

**Implementation and evaluation of a health facility quality improvement
intervention for maternal and neonatal health in Southern Tanzania**

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If it walks like a duck and quacks like a duck, it must be a duck, does not apply in Quality Improvement.

David Colton

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LIST OF ABBREVIATIONS

ANC Antenatal care

ART Antiretroviral

AZT Azidothymidine

BPCR Birth Preparedness and Complication Readiness

CCHP Council Comprehensive Health Plan

CHAI Clinton Health Access Initiative

CHF Community Health Fund

CHMT Council Health Management Team

CMNH Community Maternal and Neonatal Health

CO Clinical Officer

COPE Client Oriented Provider Efficient

DANIDA Danish International Development Agency

DHIS District Health Information Software

DHS Demographic and Health Survey

DMO District Medical Officer

EmOC Emergency Obstetrics Care

e-TIQH electronic Tool to Improve Quality of Health Care

FANC Focused Antenatal Care

HAART Highly Active Anti-Retroviral Therapy

HIV/AIDS Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome

HMIS Health Management Information System

HRH Human Resources for Health

IHI Ifakara Health Institute

IMCI Integrated Management of Childhood Illness

INSIST Improving Newborn Survival in Southern Tanzania

IPTp Intermittent preventive treatment during pregnancy

IQR Interquartile Range

ISAQH Initiative to strengthen affordability and quality of healthcare

ITN Insecticide Treated Net

LGA Local Government Authorities

LLIN Long-lasting insecticidal nets

LSHTM London School of Hygiene and Tropical Medicine

MCH Mother and Child Health

MDG Millennium Development Goals

MeSH Medical Subject Headings

MMR Maternal Mortality Ratio

MNH maternal and Neonatal Health

MoH Ministry of Health

MoHCDGEC Ministry of Health, Community Development, Gender, Elderly and Children

MoHSW Ministry of Health and Social Welfare

MSD Medical Stores Department

NBS National Bureau of Statistics

NIMR National Institute for Medical Research

NMR Neonatal Mortality Rate

OPD Out Patient Department

PCR Polymerase Chain Reaction

PDCA Plan-Do-Check-Act

PHC Primary Health Care

PMTCT Preventing Mother to Child Transmission

PNC Postnatal care

PORALG President's Office Regional Administration and Local Government

PPP Public Private Partnership

RCHS Reproductive and Child Health Services

RHMT Regional Health Management Team

SBM-R Standards Based Management and Recognition

SQUIRE Standards for Quality Improvement Reporting Excellence

STPH Swiss Tropical and Public Health Institute

TBA Traditional Birth Attendant

THDS Tanzania Health and Demographic Survey

TQM Total Quality Management

TV Television

UK United Kingdom

UN United Nations

UNFPA United Nations Population Fund

UNICEF United Nations Children's Fund

WHO World Health Organization

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SUMMARY

Maternal and neonatal deaths are still major public health problems in Tanzania. Efforts to improve quality of healthcare delivery have been put in place especially in the area of maternal and neonatal health in order to reduce the number of deaths and to ensure healthy living for every woman and child. In Tanzania, almost every pregnant woman receives antenatal care at least once, however, despite this high coverage, the quality of services provided during the antenatal care is low. In addition, the number of institutional deliveries is not proportional to the level of antenatal care, i.e. the number of facility deliveries constitute almost half of the total number of at least one antenatal visit. Furthermore, the quality of care of these few facility deliveries is also a problem.

Thus, a study focusing on "Improving Newborn Survival in Southern Tanzania(INSIST)" was designed to implement and evaluate cost effectiveness of interventions to improve neonatal survival in rural southern Tanzania. This setting is among the areas that accounts for the highest national maternal and neonatal mortality and morbidity.

This PhD thesis focused on contributing to a better understanding of the development, implementation and evaluation of a health facility intervention using a quality improvement (QI) approach in Ruangwa district, Lindi region from 2010 to 2011. The following three objectives were achieved: 1.) To describe the development and implementation of the QI intervention used in INSIST project; 2.) To review evaluation of QI approaches in sub Saharan Africa through a systematic review of published literature; 3.) To understand barriers and facilitators of the QI intervention implementation among health care providers in Ruangwa district.

