Akademiska sjukhuset, Entrance 95/96, Uppsala, Thursday, 3 March 2016 at 09:15 for the degree of Doctor of Philosophy (Faculty of Medicine). The examination will be conducted in English. Faculty examiner: Professor Albrecht Jahn (Institute of Public Health, University of Heidelberg).

Abstract

Use of skilled care during antenatal visits and delivery is recommended to address the burden of maternal mortality. However there are few facility deliveries and insufficient knowledge of danger signs, especially in rural Tanzania.

The aim of this thesis was to explore the perceptions and challenges that the community faces while preparing for childbirth and to evaluate an intervention of the Home Based Life Saving Skills education programme on knowledge of danger signs, facility delivery and male involvement when delivered by rural community health workers in Tanzania.

In Paper I, Focus Group Discussions explored the perceptions and challenges that the community encounters while preparing for childbirth. Structured questionnaires assessed men’s knowledge of danger signs and birth preparedness and complication readiness in Paper II. The effect of the Home Based Life Saving Skills education programme in the community was assessed with a before-and-after evaluation in two districts; one intervention and one comparison. Paper III assessed the effect of the programme on knowledge of danger signs and birth preparedness and facility delivery among women, while Paper IV evaluated its effect on male involvement.

The community perceived that all births must be prepared for and that obstetric complication demands hospital care; hence skilled care was favoured. Men’s knowledge of danger signs was limited; only 12% were prepared for childbirth and complications. Preparedness was associated with knowledge of obstetric complications (AOR=1.4 95% CI 1.8 – 2.6). The intervention showed women utilizing antenatal care (four visits) significantly more (43.4 vs 67.8%) with a net effect of 25.3% (95% CI: 16.9 – 33.2; p < .0001). The use of facility delivery improved in the intervention area (75.6 vs 90.2%; p = 0.0002), but with no significant net effect 11.5% (95% CI: -5.1 – 39.6; p = 0.123) when comparing the two districts. Male involvement improved (39.2% vs 80.9%) with a net intervention effect of 41.1% (CI: 28.5 – 53.8; p < .0001). Improvements were demonstrated in men’s knowledge level, in escorting partners for antenatal care and delivery, making birth preparations, and shared decision-making.

The intervention, in educating this rural community, is effective in improving knowledge, birth preparedness, male involvement and use of skilled care.

Keywords: Birth Preparedness and Complication Readiness, Obstetric danger signs, Male Involvement, Community Health Workers, Maternal Health, Rural, Tanzania

Furaha August, Department of Women’s and Children’s Health, International Maternal and Child Health (IMCH), Akademiska sjukhuset, Uppsala University, SE-75185 Uppsala, Sweden.

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urn:nbn:se:uu:diva-272245 (http://urn.kb.se/resolve?urn=nbn:se:uu:diva-272245)
To my parents, my wife Abella and my daughters Siriel and Shannen
List of Papers

This thesis is based on the following papers, which are referred to in the text by their Roman numerals.


III. **August F**, Pembe AB, Mpembeni R, Axemo P, Darj E: Effectiveness of the Home Based Life Saving Skills training by community health workers on knowledge of danger signs, birth preparedness, complication readiness and facility delivery, among women in Rural Tanzania. *Submitted*


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<td>Antenatal Care</td>
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<td>AMO</td>
<td>Assistant Medical Officer</td>
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<td>BEmOC</td>
<td>Basic Emergency Obstetric Care</td>
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<td>BP/CR</td>
<td>Birth Preparedness and Complication Readiness</td>
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<td>CBO</td>
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<td>ICPD</td>
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<td>MDGs</td>
<td>Millennium Development Goals</td>
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<td>Ministry of Health and Social Welfare</td>
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<td>MMR</td>
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<td>NBS</td>
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Preface

Growing up as a young boy, I always wanted to become a doctor, but I never imagined I would ever become an obstetrician/gynaecologist. I think my parents inspired me, as both are doctors, my father being a paediatrician/neonatologist, and my mother an obstetrician/gynaecologist. I actually took a long route to arrive at medical school. In my secondary school, physics was not taught routinely as a subject. This subject is a prerequisite to enter medical school. I had to put in extra hours to study physics so that I could get enough credits to be accepted into the medical school.

In 2000, I was able to conclude my medical degree and graduated. One is always undecided about in which subject to specialise after medical school. After medical school I was employed to work as a paediatric surgeon. It was an exciting time but I still felt I was interested in doing obstetrics and gynaecology. Finally, I joined a master’s programme in obstetrics and gynaecology and graduated in 2007. I was then lucky enough to join the academic staff at Muhimbili University. I liked teaching and I enjoy interacting with my students. During my residency and afterwards, I have sadly witnessed how women who came to hospital, arriving late with complications, and later succumbed to death. It often bothered me and I was always thinking that there must be a way to prevent this problem. Something needed to be done to help these women before they experienced serious complications.

I was given an opportunity by the White Ribbon Alliance Tanzania Chapter to be trained as master trainer of Home Based Life Saving Skills. Consultants from the American College of Nurse Midwives conducted this training. I really liked this kind of training and I thought to myself that this might be one of the ways to educate the community on how to recognise danger signs, prepare for childbirth and, ultimately, travel to hospital for any life-threatening event on time.

When an opportunity came to pursue a PhD degree, I welcomed it and I decided that I would use my skills to design and conduct an intervention in a research setting in the rural area. This was to be done by educating the community on Home Based Life Saving Skills by deploying community health workers. It has been a rewarding experience and, of course, at times a challenging undertaking.
It is my hope this work will contribute towards improving the lives of our pregnant mothers and in empowering the community to take actions in case of emergencies, and, ultimately, to help in the prevention of maternal deaths in rural Tanzania.
Introduction

The global burden of maternal mortality

Maternal mortality is unsatisfactorily high and is a public health concern that is recognised worldwide. Several initiatives have been advocated in addressing this problem. These include; the 1987 Safe Motherhood Conference, the 1994 International Conference on Population and Development in Cairo, and the 1997 Safe Motherhood Technical Consultation in Sri Lanka (1). In addition, to reduce this staggering burden of death, the Millennium Development Goal (MDG) 5, target 5A was launched with the aim of reducing maternal mortality numbers by 75% between 1990 and 2015. Since 1990, the maternal mortality ratio has declined by 43% worldwide, with most of the decline occurring after 2000 (2). Although the maternal mortality ratio is decreasing globally, its reduction in sub-Saharan countries is proceeding at a much slower rate (1, 3). The average decline worldwide is 2.6% instead of the 5.5% that would have been necessary to contribute to achieving the MDG 5 worldwide (4).

It is estimated that in 2015, more than 303,000 women died from preventable complications related to pregnancy and childbirth, with most of these deaths occurring in low-income countries (1, 5). It was estimated that only 16 countries would achieve the MDG 5 by the year 2015 (6). Current data demonstrate that only 9 countries have reached MDG 5A; namely, Bhutan, Cape Verde, Cambodia, Iran, Laos, Maldives, Mongolia, Timor-Leste and Rwanda. Another 39 countries, including Tanzania, have made significant progress. However, these countries have not reached the goal of reducing maternal mortality by 75% (5). In September 2015, the new initiative of Sustainable Development Goals (SDG), specifically Goal number 3, was launched to reduce the maternal mortality ratio worldwide from 216 per 100,000 live births in 2015 to less than 70 per 100,000 live births by 2030. In addition to this target, there should be no individual country going beyond 140 maternal deaths per 100,000 live births (5, 7). It is the responsibility of each country to have clear political will and commitment to work towards improving health systems and access to quality of care, before, during and after childbirth in order to achieve the SDGs.
The direct causes of maternal mortality include haemorrhage, pregnancy-related hypertensive disorders, puerperal infections, obstructed labour, and abortion complications. These account for more than 70% of maternal deaths worldwide, while indirect causes, such as pre-existing conditions including HIV/AIDS, malaria, anaemia, cardiovascular diseases and diabetes, contribute to more than 28% of maternal deaths (4, 8). Evidence-based interventions, such as increasing access to skilled attendance during pregnancy and childbirth, timely access to emergency obstetric care, and access to family planning, are important in reducing maternal mortality (9-13). Most obstetric complications occur during childbirth and are unpredictable. Skilled attendance at birth is therefore the most critical strategy in order to significantly prevent maternal mortality (14).

One important indicator for MDG 5 was the proportion of births attended by skilled health workers. A skilled attendant is defined as someone who is "trained to proficiency in the skills needed to manage normal (uncomplicated) pregnancies, childbirth and the immediate postnatal period, and in the identification, management and referral of complications in women and newborns" (15). Mbizvo and Say reviewed factors that contributed to the decline in maternal mortality in Bangladesh, Bolivia, Cambodia, Morocco and Rwanda, and demonstrated that increased uptake of skilled attendance of between 20% and 50% was likely to have contributed to the decline in maternal mortality (16). However, rates of skilled attendance have changed little in sub-Saharan countries since the launch of the MDGs (2). Analysis of 54 countries completed by Barros and colleagues shows that wealth inequality remains high when it comes to utilisation of skilled attendance at birth (17). Several other factors are known to contribute to the non-use and low utilisation of skilled care, including physical distance, economic reasons, sociocultural factors and perceived need for the services, as well as quality of care (18-21).

In order to increase the use of skilled attendance, there is a need for interventions that increase supply and demand of the utilisation of these services. The supply side involves improvements in the provision of maternal health services; both in terms of staff number, training, accountability and equipment, and the demand side involves the perceived need of individuals or the community to utilise the services (22-24). An increase in utilisation of skilled maternity care can be achieved by providing birth preparedness information that empowers the community with knowledge about danger signs and ways to prepare for childbirth and emergency situations. An increased knowledge level is envisaged to reduce delays in seeking care, accessing care and even receiving appropriate care (25). Community-based interventions that provide education to women, men and the community have also
been shown to have potential to increase demand for utilisation of skilled care (26-28).

Birth preparedness and complication readiness

In order to make the family ready for childbirth and any obstetric emergency, the concept of birth preparedness and complication readiness (BP/CR) is currently advocated to be introduced to the communities (29). BP/CR involves acquiring knowledge about the danger signs, identifying a skilled attendant for childbirth, identifying which health facility to approach in an emergency situation, identifying transport to use in advance, having money set aside, and identifying a blood donor (29). When these steps are followed they are expected to reduce the three delays (delays in seeking care, reaching care and accessing care), and promote and increase utilisation of skilled care and obstetric emergency care. BP/CR messages aimed at individuals, families and communities would help with reducing the first two delays. Ensuring that health facilities and referral systems are prepared to manage normal labour and emergencies is crucial in reducing the third delay. Ultimately, this strategy will lead to a reduction in maternal mortality (25). BP/CR is included in the new World Health Organization (WHO) model for antenatal care education in a clinical setting (30, 31). Initiatives that promote BP/CR are described as compelling and as logical means to ensure the receiving of timely skilled care for delivery and in emergency obstetric care (32). The WHO recommends the use of community-based interventions to provide communities with BP/CR messages through home visits (33).

Counselling on danger signs and birth preparedness should be given during antenatal care (ANC) visits, as recommended by the WHO. However, women having little knowledge of danger signs have been reported in several studies conducted in Tanzania and other developing countries (34-36). In addition, studies from Ethiopia, Nigeria and Kenya have also shown women to have insufficient knowledge on birth preparedness and emergency readiness (37-40). This raises questions about whether facility-based dissemination of messages to increase awareness of danger signs can continue to be the only reliable means of conveying this knowledge, or whether there is a need to introduce other methods so as to involve the whole community. This could be done in new ways that go beyond the health facility by making members of the family and the community aware of the complications, as they participate in one way or another in the decision-making process when a complication occurs. Because decision-making for accessing or reaching care has been shown to be dominated by men (41-43), it is important to involve men in these strategies and regard them as partners.
Male involvement in maternal health

Men’s involvement in maternal and reproductive health has been encouraged for the last two decades (44). The programme of action of the 1994 International Conference on Population and Development (ICPD) emphasised the importance of men’s active inclusion and shared responsibilities in reproductive health (45). It has been demonstrated that there is elevated use of skilled attendance, use of contraceptives and antiretroviral treatment when men are involved (26, 46, 47). Women’s reproductive choices or outcomes depend on the financial power and support of their husbands. Participation in birth preparedness and partner involvement in the decision-making process have been reported to be factors affecting the choice of place of delivery in Uganda and Nigeria (39, 46). Studies completed in Malawi and Kenya point towards a growing number of men who take an interest and are keen to participate in maternal health if an environment conducive to their participation is provided at ANC (42, 48, 49). However, barriers that have been shown to impede male involvement include factors related to social, cultural and health services. Men may see pregnancy as ‘women’s business’, or they might feel shy, embarrassed or ‘out of place’ in the ANC clinic and this is due to gender norms that maintain the idea that it is unnecessary for men to be involved in pregnancy and post-partum periods (50-53). In addition, men may not have the necessary knowledge to understand the importance of engaging in active involvement with their spouse’s health during pregnancy and childbirth has also been identified as a barrier (53-55). An insufficient number of staff, inadequate training of health workers, and the policies in place at the health facilities regarding men’s participation are some of the known health system barriers (52, 53, 56, 57).

One of the strategies to increase male involvement is to improve men’s knowledge of obstetric danger signs and birth preparedness which eventually will make them better positioned to assist their spouses in making decisions regarding accessing ANC and delivery care. ANC have focused mainly on women who are traditionally not decision-makers and have no financial power (42, 58). It is therefore important to design interventions that involve men in maternal health and that accommodate both genders (59). Men should be regarded as partners in the programmes that involve maternal health by actively encouraging them to participate in ANC counselling, raising their awareness of danger signs, making shared decisions, and providing social support (60, 61). A community-based approach such as the Home Based Life Saving Skills (HBLSS) training programme can be one way to achieve this goal.
Community-based interventions for maternal and child health care

Community-based interventions have been shown to reduce neonatal and childhood mortality (62). Community-based packages that promote BP/CR messages in the community by using support groups and women’s groups have been found to be the most effective in reducing neonatal deaths (63). A Cochrane review of 2010 has shown that the interventions contributed to an increased rate in the initiation of breastfeeding (63, 64). A recent review of 26 randomised controlled trials and quasi-experimental studies completed in low-income countries on the effectiveness of community-based interventions in reducing maternal and neonatal morbidity and mortality has shown that there is a reduction in maternal mortality and morbidity, and an increase in institutional deliveries (65). The WHO now recommends the use of Community Health Workers in maternal and child health care following promising results in achieving reductions in neonatal mortality in low-income countries where such services have been implemented (66, 67).

The WHO defines Community Health Workers (CHWs) as “members of the communities where they work, selected by the communities, answerable to the communities for their activities, supported by the health system but not necessarily a part of its organization, and have shorter training than professional workers” (68).

In 2012, a campaign was introduced to train one million community health workers by the year 2015 in sub-Saharan countries (69). It aimed to complement the health system where CHWs would be compensated for their work and be supervised by the relevant authorities such as the Ministry of Health. Their work would be linked with primary health care and mostly geared towards achieving reduced maternal and perinatal mortality (MDGs 4 and 5). In addition, their work was meant to be facilitated by mobile phone technology in order to reach poor communities in rural areas (70).

Home Based Life Saving Skills

HBLSS is a programme developed and introduced by the American College of Nurse Midwives (ACNM) which involves the joint training of the pregnant woman, her partner and other family members (71, 72). The aim is to equip the immediate family members with knowledge in recognising life-threatening danger signs, make birth preparedness arrangements, promote health-seeking behaviour, and promote the acquisition of skills to help the woman if any problem occurs at home. The training is conducted through encouraging dialogue so that joint informed decisions can be made when the
need for action arises. HBLSS is a community competency-based programme that aims to reduce maternal and newborn mortality by increasing access to basic lifesaving measures within the home and community and decreasing delays in seeking and accessing care (71). The HBLSS was conceived as a component of the Community Partnership for Safe Motherhood Model. Previous studies, which were done in Bangladesh, Indonesia and Liberia, have shown that, by using HBLSS, community members acquired knowledge of danger signs and skills for helping a woman who has an obstetric complication to access care and receive a timely referral (27, 73-75).

HBLSS is implemented through a cascade training strategy and was introduced in Tanzania in 2007 where 24 health workers from various parts of the country were trained by ACNM consultants. The 24 health workers became master trainers. The training was provided in collaboration with the White Ribbon Alliance as advocacy in addressing the challenges of maternal mortality in Tanzania. The Ministry of Health and Social Welfare (MOHSW) supported the training. The master trainers then went on to train HBLSS trainers and they eventually trained HBLSS guides. The HBLSS guides were mainly health attendants who were working at health facilities. The HBLSS guides trained pregnant mothers together with other family members on HBLSS modules.

While the HBLSS programme is designed to be delivered in the community by health professionals, such as midwives, nurses or other health attendants, in this study project we trained community health workers as HBLSS guides instead.

United Republic of Tanzania

Tanzania is an eastern African country with a population of about 45 million inhabitants (76) with a population density of 51 per square kilometer. The annual population growth rate is 2.7%. With a total area of 945,000 square kilometers, Tanzania is the largest country compared to its neighbours in the west (Rwanda and Burundi), north (Kenya and Uganda), and south (Zambia, Mozambique and Malawi). To the east is the Indian Ocean where island of Zanzibar is located 30 kilometers from the mainland. One of the world’s most recognised landmarks in Tanzania is Mount Kilimanjaro, which, at 5,985 meters above sea level, is the tallest mountain in Africa (Figure 1).

Mainland Tanzania has 27 administrative regions, 133 districts and 1,632 councils. Each council is divided into divisions, which in turn are composed of three to four wards. The wards are composed of 5 – 7 villages. The local
Government councils are the most important local administrative body and are responsible for the implementation units for public health services (77).

Figure 1. Map of Tanzania regions and boundaries and Pwani region showing Mkuranga and Rufiji districts

Life expectancy at birth for men is 60 years, while for women, it is 63 years. The literacy rate is, on average, 71.5% in the country, while literacy among adult women is 76% compared to 87% for men with education. The Total Fertility Rate is 5.2 and women of childbearing age (15–49) make up 47.1% of the total population (76). The majority of the population (71%), which is mainly involved in agriculture, resides in the rural areas, and is mainly involved in agriculture. The annual growth domestic product for Tanzania is 7% and the per capita GDP for 2014 was 939 US dollars. Agriculture (employing 80% of the workforce), tourism and gold mining are the main sources of revenue for the national income (78, 79). The proportion of the population living below the national poverty line spending less than 0.60 USD per day is 28.2%, the majority of whom reside in rural areas (80). The infant mortality rate (IMR) has been declining in Tanzania: currently, it is estimated to be 45 per 1,000 live births, compared to 115 per 1,000 live births in 1988 (76) and, in this case, MDG 4 has been achieved.
Health system in Tanzania

Health system structure

The health system in Tanzania is a pyramidal structure of health care services. According to the current Health Sector Strategic Plan, July 2015 – June 2020 (81), at the bottom of the pyramid is the Household/Community level, whereby community-based health activities provide health promotions and prevention services to families in villages and neighbourhoods (Figure 2).

At the village level, there are public and private dispensaries that provide preventive and curative services. ANC and delivery services are provided in the dispensaries. At ward level there are rural health centres, which can admit patients and, in some, caesarean sections can be performed. District and council hospitals provide care to patients referred from dispensaries and health as well as providing basic surgical services (81). Regional Referral Hospitals are level 2 facilities that receive referral patients from lower levels (district and council hospitals and health centres) and also provide specialist medical care such as general surgery, cardiology, nephrology and gynaecological services. Zonal and national hospitals provide advanced medical care and serve as teaching hospitals for biomedical, medical and nursing training (81).

Figure 2. Health care pyramid in Tanzania. Source: MOSHW; Health Sector Strategic Plan 2015–2020 (81).

Key to Figure 2: APHFTA: Association of Private Health Facilities in Tanzania, CBO: Community Based Organisations, FBO: Faith Based Organisations, NGO: Non-Government Organisation.
Health delivery services

In Tanzania, at least 90% of the population lives within five kilometers of a primary health care facility. Currently there are 5,819 public dispensaries and 1,123 private dispensaries. There are 614 public health centres and 78 private health centres. There are 15 private and 12 faith-based regional hospitals, that receive referrals from 63 government-owned district hospitals and 37 designated hospitals. Designated hospitals are faith-based hospitals that have been contracted by the government to provide health services in districts where there are no public hospitals (81). Council health management teams are responsible in organising and implementing health services and health promotion at community, health center and district level. Information on maternal and child health is available in the national health management information system (HMIS) known as MTUHA.

Human Resources for Health

Human Resources for Health (HRH) is a major constraint to service delivery in Tanzania. Data from the Health Sector Strategic Plan IV (HSSP IV) of 2014 show that there are 929 medical specialists, 1,157 medical doctors, 1,710 Assistant Medical Officers (AMOs), and 13,848 enrolled nurses and nurse midwives in Tanzania (81). This translates to only 8 skilled health personnel (doctors, nurses and midwives) per 10,000 persons (82), which is well below the minimum of 23 per 10,000 recommended by the WHO (83). Rural and remote areas face a major shortage of health staff and many primary health care facilities in these areas do not have qualified staff. In Tanzania, medical doctors include physicians and AMOs. Training of physicians consists of 6 years of study at any public or private medical universities. AMOs, also known as non-physician clinicians, are those who have worked as clinical officers (and are trained for three years in general medicine) before undergoing two years of additional non-university training that also includes training in obstetric operative care (84). Midwifery services are provided by registered and enrolled nurses who have had training in nursing for two years and midwifery for three years. These professionals provide ANC and delivery services as well as life-saving procedures that may be needed before referring the patients (85). Another cadre of health care staff, Mother and Child Health Aides (MCHAs), receive two years’ training in mother and child health care. MCHAs were the major providers of reproductive health care in the 1990s but their roles are currently being phased out and replaced by registered and enrolled nurses.

In Tanzania, community health workers (CHWs) are volunteers selected from the villages and each village has two community health workers both men and women. They provide health promotion messages and assist during
the implementation of interventions such as vaccinations. Recently there have been efforts made by the government to enhance the role of CHWs in the strategies to attain MDGs 4 and 5. The Primary Health Care Services Development Programme (2007–2017) (77) and the National Road Map Strategic Plan to Accelerate Reduction of Maternal, Newborn and Child Deaths (One Plan), have articulated and emphasised the importance of the role of CHWs. In order to achieve this strategy, national guidelines and training materials for Integrated Maternal and Child Health CHWs were approved in 2012 (86). A pilot study was conducted in Morogoro region to evaluate a way forward in integrating CHWs in 2012. Furthermore, the Health Sector Strategic Planning of 2015 – 2020 seeks to formalise the role of CHW from being a volunteer to one that is part of the professional health cadres and is integrated into the health care system (81).