Our findings demonstrated that it is feasible to apply QI techniques in improving health systems performance at dispensary and health center levels. The differences in healthcare cadres and level of education was not a barrier in using QI techniques. Use of QI methods motivated and built capacity of healthcare providers. Proper counselling sessions during pregnancy improved knowledge of pregnant women and their families on pregnancy related issues and empowered them to make informed decisions such as delivering their babies in healthcare facilities.

In conclusion, this thesis reports a case that shares interesting and powerful lessons from the real-time project implementation experience that are worth taking into consideration when planning for future studies in similar settings. The use of QI methods facilitates the strengthening of health systems as we seek to balance high coverage of services with high quality of providing them.

MUHTASARI

Mojawapo ya matatizo yanayoikumba sekta ya afya Tanzania ni pamoja na vifo vya akina mama vinavyohusiana na uzazi na vya watoto wachanga. Juhudi za kuongeza ubora wa utoaji wa huduma za afya zimewekwa hususan katika eneo la afya ya mama na mtoto ili kutokomeza vifo hivi na kuhakikisha maisha yenye afya kwa kila mtoto mchanga na uzazi salama. Katika Tanzania takriban kila mwanamke mjamzito anahudhuria huduma za kliniki ya wajawazito angalau mara moja kwenye ujauzito wake, ingawa idadi ya uhudhuriaji kliniki ya wajawazito ni kubwa, kiwango cha ubora wa huduma kitolewacho wakati wa mahudhurio hayo bado hakiridhishi. Vilevile, mwamko wa kujifungua kwenye vituo vya kutolea huduma za afya hauendani na mwamko wa akina mama kuhudhuria kliniki ya wajawazito. Asilimia ya akina mama wanaojifungua kwenye vituo vya kutolea huduma za afya ni karibu nusu ya asilimia ya mahudhurio ya wajawazito kwenye vituo hivyo hivyo kwa ajili ya kliniki. Lakini pia ubora wa huduma za kujifungulia kituoni kwa idadi hiyo ndogo ya akina mama bado hairidhishi.

Utafiti uliojikita kwenye “Kuboresha Uhai wa Mtoto Mchanga Kusini mwa Tanzania” ulibuniwa ili kupata taswira kuhusu namna ya kuimarisha mfumo wa afya kupitia jamii na vituo vya kutolea huduma za afya ili kutatua matatizo haya. Utafiti huu ulitekelezwa katika Halmashauri za Wilaya sita za mikoa ya Lindi na Mtwara, kusini mwa Tanzania. Eneo hili ni moja kati ya maeneo ambayo yanachangia kwa kiasi kikubwa kitaifa vifo vya watoto wachanga na vya akina mama wajawazito au mara tu baada ya kujifungua.

Utafiti wa kizamivu ulifanyika katika kuandaaa, kutekeleza na kutathmini afua kwenye vituo vya kutolea huduma za afya kwa kutumia mbinu ya kuimarisha ubora katika Halmashauri ya Wilaya ya Ruangwa, Mkoa wa Lindi tangu mwaka 2010 mpaka 2011. Mbinu ya kuimarisha ubora iliyotumika ilitekelezwa kwa kuleta pamoja timu za watoa Huduma za Afya kutoka vituo tofauti tofauti vya kutolea huduma za afya, ambao wana lengo moja katika kufanya kazi kwa pamoja kwa kuzingatia utaratibu maalumu ili kuboresha utoaji huduma za uzazi kwa akina mama wajamzito na watoto wachanga. Mbinu hii ilifanya kazi kupitia washiriki kutoa mawazo yenye kuleta mabadiliko ya kuboresha mfumo uliopo, kufuatilia utekelezaji wa mabadiliko mara kwa mara kupitia ukusanyaji wa takwimu, kushirikishana uzoefu na kujifunza. Mada walizofanyia kazi zilijumuisha ushauri juu ya maandalizi ya kujifungua, mama kujifungulia kituoni, namna ya kutumia grafu ya uchungu, huduma baada ya kujifungua pamoja na chanjo.

Ili kuweza kujifunza kama mbinu hii inafanya kazi na ni kwa namna gani iliweza kuleta mafanikio katika utoaji huduma, utafiti huu wa kizamivu unalenga kuelezea utekelezaji wa afua na kutathmini mtazamo wa watoa huduma za afya juu ya afua ya uimarishaji ubora kwa kupitia “qualitative study”.