Health care financing
The Government of Tanzania allocated about 10% of its total expenditure to health in 2012/2013. This figure is short of the target according to the Abuja declaration which advised an expenditure of 15% of the total budget on health (81). Of the total expenditure for health, 33% was made available for reproductive, maternal and child health (87). Tanzania has also introduced health insurance schemes that could help in the reduction of primary health care cost. These include the National Health Insurance fund that covers civil servants, the National Social Security Fund and Community Health Funds. In total, these schemes accounted for 5% of the overall government expenditure in 2012 (82).

Maternal health care in Tanzania
According to the Census of 2012, the Maternal Mortality Ratio (MMR) in Tanzania was 432 per 100,000 live births, which is slightly lower compared with the Demographic Health survey data of 2010 which reported a rate of 454 per 100,000 live births (76, 78). The target in Tanzania for MDG 5, of reaching 193 per 100,000 live births, down from 910 per 100,000 in 1990, has not been reached, but progress has been made (5).

Fifty percent of births in Tanzania occur in health facilities and 48% are delivered at home. There are variations depending on the region of the country, for example, in a southwest region called Rukwa, the facility delivery rate is 30%, while in Dar es Salaam, it is 98%. Although the proportion of mothers who deliver in health facilities is low, more than 96% of women attend antenatal care (ANC) in health facilities at least once and 43% attended four times, as recommended (78).
The Tanzanian Government has embarked on ambitious plans and policies to address the challenge of high maternal mortality, including the introduction of Focused Antenatal Care (FANC) in 2002. This entailed the provision of ANC services free of charge and women are supposed to attend the ANC at least four times and receive counseling on birth preparedness messages (88). In 2008, a strategic road map to reduce maternal and neonatal mortality was launched with the aim of increasing antenatal attendance to at least 4 visits from 64% in 2005 (89) to 90% in 2015 (90). In addition, the policy aimed to increase the coverage of births attended by skilled attendants from 46 to 80%. Furthermore, the goal was to have increased coverage of Comprehensive Emergency Obstetric Care (CEmOC) from 64% of hospitals to 100%, and of Basic Emergency Obstetric Care (BEmOC) from 5% of health centres and dispensaries to 70% (90). A recent review of the achievement of these goals demonstrates that, in 2012, 20% of dispensaries and 39% of health centres could provide BEmOC, while 73% of hospitals could provide CEmOC (87). All of these improvements will obviously increase the supply side of care; therefore, increasing the demand side of obstetric care is of utmost necessity and can be achieved by employing community-based strategies.
Theoretical Framework

The Three-Delays Model

In order to understand the causes of maternal mortality, a three-delays model was developed by Thaddeus and Maine (25). In their model, they described three delays; delay in seeking care, delay in reaching care, and lastly, delay in receiving appropriate care. Delays in seeking care can be due to failure to recognise danger signs, or not perceiving the severity of the obstetric complication, socio-cultural factors, lack of money, or previous experiences in contact with the health system. Delays in reaching care can be caused by facilities being a long distance from the pregnant woman’s home, poor roads and the absence of affordable transportation to the health facility. Delays in receiving care may be due to the negative attitude of health providers, poor skills of health personnel, lack of health providers as well as shortages and stock-outs of basic equipment and supplies.

Health Belief Model

Access and utilisation of safe and skilled care for delivery also depends on the behaviour of the individuals and/or the community. The Health Belief Model (HBM) has been used to describe behavioural changes and has six main constructs that will influence people to take action. The HBM posits that a person’s or a community’s health-related behaviour depends on their perceived risk of outcome where there is susceptibility to a maternal complication (perceived susceptibility) or with severe consequences (perceived severity). Taking actions such as utilising skilled care in ANC and delivery will minimise risk of unwanted outcome (perceived benefits) and the benefits outweigh the obstacles (perceived barriers) in taking actions. When individuals are exposed to factors that help them to strategise to take action such as through training (cues for action), then they will be confident in their ability to take action (self-efficacy) (91, 92).
Social construction of gender and masculinities

Connell (93) has described a dominant form of masculinity; hegemonic masculinity. This is defined as the “configuration of gender practice which embodies the currently accepted answer to the problem of legitimacy of patriarchy, which guarantees (or is taken to guarantee) the dominant position of men and subordination of women” (93, 94). This is seen as an idealised phenomenon of “a real man” who is obliged to be strong and who can be entitled to violence, risk-taking, expressing no emotions, being the provider and decision-maker in the family and having material success. This social construction of masculinities is also relevant in issues related to male involvement in maternal health. Despite an increased interest in studying male involvement in maternal health care, there is no consensus on which theoretical framework is most appropriate in studying male involvement. Two approaches have been considered while designing programmes to involve men. First, male involvement is seen as a marker of gender equity as part of social determinants of health (95). This social determinants approach posits the adoption of more equitable gender roles such as joint decision-making among couples, shared household chores and parenting that will eventually lead to healthier behaviours, such as immunisation for children, improved contraceptive use and improved health care seeking in case of emergency. This has a potential to position man as an agent of positive change (60). The second approach relates to the consideration that male involvement is merely instrumental, for example, providing direct assistance, such as money, leads to the improvement of the health of their spouse and children. The latter approach is seen as ‘gender neutral’ (61, 96) or ‘gender blind’ (52), because it considers men’s action independent of their gendered roles and there is a risk of reinforcing gender norms that disempower women (56).
Rationale of the study

Despite the implementation of several initiatives, such as the Safe Motherhood Initiative and the introduction of FANC, maternal mortality is still unacceptably high in Tanzania. The utilisation of skilled care during pregnancy and delivery is crucial in reducing mortality as life-threatening complications can occur without warning. The community must be empowered by having adequate knowledge and understanding the importance of accessing skilled care.

Previous studies in Rufiji district showed that the community has a low compliance to facility delivery and referral to hospitals when advised (41). As in other parts of Tanzania, women in Rufiji district have limited knowledge of the danger signs of complications that may arise during pregnancy, delivery and after delivery, despite having a high attendance rate at antenatal care (34, 97). In a study done in the rural district of Rufiji on the use of essential obstetric care facilities, Urassa and colleagues found that a quarter of women with complications were referred to the hospital level but less than half arrived at their referral points. Out of 60 referred cases, 52% did not arrive in any of the two hospitals of the district (98).

The introduction of Focused Antenatal Care (FANC) in 2002 was expected to increase client-provider contact time, allowing every woman to receive adequate individual counseling on the danger signs and other education messages, including preparation of a birth plan and emergency readiness. Despite this effort, the Tanzania Demographic Health Survey (TDHS) of 2010 reports that the majority of women receive antenatal care, but less than half of them are informed of the danger signs of pregnancy complications (78). In addition, studies have shown that at ANC, the duration of contact between the health worker and the pregnant woman is low (99, 100).

Therefore, there is a need to apply innovative community-based interventions involving the pregnant woman, her partner and closest family members, to help reinforce the importance of BP/CR messages to eventually improve the utilisation of skilled care and thereby lead to a reduction of maternal mortality.
Aim and objectives

Aim
The aim of this thesis was to explore the perceptions and challenges that the community faces regarding preparations for childbirth and to evaluate an intervention of Home-Based Life Saving Skills training on the knowledge of danger signs, facility delivery and male involvement in a rural community in Tanzania.

Specific Objectives
1. To explore the perceptions, experiences, and challenges that the community faces on birth preparedness and complication readiness (Paper I).

2. To assess men’s knowledge of danger signs, birth preparedness and complication readiness (Paper II).

3. To determine the effect of the HBLSS educational programme on birth preparedness and complication readiness, utilisation of maternal health care services and facility delivery (Paper III).

4. To assess the impact of the HBLSS educational programme on male involvement in maternal health (Paper IV).
Material and Methods

Study Design
This study used mixed research methods and consisted of three phases. The first phase involved conducting baseline studies using a qualitative research method (Paper I) along with a quantitative component (Paper II). The second phase was a community-based intervention. In the third phase, household surveys were used to evaluate the HBLSS education performed by CHWs. A quasi-experimental study was designed using pre/post, non-equivalent groups in an intervention district and a comparison district (Papers III and IV). An overview of the study design and participants is shown in Table 1.

Table 1. Overview of study design, participants and methods used

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Study Design</td>
<td>Qualitative study</td>
<td>Cross-sectional survey</td>
<td>Comparison Intervention/Control districts</td>
<td>Comparison Intervention/Control districts</td>
</tr>
<tr>
<td>Participants</td>
<td>67 women and 65 men</td>
<td>725 men</td>
<td>1,542 women (intervention) and 1,528 women (comparison)</td>
<td>1,378 men (intervention) and 1,358 men (comparison)</td>
</tr>
<tr>
<td>Data collection</td>
<td>12 Focus Group Discussions (FGDs)</td>
<td>Structured questionnaire</td>
<td>Structured questionnaire</td>
<td>Structured questionnaire</td>
</tr>
<tr>
<td>Data analysis</td>
<td>Qualitative Content Analysis</td>
<td>Descriptive Statistics,</td>
<td>Descriptive statistics, SPSS Difference in Differences (DID) SAS</td>
<td>Descriptive statistics, SPSS Difference in Differences (DID) SAS</td>
</tr>
</tbody>
</table>
Study Setting

The study was conducted in two districts, Rufiji and Mkuranga, in the Pwani region, which consists of a total of six districts. Rufiji district was used as the intervention district and is located about 200km south of Dar es Salaam and covers an area of 13,339 km². The district has 6 divisions, 19 wards, and 128 villages. It has an estimated population of 212,000 according to the recent census conducted in 2012 (76). The Rufiji River traverses the district and divides it into flood plains, plateau and a coastal area. Mkuranga was chosen to be a comparison district because of its similar demographic and socio-economic characteristics. It has an area of 2,827 km². The district has 4 divisions, 15 wards, and 109 villages. The population of Mkuranga as per the 2012 national census is estimated to be near 223,000 (76). The literacy rate in Pwani region is 83.1% among men and 66.9% among women. The percentage of women of reproductive age (15 – 49 years) is 47.5%. The annual population growth rate in this region is 2.2% (76).

A major highway links Dar es Salaam to the southern regions of the country. However, a limited transport system makes people depend more on the health services that are available within their locality. The main mode of transport is bicycles, motorcycles and vehicles along the main road. Currently there are many motorcycles available in the area. These are sometimes used as paid transportation to take pregnant women to a hospital. The economic activities in both districts are similar, and include small-scale agriculture of cassava, rice and maize, and fishing. Cashewnut is the main cash crop in both districts with Mkuranga producing the largest in terms of tonnage.

In Rufiji district there are two hospitals; one public and one private (not-for-profit), five health centres and 56 dispensaries. Mkuranga has one public hospital, two health centres and 47 dispensaries.

Study Participants and Data collection

Paper I

The aim of Paper I was to explore the community perceptions of preparing for childbirth. Purposeful sampling, including both men and women of different ages, living in rural or semi-urban areas and having recent or previous experiences of childbirth, were invited to participate in the study, in order to ensure as broad a perspective on BP/CR as possible (101). Included in the study were men and women who were 40 years of age or younger and who had a baby delivered in the last 2 years, and older men and women above 50 years of age. Homogeneous groups of young men and women, and older men and women, were sepa-
rated in the discussions, so as to mitigate the effect of feelings of insubordination. Village leaders assisted with recruiting the participants. The villages that provided the participants were selected purposefully from semi-urban and rural areas with health facilities that serve as referral points in these areas.

Data collection

In order to capture perceptions in the community, Focus Group Discussions (FGDs) were chosen as the most relevant tool to collect the data. Utilising FGDs facilitates group interactions and can provide rich information about perceptions and experiences in a way that a questionnaire would not to be able to (101). A village was selected and four FGDs with young men, young women, older men and older women were performed. Another village was approached and, in a similar way, four FGDs were held. In order to be sure of saturation of the material, a third village was added, however, no essential new information was revealed. In total, 12 FGDs with 10 – 12 participants in each were conducted in the Swahili language that was known to all participants. Five FGDs were conducted by a male social scientist and the rest were moderated by an obstetrician/gynaecologist, the author of this thesis. Another gynaecologist took notes during the discussions. A topic guide that had been pre-tested in another district was used to collect the information. Topics for discussion included cultural and social issues surrounding pregnancy and childbirth, use of traditional medicine during pregnancy and childbirth, and steps taken to prepare for safe pregnancy and potential complications. The discussions were introduced by asking the participants to discuss what happens when a woman in the family conceives and what are the preparations made for childbirth and for any possible emergency or unforeseen incident. The FGDs were tape-recorded upon consent being given by the participants and were transcribed verbatim.

Papers II, III and IV

Community-based surveys were conducted in Rufiji and Mkuranga districts. Data for Papers II, III, and IV were collected using a structured questionnaire developed by JHPIEGO, an affiliate of John Hopkins University, and adapted to the Tanzanian context (102). Experienced research assistants, both men and women piloted the questionnaire in nearby Kisarawe district before collecting the data. Information collected included socio-demographic characteristics, such as age, marital status, education level, knowledge of danger signs during pregnancy, childbirth and postpartum, knowledge of BP/CR and actions taken on BP/CR. Related to knowledge of danger signs, participants were asked to mention spontaneously any danger signs during pregnancy, childbirth and the postpartum phases. During pregnancy, correct possible options were signs such as excessive vaginal bleeding, swollen hands and feet, fits, fever, severe abdominal pain, premature rupture of membranes, and blurred vision. Obstetric danger signs during childbirth
were for example excessive vaginal bleeding, severe headache, fits, severe abdominal pain, labour lasting more than 12 hours and retained placenta. In the postpartum phase, possible danger signs were excessive vaginal bleeding, severe headache, and fits after delivery, foul-smelling discharge, fever and severe abdominal pain (Table 2).

For BP/CR, knowledge and actions taken included: saving money; identifying transport, a skilled attendant, where to go in case of emergency and a blood donor; and preparing a birth kit. In our study identifying a birth kit meant buying materials such as surgical blades, clean clothes, syringes and surgical gloves as part of the preparation (Table 2).

Table 2. Summary of items used to identify knowledge of danger signs, knowledge on BP/CR and actions taken

<table>
<thead>
<tr>
<th>During Pregnancy</th>
<th>During Childbirth</th>
<th>During Postpartum</th>
<th>Knowledge of BP/CR</th>
<th>Actions taken on BP/CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excessive vaginal bleeding</td>
<td>Excessive vaginal bleeding</td>
<td>Excessive vaginal bleeding</td>
<td>Saving money</td>
<td>Saved money</td>
</tr>
<tr>
<td>Convulsions</td>
<td>Convulsions</td>
<td>Convulsions</td>
<td>Identifying transport</td>
<td>Identified transport</td>
</tr>
<tr>
<td>Fever</td>
<td>Delay in placenta delivery</td>
<td>Foul smelling discharge</td>
<td>Identify where to go in case of emergency</td>
<td>Identified where to go in case of emergency</td>
</tr>
<tr>
<td>Blurred visions</td>
<td>Fever</td>
<td>Difficulty breathing</td>
<td>Identifying skilled birth attendant</td>
<td>Identified skilled birth attendant</td>
</tr>
<tr>
<td>Difficulty in breathing</td>
<td>Preterm rupture of membranes</td>
<td>Abdominal pain</td>
<td>Identifying blood donor</td>
<td>Identified blood donor</td>
</tr>
<tr>
<td>Swelling of hands and feet</td>
<td>Prolonged labour</td>
<td>Pain in the perineum</td>
<td>Identifying birth kit</td>
<td>Prepared birth kit</td>
</tr>
<tr>
<td>Severe abdominal pain</td>
<td>Body weakness</td>
<td>Swollen or tender breasts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dizziness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduced or increased fetal movements</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Premature rupture of membranes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The household wealth was estimated using ownership of assets. The wealth quintiles index was calculated using principal component analysis. The asset items included were; owning a radio, bicycle, and mobile phone, type of flooring material, source of drinking water and source of cooking energy. The sample was divided into 5 population quintiles with A1 being poorest (20%) and A5 being least poor (20%).
In Paper II, the aim was to determine the actions taken on BP/CR and knowledge of danger signs among men. Baseline data were collected from men who had partners who had given birth in the last two years in Rufiji. A total of 756 men were invited and 725 men (95.9%) agreed to participate. They were randomly selected from the community using a two-stage cluster sampling technique. First, all health facilities were listed in each district, then 14 health facilities were randomly selected by ballot method. Secondly, two villages from the catchment area of each facility were randomly selected and all men in these villages whose partner had delivered within the last two years were invited to participate.

Paper III aimed at determining the effect of the intervention on facility delivery, ANC attendance, knowledge of danger signs, and knowledge and actions on BP/CR among women. The same two-stage cluster sampling technique was used, and all women from the villages who had delivered a child in the last two years were invited to participate in the study. The calculated sample size was estimated to be 1,400 (700 per district) based on a facility delivery of 47% (89) in Tanzania with the assumption of detecting a 15% effect on increased facility delivery as the primary outcome, the power of 90% with a 5% significant level, design effect of 1.5 and assuming a 3% non-response rate. The same villages in both districts were visited before and after the intervention.

In Paper IV we assessed the effect of the intervention on male involvement in maternal health in this rural community. Information on socio-demographic characteristics, accompanying wife to ANC, shared decision-making, knowledge of danger signs, and knowledge and action on BP/CR were collected. Using the same procedure for sampling as in Paper III, men whose wives had delivered in the last two years were selected. The estimated sample size was 1,300 (650 per district), based on the proportion of male involvement in accompanying their spouse to ANC of 65% in Uganda with similar context to rural Tanzania (47), and detecting a 10% effect on increasing male involvement, the power of 80% with a 5% significant level, design effect of 1.5 and assuming a 20% non-response rate. Participants were not necessarily the same during the two surveys.

**Intervention**

The intervention package had two components. The first one involved the training of health workers and community health workers and the second was the training of the community on HBLSS by community health workers (Figure 3).
Training of health workers and Community Health Workers

HBLSS training is provided through cascade training. The American College of Nurse Midwives (ACNM) provided training to 24 master trainers in Tanzania. The author of this thesis is one of the master trainers and trained 24 health workers who were selected from 14 health facilities in Rufiji district. The training of the health workers on HBLSS topics, how to conduct HBLSS training to CHWs and how to supervise them were conducted over a period of one week. The training employed different pedagogical methods such as lectures and role-playing. In addition, adult learning techniques, such as use of stories, discussions and demonstrations, were used to train the participants. The master trainer supervised the health workers and they in turn trained 66 CHWs both men and women from the villages forming the catchment population for two weeks.

Training of the community

In the HBLSS programme, CHWs are also known as community guides. They are trusted men and women selected from the community, who can all read and write. They usually volunteer to take part in health promotion campaigns such as the immunisation of children and pregnant women. The CHWs were required to make four home visits with pregnant women and their families, including husbands, throughout the pregnancy. It was the responsibility of the CHWs to identify all pregnant women in their catchment villages. Once identified, the pregnant women and their families would make arrangements for a feasible and appropriate time for the training to be conducted at their homes. During the visits the CHWs conducted training about recognising obstetric and neonatal
danger signs, the importance of attending ANC and delivering in a health facility, shared decision-making, BP/CR, hygiene, and the importance of rest during pregnancy. Details of the content of the visits are shown in Table 3. To maximise effective learning and communication among the community members, the CHWs used different methods including the use of stories and case histories, discussions and demonstration, and the identification of danger signs using pictorial cards and Take Action Cards (TAC). These cards contained images depicting potential problems on one side and on the reverse side, information on what action to take for each (Figure 4). At the end of the training visits, the cards were left with the family to keep for their own use.

CHWs were given register books to record the home visits they had made. The health workers, who were supervisors to CHWs, checked these books regularly. The health workers made occasional visits with the CHWs and participated in the training of the families. Health workers also documented their supervision visits. The master trainer supervised the health workers by reviewing their records and participated in the education of families occasionally. There was a one-day refresher course for the health workers and CHWs once every two months to update their training skills. During these meetings, challenges regarding the implementation of the educational home visits were discussed.

The CHWs were provided with bicycles in order to assist in moving around in the rural areas. They also received training materials, T-shirts with the HBLSS logo, and a small bag in which to keep the materials. They were provided with a monthly allowance of 30,000 Tanzanian shillings (USD $13.60).

Table 3. Training of pregnant women, husbands and family members on HBLSS

<table>
<thead>
<tr>
<th>Visit 1</th>
<th>Visit 2</th>
<th>Visit 3</th>
<th>Visit 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Importance of attending antenatal early</td>
<td>Recognition of maternal danger signs and actions to take</td>
<td>Recognition of maternal danger signs and actions to take for early referral</td>
<td>Recognition of maternal newborn danger signs and actions to take</td>
</tr>
<tr>
<td>Recognition of maternal danger signs and actions to take</td>
<td>Birth preparedness and complication readiness</td>
<td>Birth preparedness and complication readiness</td>
<td>Birth preparedness and complication readiness</td>
</tr>
<tr>
<td>Importance of rest during pregnancy and nutrition</td>
<td>Importance of skilled care for delivery and joint decision-making in seeking delivery care</td>
<td>Importance of skilled care for delivery and joint decision-making in seeking delivery care</td>
<td></td>
</tr>
<tr>
<td>Importance of helping the woman with household chores</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 4. Pictorial card demonstrating danger signs; Line 1; Antepartum and Postpartum bleeding (left), Abdominal pain, fever, painful micturition (right). Line 2; Headache, fits during pregnancy (left), Prolonged labour (right). Line 3; Foul smelling vaginal discharge and weakness due to malaria (left), Family size discussion (right).
Outcome measures

Community perceptions, experiences and challenges regarding BP/CR were the outcome measures in Paper I.

In the cross-sectional survey, Paper II, the main outcome measure was the level of BP/CR in terms of actions among men. If a man had made three of the six actions he was considered to be prepared (Table 2). This technique was considered appropriate as a study in rural Uganda used a similar procedure (35). Associations between being prepared and socio-demographic characteristics and selected reproductive characteristics were determined.

The main outcome measure in Paper III was place of delivery for the women within the last two years. Other measures included: attendance to antenatal care; knowledge of three or more danger signs during pregnancy, childbirth and postpartum; knowledge of three or more BP/CR; and three or more actions taken on BP/CR (Table 2).