Utafiti huu una malengo matatu: 1.) Kuelezea uandaaji na utekelezaji wa afua ya uimarishaji ubora iliyotumika kwenye mradi wa INSIST; 2.) Kufanya mapitio ya tathmini ya mbinu za uimarishaji ubora wa afya barani Afrika - Kusini mwa Jangwa la Sahara kwa kupitia hatua kwa hatua tafiti zilizochapishwa; 3.) Kuelewa vikwazo na viwezeshi vya utekelezaji wa afua ya uimarishaji ubora miongoni mwa watoa huduma za afya katika Halmashauri ya Wilaya ya Ruangwa. Matokeo yanalenga katika kuchangia ushahidi wa kisayansi kuhusu na kwa namna gani afua za uimarishaji ubora zinavyoweza kupunguza maradhi na vifo vya mama wajawazito na watoto wachanga nchini Tanzania.

Matokeo yetu yameashiria kwamba inawezekana kutumia mbinu za kuboresha utoaji huduma ili kuboresha mfumo wa afya kwenye ngazi za vituo vya afya na zahanati. Tofauti kati ya kada mbalimbali na viwango vya elimu vya watoa huduma za afya haileti kipingamizi kwenye matumizi ya mbinu za kuboreshaji utoaji huduma. Matumizi ya mbinu za uboreshaji utoaji huduma zilihamasisha na kuongezea ujuzi watoaji huduma za afya. Utoaji ushauri fasaha wakati wa ujauzito uliwaongezea uelewa mama wajawazito na familia zao kuhusu maswala ya ujauzito na kuwatia nguvu ya kuwasaidia kufanya maamuzi yakinifu kuhusu kujifungualia kwenye vituo vya kutolea huduma za afya.

Kwa kumalizia, matokeo ya utafiti huu yametoa mafunzo yenye maslahi ambayo ni muhimu kuzingatia wakati wa kupanga tafiti za aina hii, zitakazo fanyika kwenye mazingira yanayofanana na ya Halmashauri ya Wilaya ya Ruangwa. Mapokeo ya mbinu za uimarishaji ubora katika mfumo wa afya haubagui uimarishaji wa mfumo wa afya bali unawezesha. Tunahitaji kuwa na uwiano katika kuwafikishia huduma za afya kwa wananchi na kuwapa huduma zenye ubora wa hali ya juu.

GLOSSARY

Act: A bill which has passed through the various legislative steps required for it and which has become law

Action period: the period during which quality improvement teams test and implement changes in their local settings and collect data to measure the impact of the changes.

Breakthrough series: a collaborative process designed to help health care organizations make “breakthrough” improvements in quality while reducing costs and bridging the know – do gap.

CD4: Type of white blood cells called T lymphocytes or T cells that fight infection and play an important role in immune system function.

Collaborative: a group of quality improvement teams working together to achieve a common aim

Guidelines: statements that include recommendations, intended to optimize patient care, that are informed by a systematic review of evidence and an assessment of the benefits and harms of alternative care options.

Learning sessions: a meeting during which quality improvement teams from all participating organizations come together to learn about the chosen topic and to plan changes.

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

Neonatal mortality: the death of the baby occurring during the first four weeks after birth (28 complete days).

Pilot study: a small-scale study to test the proposed study design or methodology.

Plan-Do-Study-Act cycle: shorthand for testing a change by developing a plan to test the change (Plan), carrying out the test (Do), observing and learning from the consequences (Study), and determining what modifications should be made to the test (Act).

Quality Assurance: a systematic process of checking compliance to specifications requirements or standards and implementing methods for conformance.

Quality Control: the inspecting, testing or checking service or product to find problems and defects.

Quality improvement in healthcare: consists of systematic and continuous actions that lead to measurable improvement in health care services and the health status of targeted patient groups.

Quality in healthcare: the direct correlation between the level of improved health services and the desired health outcomes of individuals and populations.

Introduction

PART I: INTRODUCTION

CHAPTER 1: BACKGROUND

This thesis aims to contribute to a better understanding of using quality improvement (QI) approaches to improve maternal and neonatal health services by looking at what is known about QI approaches in healthcare; the burden of maternal and neonatal health, the routinely available maternal and neonatal health interventions to determine how we can integrate the QI and maternal health interventions to foster maternal and neonatal survival in Tanzania. The first chapter explains the maternal and neonatal health, the burden of maternal and neonatal deaths and the existing interventions globally and locally in Tanzania.