The main outcome for Paper IV was male involvement. There are no common criteria in the literature defining male involvement. Criteria such as escorting their partner to ANC or childbirth as a measure of male involvement has been used in some studies, while others have used a combination of indicators (47, 103, 104). A composite score was used to describe male involvement in our study. The male involvement score was based on a dichotomous answer (yes/no) to the following five components: 1) men escorting their wives to ANC; 2) escorting women to place of delivery; 3) joint decision-making on the place of childbirth; 4) knowledge of at least three or more danger signs in each of the phases (pregnancy, childbirth and the postpartum period), however, the items to identify knowledge were not ranked according to importance; and 5) at least three BP/CR actions taken. A composite index for male involvement was based on having made three out of the five above actions. The knowledge of danger signs and BP/CR was obtained by letting the participants mention danger signs without giving any options (Table 2). The location of the last delivery for the wife was also documented.

Data Quality

Data were collected using a pre-tested questionnaire. Seven research assistants both men and women were trained for five days and supervised by the author of this thesis during the data collection. The research assistants were medical students who had experience in conducting household surveys related to reproductive health. At the end of each day of data collection, all ques-
tionnaires were reviewed for any missing information. If any information was lacking, the research assistant contacted the participant the following day to fill in the missing information. If an eligible participant was not around, he or she was visited three times before being regarded a non-responder.

Data Analysis

For the qualitative study (Paper I), data analysis was guided by using the Qualitative Content Analysis approach, described by Graneheim and Lundman (105). The transcripts were translated into English in order for the international research team members to participate in the analysis. They were uploaded into the NVivo 10 software package (QSR International) to aid in the sorting of the data. The focus of the analysis was to obtain the manifest meaning of the text, to get an understanding of what the text says, and not an in-depth interpretation of the underlying meanings of the text material. The transcripts were read several times to allow the research team to become acquainted with the data. Paragraphs and text referring to the perceptions and experiences regarding BP/CR were identified and were used to form the meaning units. The meaning units were further condensed to form condensed meaning unit and codes. The codes were combined into subcategories and categories in relation to their differences and similarities. All authors read the material and reflected on each of the meaning units, condensed units, codes, subcategories, and categories, and discussed each of these until agreement was reached.

For the quantitative studies, data were cleaned and entered in a database. For Paper II, binary logistic regression and multiple logistic regression analysis were performed to determine the association between being prepared and socio demographic characteristics and predictors of being prepared using SPSS version 18. Adjusted odds ratio (AOR) and 95% Confidence Interval (CI) were used to express the results.

In Papers III and IV, descriptive statistics were used to describe the socio-demographic characteristics and the chi-square test was used to compare the intervention and comparison districts using SPSS version 18. Changes in proportions of knowledge of danger signs, knowledge and actions on BP/CR, antenatal care attendance and facility delivery were calculated in the intervention and comparison district before and after the intervention (Paper III). In Paper IV, the male involvement, defined as; escorting wife to ANC and childbirth, making joint decisions, knowledge of danger signs and actions taken for BP/CR, were assessed before and after the intervention in both districts.
The net intervention effect (NIE) was estimated as the difference in proportions between baseline and endline in the intervention district minus the difference between the baseline and endline in the comparison district. Post-intervention differences within and in between the districts were also calculated. For each variable, an estimated proportion and its variance was calculated according to cluster sampling design (106). The net effect is the linear combination of four independent samples. \( P \)-values from a \( Z \)-test and 95\% confidence intervals for the intervention effect were calculated based on a normal distribution. A \( p \)-value of \( < 0.05 \) was considered statistically significant. The analysis was performed with SAS version 9.4 (SAS Institute Inc., Cary, NC, USA).

**Ethical considerations**

Ethical approval was obtained from Muhimbili University of Health and Allied Sciences, Senate Research and Publication Committee. Permission to conduct the study was granted by the local government authorities of the districts and villages in Rufiji and Mkuranga districts. The participants were given information regarding the study and were explained their rights to continue or withdraw from the study at any time without giving a reason. They were assured that the information provided would be kept safely to ensure confidentiality. Upon accepting to participate in the study, informed consent was obtained by each participant signing the information sheet. Those who could not read or write declared their consent by inserting a thumbprint.
Results

Community perceptions on childbirth, birth preparedness and complication readiness (Paper I)

In Paper I there were 132 participants. The young participants’ age range was 19 – 36 years, while for the older men and women the range was 51 – 76 years. Two categories emerged from the analysis as shown in Table 4. The community expressed the importance of birth preparations geared towards delivering in health facilities. Moreover, they recognised that complications during pregnancy are better handled at hospitals. Attending ANC was perceived as part of preparation for childbirth where pregnant women would be examined, tested and receive information about the progress of the pregnancy.

“When I was told that my daughter or granddaughter was pregnant, the first thing was to take her to hospital to check whether she really was pregnant. She would undergo a general health check-up. She would continue to attend clinic as her pregnancy grows. Her doctor would advise her on what to do, whether to go and deliver at a normal clinic or not”. (Older woman FGD 4)

They reported the importance of delivering in hospital where qualified staffs are present to deal with any complications that may arise. However, obstacles related to poverty, lack of advance preparation, stigma directed towards unmarried women and those who attend ANC without partners as well as informal user fees affect their BP/CR and hinder the intention to use skilled care for ANC and delivery (Table 4).

“You went there so that she would help you, instead she sends you to go and buy gloves so she would make some tests on you. The situation you left at home was not good financially, yet she wants you to go home first and ask your husband to go and buy gloves for you then go back to the health centre. At the same time, your time to give birth is almost up and you’re in a critical condition. So, sometimes you think it would be better for you to remain seated where you are so that you would give birth right there alone … unless a neighbour passes by and is kind enough to help you …” (Young woman FGD 1)
Table 4. Categories and subcategories on perception of birth preparedness and complication readiness

1. All births need to be prepared
   - Antenatal care prioritised but has challenges
   - Family responsible for supporting the pregnant mother
   - Stigmatising of unmarried women affects preparation
   - Practical preparations are financially demanding
   - Facility delivery preferred

2. Danger signs demand hospital care
   - Recognising danger signs
   - Health care services, ‘free but not free’
   - Men decide but in consultation
   - Traditional beliefs are fading out
   - Herbal remedies still used for treatment

Men’s knowledge of danger signs and BP/CR (Paper II)

The proportion of men who could mention at least one danger sign during pregnancy was 53.5%. Of these, 21.6%, mentioned high fever as a danger sign while only ten percent mentioned excessive vaginal bleeding as one of the danger signs during pregnancy. Forty-four percent of men mentioned at least one danger sign during childbirth and excessive vaginal bleeding was mentioned by 22.7%. In the postpartum period, 34.6% of men mentioned at least one danger sign, with excessive bleeding (17.8%) being mentioned by most, and only one percent mentioned severe headache. With regards to actions taken for BP/CR, only eighty-seven men (12%) made three actions out of six. The most common preparation made was purchasing a birth kit (54.3%) and the least made was the identification of a blood donor (0.1%).

In the binary logistic regression calculations, knowledge of danger signs during pregnancy, place of residence (semi-urban/rural) and escorting wife to ANC were associated with being prepared. After adjusting for age, marital status, and level of education in multivariable logistic regression, knowledge of danger signs during pregnancy was strongly associated with being prepared (AOR = 1.4, 95% CI; 1.8 – 2.6) and it was less likely to be prepared if living in rural area (AOR = 0.6, 95% CI; 0.5 –0.8).
Effect of the intervention (Papers III and IV)

A total of 1,584 and 1,486 women were interviewed at baseline and endline, respectively. There were no differences in terms of socio-demographic characteristics such as age, marital status, education level and wealth quintiles between the intervention and comparison districts. We observed significant improvement of knowledge of three or more danger signs during pregnancy (15.2% vs. 48.1%) with a net intervention effect of 29.0% in the intervention area (95% CI: 12.8 - 36.2; p < .0001) (Table 5) compared with the comparison district. There was a significant effect on the knowledge of three or more danger signs during childbirth (15.3% vs. 43.1%) with a net intervention effect (NIE) of 18.3% (95% CI: 11.4 – 25.2; p < .0001) and postpartum for those mentioning three or more of the signs (8.8% vs. 19.8%) with an NIE of 10.7% (95% CI: 6.4 – 15.7; p < .0001). Birth preparedness practice improved for those who made more than three actions (20.8 vs. 35.3%) with an NIE of 12.8 % (CI: 10.3 – 20.3; p < .0001) between the intervention and control district at baseline and endline. In the intervention area, utilisation of antenatal care with four visits improved significantly (42.4 vs 67.8%) with an NIE of 25.2% (95% CI: 16.9 – 33.2; p < .0001), and the use of facility delivery improved (75.6 vs. 90.2%; p = 0.0002) (Figure 5), but the NIE was not significant, at only 11.5% (95% CI: -5.1 – 39.6; p = 0.123), when compared to comparison district (Table 5).

Figure 5: Facility delivery rate at baseline and endline in the intervention and comparison districts

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Table 5. Effect of intervention on utilisation of skilled care, knowledge of danger signs and birth preparedness among women in Intervention and Comparison districts

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intervention % Estimate change</th>
<th>Comparison % Estimate change</th>
<th>NIE</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facility delivery</td>
<td>14.6</td>
<td>3.1</td>
<td>11.5</td>
<td>-5.1–39.6</td>
<td>0.123</td>
</tr>
<tr>
<td>ANC visits</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At least 1</td>
<td>4.3</td>
<td>0.5</td>
<td>3.7</td>
<td>-1.1–5.6</td>
<td>0.119</td>
</tr>
<tr>
<td>4 or more</td>
<td>25.4</td>
<td>0.2</td>
<td>25.2</td>
<td>16.9–33.2</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Knowledge danger signs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pregnancy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge of at least 3</td>
<td>32.9</td>
<td>3.9</td>
<td>29.0</td>
<td>12.8–36.2</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Childbirth</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge of at least 3</td>
<td>27.8</td>
<td>9.6</td>
<td>18.3</td>
<td>11.4–25.2</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Postpartum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge of at least 3</td>
<td>11.0</td>
<td>0.3</td>
<td>10.7</td>
<td>6.4–15.7</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>BP/CR actions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Money</td>
<td>22.2</td>
<td>15.8</td>
<td>6.4</td>
<td>-3.5–16.4</td>
<td>0.195</td>
</tr>
<tr>
<td>Transport</td>
<td>15.9</td>
<td>1.8</td>
<td>13.9</td>
<td>3.8–27.4</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Skilled attendant</td>
<td>4.4</td>
<td>0.1</td>
<td>4.3</td>
<td>2.5–8.1</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Where to go</td>
<td>9.6</td>
<td>-0.1</td>
<td>9.7</td>
<td>3.3–17.9</td>
<td>0.035</td>
</tr>
<tr>
<td>Blood donor</td>
<td>4.4</td>
<td>0.2</td>
<td>4.2</td>
<td>2.0–6.5</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Birth Kit</td>
<td>23.4</td>
<td>22.2</td>
<td>1.2</td>
<td>0.2–5.1</td>
<td>0.582</td>
</tr>
<tr>
<td>BP/CR actions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥ 3</td>
<td>14.5</td>
<td>1.7</td>
<td>12.8</td>
<td>10.3–20.3</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Knowledge of 3 BP/CR</td>
<td>11.3</td>
<td>2.1</td>
<td>9.2</td>
<td>2.8–13.2</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

NIE: Net intervention effect; CI: Confidence interval; % Estimate change = difference in proportion between baseline and endline after the intervention
Paper IV

There were no differences in terms of socio-demographic characteristics such as age, marital status, education level and wealth quintiles between the intervention and comparison districts. The results show that there was improvement in male involvement (39.2 % vs 80.9%) with a net intervention effect of 41.1% (CI: 28.5 – 53.8; p < .0001). There was improvement in the knowledge of danger signs during pregnancy, childbirth and postpartum periods. The proportion of men accompanying their wives to antenatal and delivery also improved. Shared decision-making for place of delivery improved markedly (46.8% vs. 86.7%), showing a net intervention effect of 38.5% (CI: 28.0 – 49.1; p < .0001). Whilst facility delivery for spouses of the participants improved in the intervention district, this did not show statistical significance when compared to the comparison district with a net intervention effect of 12.2% (95% CI: -2.8 – 27.1: p = 0.103) (Table 6).
Table 6. Effect of intervention on male involvement in intervention and comparison district

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intervention % Estimate change</th>
<th>Comparison % Estimate change</th>
<th>NIE</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wife’s Facility delivery</td>
<td>11.6</td>
<td>-0.6</td>
<td>12.2</td>
<td>-2.8–27.1</td>
<td>0.103</td>
</tr>
<tr>
<td>Escorted wife to ANC</td>
<td>20.3</td>
<td>3.9</td>
<td>16.4</td>
<td>5.6–27.2</td>
<td><strong>0.002</strong></td>
</tr>
<tr>
<td>Escorted wife to delivery</td>
<td>33.8</td>
<td>0.7</td>
<td>33.1</td>
<td>24.1–42.1</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Shared decision-making</td>
<td>39.9</td>
<td>1.4</td>
<td>38.5</td>
<td>28.0–49.1</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Male involvement score</td>
<td>41.7</td>
<td>0.5</td>
<td>41.1</td>
<td>28.5–53.8</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Knowledge of ≥ 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pregnancy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge of ≥ 3</td>
<td>22.4</td>
<td>1.1</td>
<td>21.3</td>
<td>13.7–28.9</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Childbirth</td>
<td>14.1</td>
<td>0.1</td>
<td>13.9</td>
<td>10.5–17.4</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Knowledge of ≥ 3</td>
<td>15.1</td>
<td>0</td>
<td>15.1</td>
<td>9.2–21.0</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Postpartum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge of ≥ 3</td>
<td>22.9</td>
<td>-3.8</td>
<td>26.8</td>
<td>15.3–38.2</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

NIE: Net intervention effect; CI: Confidence interval; % Estimate change= difference in proportion between baseline and endline after the intervention.
Discussion

The community perceived that all births need to be prepared for and that all pregnant women presenting with danger signs should be treated at health facilities hence the use of skilled care was favoured. However, barriers related to the inability to prepare in advance hindered the realisation of the intention to use skilled care. Men’s knowledge of danger signs was found to be limited and few men were prepared for childbirth and any related complications.

The novelty of using CHWs to educate the community on HBLSS in Tanzania showed significant improvement in several aspects of making preparations for childbirth and is a major result of this thesis. Knowledge of danger signs related to pregnancy, childbirth and the postpartum period increased significantly among women and men. Likewise, birth preparedness practices increased significantly as did utilisation of antenatal care with the recommended four visits. After the intervention, the use of facility delivery improved in the intervention area.

Another major result of the thesis is that men’s involvement increased significantly after they took part in the education programme at home. The proportion of men accompanying their spouse for ANC and delivery increased and shared decision-making for place of delivery improved markedly.

Discussion of findings

Perceived benefits of utilisation of skilled care

The first delay in the ‘Three Delay Model’ focuses on delay in seeking care. This aspect is illustrated in this thesis by the limited knowledge of possible obstetric complications and joint preparations before childbirth in the families at large. However, participants recognised the need to be prepared for childbirth. They identified some danger signs such as severe obstetric hemorrhage and convulsions as being dangerous enough to cause death (Paper I). According to the Health Belief Model, the community perceived benefits of attending ANC, delivering at a health facility and seeking skilled care in case of an emergency. Attending ANC was seen as a good way to start childbirth
preparation and ensure that a normal pregnancy progresses well by getting tested and receiving prenatal medication such as iron tablets. They also respected the competence of health workers and considered them to be well-trained and “experts”, as reported in other studies completed in developing countries (107-110). Furthermore, ANC attendance is believed to be a preventive measure to minimise the likelihood of birth complications (111, 112). This could also explain why, in some areas, such as in Kenya, Tanzania, China and Indonesia, there is high ANC attendance but a low number of facility deliveries (97, 113-115).

Perceived barriers
The participants described their perceived barriers for birth preparation and delivery at a health facility. Perceived barriers included, meeting the cost of purchasing materials such as clean clothes, surgical blades and transportation. Others included lack of advanced preparation, decisions being made by family members, and the distance to a health facility, which illustrates Thaddeus and Maine’s second delay, the delay to reach care (20, 41, 97, 116-123). User fees for ANC and delivery services have been eliminated in Tanzania; however, the need to buy certain supplies in these poor communities contributes to the low uptake of facility-based deliveries (124-126). A third delay was identified, adding to the failure to bring the partner to ANC, health workers’ attitudes towards pregnant women and accompanying men, and the lack of motivation among health workers were perceived as being additional barriers in the utilisation of skilled care for ANC and delivery. These findings are similar to those of other studies that have been conducted in low-income countries, including Tanzania (127-130). It is important that these barriers are mitigated so that families can prepare for childbirth and so that delays in seeking and accessing skilled care are minimised, ultimately preventing maternal morbidity and mortality (25).

Perceived severity/susceptibility
Awareness of obstetric danger signs is essential in helping a pregnant woman, her husband or her family to make a quick decision to seek care if the need arises. Obstetric complications such as excessive haemorrhage, fits during pregnancy, and malaria were perceived as being serious enough to require immediate care (Paper I). Prompt arrival for women with complications to hospitals providing emergency obstetric care is fundamental in reducing maternal morbidity and mortality (131). Men in Rufiji demonstrated a low susceptibility to recognise danger signs during pregnancy, childbirth and the postpartum period (Paper II). This lack of awareness may lead to making delayed decisions to seek and access care for routine health care seeking, in case of an emergency or in complying with a referral (132, 133).
Knowledge of danger signs in men and the community at large is critical in making informed decisions regarding birth preparations and being ready for taking action if complications arise (134-136). Few studies have been done on men’s awareness of risks of obstetric severities. In a study completed in Kenya, knowledge of danger signs among men was found to be higher than in our study (137). This contrast can be explained by a difference in methodology used in eliciting the data; in our study, the men’s level of knowledge was obtained by asking unprompted answers, while in the Kenyan study, men were asked to respond with yes or no answers to danger signs that were read out to them. When answers are read to participants they may tend to respond “yes” and this may overestimate the knowledge of danger signs.

Slightly more than ten percent of men were prepared for birth and complication readiness based on our definition (Paper II). This result indicates a low susceptibility to recognise possible complications and understanding of the need for increased BP/CR in the community (102, 138). Men play a key role in determining women’s access to antenatal and delivery care through making sure transport is available, and by deciding whether to successfully comply with emergency referral (41, 139-142). This is an additional reason why men also need to be equipped with knowledge on why ANC and skilled birth is essential and on how to prepare for childbirth and identify signs of complications.

The likelihood of families of pregnant women to follow recommended advice in a perceived threatening situation during pregnancy and childbirth depends on them deciding whether the perceived benefits exceed the barriers. *Modifying factors*, such as socio-demographic factors, poverty, living in a rural area, knowledge and previous experiences, influence the judgment (91, 92). If positive actions are seen as important, they may be supported by raised awareness and knowledge provided in different ways, according to the HBM and this is what we expected to do in this project. The knowledge that was provided regarding danger signs and how to prepare for childbirth and complication could provide *cues for action* and encourage readiness in case of any life-threatening complications arising during pregnancy and childbirth.

**The role of CHWs in educating the community**

One intervention to reduce maternal morbidity and mortality is increasing skilled attendance for ANC and facility-based deliveries (10, 143-145). In this thesis, the community-based intervention, deploying CHWs to train the community on HBLSS and BP/CR, had the effect of increasing the proportion of women who made more than four ANC visits as recommended by the
WHO (Paper III). In addition, the proportion of women who delivered at a health facility increased in the intervention area.

The lack of net effect on facility deliveries could be due to the already higher numbers of facility-based deliveries in Pwani region than anticipated according to the national figures, hence no significant effect could be demonstrated. Findings from similar studies employing community-based interventions, completed by using women’s groups and CHWs in low-income countries to increase demand of maternal health services, although occurring in different socio-cultural settings, have shown similar results in improving the number of ANC visits and facility-based deliveries (26, 146-153). A randomised controlled trial conducted in Northern Tanzania to improve birth preparations showed that counselling on BP/CR messages at facility level had the effect of increasing BP/CR among the women (154). When pregnant women book early for antenatal visits and make at least four visits, there is increased likelihood that they will also use skilled care for delivery (155, 156). The use of CHWs to identify pregnant women early in the community, as done in this study, may have contributed to the increased number of ANC visits and facility-based deliveries. Since CHWs live in the community and are trusted members of the community, the information they provided to the pregnant women and other members of the family might have been accepted and internalised. It is also important to ensure that, with the increased demand generated by BP/CR messages to prepare and hence utilise facility delivery, health service providers and health systems are well prepared for the increased caseload. Negative experiences of sub-standard or quality of care in the facility may refrain or delay families in seeking care (25).

Knowledge of danger signs during pregnancy, childbirth and the postpartum period improved among men and women in this community-based intervention (Papers III and IV). Community-based interventions carried out in Kenya, Eritrea and Bangladesh to improve maternal health knowledge and utilisation employing CHWs as promoters of safe motherhood have demonstrated similar improvements in knowledge of obstetric danger signs (157-159). It is also crucial that men’s knowledge of danger signs is improved, and this was achieved in this intervention (Paper IV). Making informed decisions regarding the wellbeing of their spouses for childbirth and in case of an emergency would help in reducing delays to seek care and reaching care (160). Studies completed in India and Uganda have demonstrated that when men are knowledgeable about danger signs they encourage their wives to have facility-based deliveries (47, 161). This signifies the importance of involving men in counselling for danger signs during ANC visits with their spouses as this enhances the utilisation of skilled care for delivery.

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Having knowledge of at least three BP/CR components and making three or more actions of BP/CR significantly improved among men and women in the intervention district compared with the comparison district (Papers III and IV). Identifying a skilled attendant, where to go in case of emergency, a blood donor and transport arrangements were components for which the intervention had a significant effect. Studies designed to measure improvements in maternal health service utilisation in Burkina Faso, Nepal, India, Eritrea and Bangladesh reported a similar effect in improving BP/CR by receiving information on BP/CR (134, 153, 159, 162-166). A similar intervention in Tanzania designed to improve skilled care utilisation, which had several components including community mobilisation, health facility infrastructure improvement, and health worker training, had a positive impact on improving BP/CR in the community (167, 168). This study used CHWs in educating the community and did not implement any other intervention at facility level, apart from training health workers to train and supervise CHWs.

It is imperative that men and women in the community have knowledge and are prepared for childbirth as it has been demonstrated elsewhere that having knowledge of BP/CR and being prepared is highly associated with the use of skilled care for delivery (169-171).

Male Involvement in preparation for childbirth

Traditionally, interventions to improve gender inequity have been designed to empower women (172). There have been some documented gains in women’s autonomy using this strategy. However, exclusive focus on women to address gender inequity is recognised as being limited (54). Gender inequity cannot be fully addressed when the focus is placed only on women rather than focusing on gender as a social construct that affects both men and women (61). This is also reinforced by the social construction of masculinity whereby the man is always the decision-maker and has access to financial resources (93, 94). Interventions to improve health outcomes that work with men and women together have been shown to successfully transform gender roles and norms (172, 173). Our study shows that male involvement in maternal health in this rural community improved. The counselling of men together with their wives on BP/CR messages during the ANC visits has previously shown to improve male involvement in maternal care, even so in countries with varying degrees of patriarchal male structures such as Pakistan, El Salvador and South Africa (139, 163, 174-176). The studies showed that men’s involvement could be achieved through escorting their wives to ANC, participating in the preparations for childbirth, and helping with household chores.
This study demonstrated that male accompaniment increased by 20% with significant intervention effect. The practice of men progressively attending ANC could promote equal participation of men and women in maternal care and could have a subtle effect on hegemonic masculinity, as explained by Connell (93). In addition, it could underline the understanding that pregnancy is not only a women’s issue; rather, it is a couple’s issue. When men and women are counselled together there is a potential for women to make more preparations for childbirth as was shown in previous randomised controlled trials to improve male involvement in maternal health at facility level in South Africa, India and Nepal (163, 176, 177). A recent systematic review on the impact of male accompaniment to ANC on perinatal health outcomes in developing countries resulted in improving knowledge of danger signs in women, increased numbers of facility deliveries and skilled care attendance (178). Similarly, a systematic review and meta-analysis of male involvement and maternal outcome demonstrated significant effects on facility deliveries, BP/CR and reduced maternal depression (179). These beneficial effects could be explained by the acquired knowledge about the importance of maternal health. This makes the couple aware of the potential dangers of pregnancy and childbirth and the importance of seeking care as well as being prepared for childbirth and complications. As others have argued, those interventions that improve knowledge of maternal health in the whole community especially among expectant fathers lead to improved male involvement (104, 180). The intervention conducted in this study contributed to improved knowledge and hence larger involvement, which, hopefully, will lead to a reduction in maternal morbidity and mortality.

Another explanation for improved male involvement could be shared decision-making in the family on matters related to seeking care for childbirth. The intervention has shown there was greater shared decision-making for the place of delivery. Shared decision-making is often taken as a proxy for spousal communication (103, 104, 163, 181). In a patriarchal society such as this community, men are regarded as providers and decision-makers in all matters related to pregnancy and childbirth, reinforcing hegemonic masculinity constructs (93, 94). However, there are positive changes in this regard where men consult with their wives before making a decision on what action to take (110). When women are involved in decision-making they feel empowered to decide and they involve their spouses in achieving their own health-care-seeking during the prenatal period. This also contributes to more men accompanying their spouses to ANC and eventually increases utilisation of skilled care (182). In addition, increased couple communication contributes to a more equitable relationship and hence challenges the pervasive gender norms. In a study completed in Malawi, the Malawi Male Motivator project demonstrated an increased use of contraceptives among couples when spousal communication was encouraged (183).
Whilst it is important to encourage male involvement, it is essential for health workers not to unintentionally reinforce gender roles by demanding that pregnant women who are single be accompanied by a man to ANC or else they will sometimes be refused access to the services they provide (Paper I). These actions could lead to a reduction in attendance or non-attendance at ANC due to such stigmas, especially those in relation to the testing of HIV (184). This effect has also been demonstrated elsewhere, for example, in Malawi and Tanzania (48, 185). A qualitative research study conducted in Malawi on male involvement in ANC described that the policy of ‘first and fast’ services to women who came with spouses could cause stigmatisation and unfair treatment of unaccompanied pregnant women (48). This has a further potential to reinforce gender norms and constructs of hegemonic masculinity that promote the idea that men are more important in the community. This highlights the need for health workers to encourage women to attend ANC, even if they are unable or disinclined to bring their male partner along to the appointments. Equally, the infrastructure at the facilities that provide couples with privacy and the attitude of health workers towards men should be improved so that the health system can accommodate the increasing interest of male involvement in maternal health.

Methodological considerations

Qualitative study

This thesis has used mixed methods. In Paper I, a qualitative method was used to explore a deeper understanding of the community perspectives in relation to birth preparedness and complication readiness (BP/CR). Focus Group Discussions (FGDs) allowed the community members to discuss openly their experiences, perception and challenges using their own words, which is difficult to achieve with quantitative studies (186). Furthermore, participants were selected according to age; hence they were given a sense of freedom to speak without fearing insubordination from the elders. Participants’ views and the phrases that they used in relation to their BP/CR were used to make minor changes in the JHPIEGO questionnaire for Papers II, III and IV. One such change included adding the purchase of a birth kit as an extra component in BP/CR. The community mentioned that, as part of preparation for childbirth, they had to buy materials such as syringes, sterile gloves, cord ties, mackintoshes and surgical blades. Making these additions to the questionnaire contributed highly to the quality of the study.

In qualitative research, trustworthiness has been established as a means of assessing the quality and validity of qualitative research. The four aspects of
trustworthiness in qualitative research are credibility, transferability, dependability and conformability (101, 105).

Credibility refers to whether data and its analysis address the intended focus. In this study we aimed to ensure credibility by describing thoroughly the method (FGD) that was employed, using a topic guide during the discussions, systematically analysing the data, staying close to the transcripts and describing the findings illustrated by quotes. Repeated reflection over the emerging subcategories and categories was seen as crucial during the analysis; this, and the collaboration with the international team of co-authors, added to the credibility of the findings.

The degree to which the findings can be applicable to other settings is referred as transferability. The detailed descriptions of the study context, selection criteria, description of the participants, data collection and analysis, together with use of quotes, will assist the reader to assess the possibility to apply the findings to other settings. The use of theoretical frameworks during analysis supports the improvement of the transferability (187).

Dependability refers to the possibility of changes in data collection and analysis over time and the ability of the research to account for any changes. Threat to the dependability was reduced by using a topic guide that allowed for consistency throughout the entire data collection process. The same group of researchers held the FGDs during a relatively short period of time; two months. Providing this information will enable future researchers to understand the study and repeat similar works.

Using Swahili for data collection ensured that participants spoke freely in the FGDs and that they could interact with researchers and feel able to express their experiences and perceptions. This contributed to the confirmability of the study. Furthermore, the researchers involved in the data collection and analysis had extensive knowledge and pre-understanding of maternal health, which is described. The study was strengthened by having a combination of researchers from Tanzania and Sweden and by having frequent constructive discussions. Methodological descriptions, including strength and limitations, have been discussed in the separate publications in order to allow the reader to be aware of possible bias.

Quantitative studies
Cross-sectional studies
This was a before-and-after study with a comparison group that utilised cross-sectional surveys (Papers II – IV). In Paper II, the study aimed at
demonstrating the association between being prepared and socio-demographic characteristics and knowledge of danger signs. Inherent to cross-sectional studies is the issue that we cannot establish causation. One limitation is recall bias however some participants might have remembered vividly if a complication occurred in the two years before the study was conducted. Additionally, we believe that the short duration might not have profoundly affected the recall bias. Further, social desirability is another limitation. By working with experienced senior medical students using a standardised instrument, and also by guaranteeing confidentiality and anonymity of the information obtained, we aimed to minimise this bias. Non-response bias was dealt with by following up eligible participants at least three times, as well as following up with those who had incomplete data for completion and correction.

Another important limitation is that answers to knowledge questions were all given the same weight during data analysis. One could argue, for example, that knowledge of severe bleeding during childbirth is more important than high-grade fever. However, it was decided to use the composite scoring system to capture male involvement. In the literature there is no standardised way to evaluate male involvement; therefore it is important that the research community devises a standardised methodology so that results can be compared across different contexts. This could be in the form of describing different distinct domains of male involvement such as inter-spousal communications or practical preparations and measure each individually. It is also difficult to make causal pathways between before and after in an intervention study design due to its lack of randomisation.

Internal validity

Internal validity refers to whether the study outcome is caused by the independent variable rather than other factors. There are several potential threats to internal validity. Several measures were taken to make sure these threats were addressed. The participants were selected randomly in the intervention and comparison districts and this could have reduced the risk of selection bias. History concerns with whether unanticipated events, such as intensive media campaigns, occurred during the intervention and whether these affected the outcome. However, there were no such campaigns promoted during the study period in the area. The use of a comparison group minimised the risk of maturational that is related to the processes that affect the study participants in relation to time rather than the intervention itself. In our study, we used the same validated pre-tested questionnaire at baseline and endline surveys and this helped to minimise the threat of instrumentation that is the risk associated with changing the measures that were used between two data collections.
External validity, generalisability
External validity indicates whether the finding would hold true for other persons in other places and at other times. One way to ensure this is the inclusion of a representative sample and setting. Participants were selected using a multi-stage random sampling technique to ensure that they were representative of the population being studied. This study was conducted in a rural setting and the communities were well matched in socio-demographic characteristics. This strategy could have improved the reliability of the results in terms of the knowledge on maternal health. However, it cannot be stated that this rural population sample is applicable to the urban setting, for example. Therefore, caution must be exercised when generalising the results of this study to the total population.

Difference in Differences (DID)
To assess the impact of the intervention, this thesis employed the Difference in Differences method. This method, also known as ‘double difference’, compares the changes of outcome over time between the intervention and comparison groups. It gives a stronger impact estimate than a single difference, which only compares the difference in outcome between intervention and comparison groups following the intervention. Applying the DID method removes the difference in outcome between intervention and comparison groups at the baseline. This is a good approach for calculating quantitative impact estimate; however, one of the limitations of this method is that it is does not completely avoid selection bias.
Conclusion

Challenges that a rural Tanzanian community face to prepare for childbirth were explored. Prioritised needs were identified, together with barriers to fulfill the intentions to act. In order to reduce the barriers and improve knowledge, facility deliveries and male involvement in maternal health, an intervention of Home Based Life Saving Skills training, provided by CHWs, was performed and evaluated.

This thesis has shown that this rural community favours the utilisation of skilled care attendance for ANC and delivery. There are some barriers that may contribute to non-realisation of this intention. These barriers included high costs of transport, long distance to health facility, lack of advanced preparations for childbirth and complications, costs related to purchase of birth kits and inappropriate attitude of health workers for example towards unmarried mothers.

Men were shown to have limited knowledge of dangers signs and only a small proportion was prepared for childbirth and obstetric complication. Living in a rural area was associated with less likelihood of being prepared for childbirth. Knowledge of danger signs during pregnancy was associated with being prepared among men.

The community-based intervention of educating pregnant women, husbands and families on HBLSS by CHWs has demonstrated that it is effective. This kind of intervention is effective in improving knowledge of danger signs, knowledge and actions on BP/CR among men and women. Utilisation of ANC by making the recommended four visits improved following the intervention. The intervention demonstrated effect in increasing facility delivery in the rural community.

Male involvement was demonstrated to improve in terms of men escorting their spouses to ANC and delivery and shared decision-making for place of delivery. Further, it might possibly be feasible to conduct a similar intervention by deploying CHWs in other rural communities in Tanzania.
Implications and Recommendations

Based on the research findings, there are several policy implications that can be derived from this thesis. The linkage between health workers and CHWs in this type of intervention has the potential to improve the utilisation of skilled care for antenatal care and delivery. Addressing the issues that relate to the barriers affecting that utilisation is important so as to improve maternal health, especially in rural areas. The following is recommended in order to improve service provision in the health system;

Policy/National level

• The formalisation of integrating CHWs into the health system must be implemented as they make an important contribution to health promotion during ANC and delivery.
• As there is a clear benefit of involving men in maternal health, it is advisable to include a strategy on the promotion of male involvement in the National Maternal Neonatal and Child Health policy documents related to ANC and delivery care.
• There is a need to improve rural infrastructure so that roads are passable and health facilities are accessible by providing reliable and supportive mechanisms, for example, ambulance services, throughout the year.

Health Facility level

• Health facilities should be well equipped and health workers should, through their continued training, and health workers are able to provide equal, accountable care of good quality to accommodate the increasing demand for services.
• The training of health workers on how to encourage male involvement in a positive way is advocated.
• As the health workers will preferably be linking with CHWs in the provision of services, they will also need training in effective supervision methods.
• Health workers can facilitate participatory community sessions on pregnancy and childbirth with CHWs, community members and village leaders to foster an understanding of the importance of men and
women getting involved together towards improving maternal health.

- To accommodate an increased interest in men for attending ANC and delivery, the health facilities must present an environment that is conducive to promoting and supporting their involvement.

At community/individual level

- Communities should be encouraged to start discussions in relation to the solutions to transportation problems through the creation of common transportation schemes, or the use of common health insurance funds, for women to reach skilled care for birth.
- This intervention has demonstrated that men can be positive agents for change in matters related to maternal health. Communities should be encouraged to continue the dialogue between men and women to reduce gender inequalities.
- The continued use of services provided by CHWs by both men and women is strongly encouraged as this is shown to make a potential contribution in increasing male involvement.
Summary in English

Maternal mortality is a major health problem, particularly in low-income countries and especially in the Sub-Saharan regions. The WHO estimated in 2015 that 303,000 women died from complications related to pregnancy, childbearing or unsafe abortion, mostly in developing countries. The unfinished agenda from the Millennium Development Goals continues in the new Sustainable Developing Goals focusing on every nation’s responsibility to improve health systems to meet their specific challenges. Tanzania still has unacceptably high maternal mortality; 432 per 100,000 live births and an infant mortality rate of 45 per 1,000 live births. The country has a population of 45 million people and a rapid population growth; 71% reside in rural areas and almost a third of the population is living below the national poverty line of less than 0.60 USD a day. Fifty percent of deliveries occur at home in Tanzania, without skilled birth attendants. Previous studies from Tanzania have shown weaknesses in the quality of care and referrals, low knowledge and preparation of childbirth, and low compliance to referral advice in rural areas. These findings lead to the need of an intervention in rural Tanzania to improve the outcome of pregnancies.

The aim of the project was to explore social-cultural, community and traditional practices that impact on women’s birth preparedness and access and utilisation of emergency obstetric care services in a rural district. A further aim was to assess the impact of the Home Based Life Saving Skills (HBLSS) programme on facility delivery, knowledge of obstetric danger signs, birth preparedness and complication readiness among both women and men in the community.

This project started with a qualitative study to obtain an understanding of the perceptions, experiences and challenges that the community faces on birth preparedness and complication readiness. Twelve focus group discussions (FGD) with a total of 132 participants were held in rural villages. The findings showed that community members considered the family to be responsible for supporting the pregnant women. Despite the fact that maternal health care should be provided for free, it was not perceived as such, due to additionally demanded costs.

Among the community members, there was an understanding of the necessity to prepare for childbirth and facility delivery is preferred. However, there
were barriers to adhere to this intention that were associated with poverty and the stigmatisation of unmarried women, which affected the preparation for childbirth. Traditional beliefs were seen as fading out, which illustrated that men, traditionally the sole decision-makers, are nowadays more involved and consulted the women in their family more often in matters related to childbirth (Paper I).

In order to determine the knowledge of danger signs of obstetric complications and birth preparedness among men in the community, a cross-sectional survey in a rural region was performed. Seven hundred and fifty-six men were invited to participate, 96% of which agreed to answer a questionnaire. They were all fathers and their partners had delivered within the last two years. Only half of the interviewed men could mention at least one complication during pregnancy, and less during delivery and in the postpartum period. Only twelve percent of the men were considered to be prepared for the coming childbirth, according to a scoring system that was developed. Birth preparedness was associated with men’s knowledge of danger signs; however, it was less likely for men living in the rural area to be well prepared. These findings suggest a need to execute an educational intervention that includes men (Paper II).

With the aim of increasing knowledge, preparedness for childbirth and institutional deliveries, an intervention was performed following the concept of the HBLSS programme. This is a community-based training programme developed by the American College of Nurse Midwives. The author of this thesis is, by profession, an obstetrician/gynaecologist and has been trained in HBLSS approach and is a master trainer. The training is provided to pregnant women together with their immediate family members in their homes, with the aim of recognising life-threatening conditions, promoting health-seeking behavior, birth preparedness and complication readiness, and to use life-saving skills if a problem occurs.

The novelty in this project is to use community health workers to provide this home-based training, instead of professional health workers. Community health workers (CHWs) are trusted volunteers within the community, and are usually employed for assisting in immunisation programmes and in public health information. The master trainer conducted HBLSS training with 24 health workers. This training is conducted through story-telling, role-playing and skill acquisition. The health workers trained and supervised 66 community health workers, who reached 1,542 pregnant women and their families in 28 randomly selected villages. The CHWs made four visits in each home and gave the families education using dialogue and pictorial ‘Take Action Cards’. Another district in the same region, with the same socio-demographic, economic and occupational determinants, was used as a com-
parison district, where pregnant women received routine antenatal care. Evaluation of the intervention, with a survey two years later, included 1,528 women in the two districts. The effect showed that utilisation of antenatal care, facility deliveries, knowledge of danger signs, knowledge and practice of birth preparedness and complication readiness increased significantly among women in the intervention district compared to the other district (Paper III).

Reproductive health programmes often evaluate the situation for women only. However, men, having the financial power in the families and traditionally being the main decision-makers, which, to a large extent, influences the possibility for women to access health care, are less often involved and studied. At baseline, 1,378 men were interviewed, and 1,358 after two years of HBLSS intervention. The effect, focusing on male involvement, was compared before and after the intervention in the intervention and the comparison districts. With this home-based education programme, provided by CHWs, we found an increase in male involvement, regarding the escorting of the wife to antenatal visits, and escorting her to facility deliveries, making joint discussions with the partner on where to deliver, having knowledge of obstetric danger signs, birth preparedness, complication readiness, and facility deliveries. These are all promising results and demonstrate that when the health system has a limited number of skilled health workers to provide this training to increase knowledge to prepare for childbirth, CHWs can be deployed to improve male involvement and reproductive health outcomes (Paper IV).

Utafiti unaonyesha kwamba akina mama wachache wa hospitali. Takribani nchini Tanzania asilimia hamsini ya akina mama wanajifungulia hospitali, wengine wanajifungulia hospitali majumbani. Vile vile akina mama wachache wanajifungulia hospitali. Akina mama waende kliniki walau mara nne wakati wa ujauzito lakini ni asilimia 43 tu wanahudhuri mara nne. Ni muhimu akina mama waende kliniki manapata huduma za kupimwa ili kuwala afya yao, wanapatiwa ushauri nasihi kuhusu jinsi ya kujandaa mpango binafsi wa kujifungua.

Ili kuongeza idadi ya akina mama kujifungulia katika hospitali ni muhimu wa kujifungulia hospitali. Utafiti uliofanywa awali katika wilaya ya Rufiji unaonyesha kwamba ni akina mama wachache wa hospitali walau mara nne. Vile vile akina mama waende kliniki manapata huduma za kupimwa ili kuwala afya yao, wanapatiwa ushauri nasihi kuhusu jinsi ya kujandaa mpango binafsi wa kujifungua.

Kwa mantiki iyo basi tulifanya utafiti katika wilaya ya Rufiji mkoani Pwani ili kuongeza ufahamu wa jamii kuhusu dalili za hatari za wakati wa ujazito, wa hospitali wa kujifungua na baada ya kujifungua. Utafiti uliofanywa awali katika wilaya ya Rufiji unaonyesha kwamba ni akina mama wachache wa hospitali walau mara nne. Vile vile akina mama waende kliniki manapata huduma za kupimwa ili kuwala afya yao, wa hospitali wa kujifungua na baada ya kujifungua.

Kwa mantiki iyo basi tulifanya utafiti katika wilaya ya Rufiji mkoani Pwani ili kuongeza ufahamu wa jamii kuhusu dalili za hatari za wakati wa ujuzito, wa hospitali wa kujifungua na baada ya kujifungua. Utafiti uliofanywa awali katika wilaya ya Rufiji unaonyesha kwamba ni akina mama wachache wa hospitali walau mara nne. Vile vile akina mama waende kliniki manapata huduma za kupimwa ili kuwala afya yao, wa hospitali wa kujifungua na baada ya kujifungua.
kujifungua, na baada ya kufijungua, jinsi ya kujandaa kwa mpango binafsi wa kujifungua, kuongeza idadi ya akina kujifungulia hospitali na mwisho kuongeza ushiriki wa akina baba katika afya ya mama wakati wa ujauzito.

Katika utafiti huu mbinu iliyotumika ni kutumia wahudumu wa afya vijijini (WAVI) kuelimisha jamii kuhusu Stadi za kuchukua hatua majumbani. Elimu hii walipatiwa akina mama wajawazito pamoja na mume au mwenza akiwa na wanafamilia wengine kama baba mkwe au mama mkwe au shangazi. WAVI walitembelea familia hizi mara nne wakati wa ujauzito.

Matokeo ya utafiti huu yanaonyesha kwamba jamii ilielimika na ufahamu wa dalili za hatari zinazoweza kumsabibishia mama kifo uliongezeka. Akina baba na akina mama waliweza kuongeza ufahamu ukilinganisha na kabla ya elimu hajajatolewa na WAVI. Vilevile idadi ya akina baba na akina mama iliongezeka katika kujifungua katika hospitali na mjamzito pamoja na mume au mwenza akiwa na wanafamilia wengine kama baba mkwe au mama mkwe au shangazi. WAVI walitembelea familia hizi mara nne wakati wa ujauzito wa afya ya mama ni mjamzito.

Matokeo ya utafiti huu yanaonyesha kwamba jamii ilielimika na ufahamu wa dalili za hatari zinazoweza kumsabibishia mama kifo uliongezeka. Akina baba na akina mama waliweza kuongeza ufahamu ukilinganisha na kabla ya elimu hajajatolewa na WAVI. Vilevile idadi ya akina baba na akina mama iliongezeka katika kujifungua katika hospitali na mjamzito pamoja na mume au mwenza akiwa na wanafamilia wengine kama baba mkwe au mama mkwe au shangazi. WAVI walitembelea familia hizi mara nne wakati wa ujauzito wa afya ya mama ni mjamzito.

Utafiti huu pia umaonyesha ushiriki wa akina baba waliweza kuongeza ufahamu ukilinganisha na kabla ya elimu hajajatolewa na WAVI. Vilevile idadi ya akina baba na akina mama iliongezeka katika kujifungua katika hospitali na mjamzito pamoja na mume au mwenza akiwa na wanafamilia wengine kama baba mkwe au mama mkwe au shangazi. WAVI walitembelea familia hizi mara nne wakati wa ujauzito wa afya ya mama ni mjamzito.

Hivyo basi njia hii ya kutumia WAVI kutoa elimu wao kwenda kliniki mara nne wakati wa kujifungua na wakati wa kujifungua. Kwa kuongeza ushiriki wa kujifungua katika WAVI ni kiume mume au mwenza akiwa na akina mama mbili wa afya ya mama wakati wa kujifungua na kujifungua katika hospitali WAVI.
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