1.1 Maternal and neonatal health

Maternal health refers to the health of women during pregnancy, childbirth and postnatal period. It takes approximately 46 weeks from gestation to postnatal period. In this period the health of the pregnant woman and the newborn baby is faced with high risk of morbidity and mortality, and requires a lot of attention and care. Women need a continuum of care to ensure the best possible health outcome for them and their newborns (Berglund and Lindmark, 2016, World Health Organization, 2004b). The continuum of care starts from preconception, to antenatal care followed by childbirth which involves the provision of midwifery care and end with postnatal care. The successful provision of the continuum of care requires a functioning health care system (World Health Organization, 2004b).

1.2 Global situation of maternal health

Every two minutes a woman dies in pregnancy or childbirth (UNFPA, 2016, Nour, 2008), although maternal deaths worldwide have decreased by 44% since 1990 (WHO, 2015b). Approximately 800 women still die each day from largely preventable causes before, during, and after the time of childbirth (WHO, 2015a). Sub-Saharan Africa alone accounted for roughly 66% (201 000) of the estimated global maternal deaths in 2015 (WHO, 2015b). The lifetime risk of maternal mortality is estimated at 1 in 36 in sub-Saharan Africa, contrasting sharply with approximately 1 in 4900 in developed countries (WHO, 2015b). Knowing the level of maternal mortality is not enough; we need to understand the underlying factors that led to the deaths and then prevent them (World Health Organization, 2004a).

1.2.1 Why do women die?

Women die as a result of complications during and following pregnancy and childbirth, most of these complications are preventable or treatable (Bhutta et al., 2014a, WHO, 2015a). Other complications may exist before pregnancy but worsen during pregnancy, especially if not managed or managed poorly beforehand (Dumont et al., 2006). The major complications

that account for nearly 75% of all maternal deaths are: maternal haemorrhage, maternal sepsis and other pregnancy-related infections, hypertensive disorders of pregnancy, obstructed labour and abortion.

1.2.2 Why do women not get the care they need?

In high-income countries, virtually all women have at least four antenatal care (ANC) visits, are attended by a skilled health worker during childbirth and receive postpartum care (World Health Organization, 2005); this is not the case worldwide, and especially not in low-income countries. While the global ANC of at least one visit coverage had reached approximately 83% by 2015, only 64% of pregnant women received the recommended minimum of four ANC visits and 74% of women delivered with skilled assistance (World Health Organization, 2015). In sub Saharan Africa, only 51% of women benefited from skilled care during childbirth and 77% of pregnant women had at least one ANC visit (Finlayson and Downe, 2013, World Health Organization, 2015). This means that millions of births are still not assisted by skilled personnel. WHO defines skilled personnel as accredited health professionals, such as a midwife, doctor or nurse, who have been educated and 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 (World Health Organization, 2004b). Factors that prevent women from receiving or seeking care during pregnancy and childbirth, include but not limited to poverty, distance, lack of information, poor quality of care, inadequate services, and cultural practices (Evjen-Olsen et al., 2008, Afari et al., 2014).

1.3 Global situation of neonatal health

During the 1990s, neonatal deaths were hardly mentioned in global health circles (Lawn et al., 2009). The Millennium Development Goals (MDGs) have been associated with remarkable progress in the reduction of under five deaths. The rate of under five deaths in 1990 was 90 per 1000 live births, and was reduced to 43 per 1000 live births in 2015 (United Nations, 2015). Globally, the neonatal mortality rate fell from 36 deaths per 1,000 live births in 1990 to 19 in 2015 (UNICEF, 2015). The decline in neonatal mortality from 1990 to 2015 has been slower than that of post neonatal under five mortality: 47% compared with 58% globally. Thus, neonatal mortality reduction has progressed about 30% more slowly than post neonatal under five mortality (Lawn et al., 2014). South America has made remarkable progress in reducing neonatal deaths compared to sub Saharan Africa and Asia. More than half of neonatal deaths occur in the five highest burden countries: India (779 000 deaths),

Nigeria (276 000), Pakistan (202 400), China (157 400), Democratic Republic of Congo (118 100) (Lawn et al., 2014). Estimates of major global direct causes of neonatal deaths in 2010 were; 35% direct complications from preterm birth, 23% intrapartum-related events, and 27% infections, including sepsis, pneumonia, diarrhea, meningitis and tetanus. Most of these maternal and neonatal deaths occur during labor, child birth or immediately after child birth, making it crucial to have effective intrapartum strategies which could address this area.

1.4 Tanzania situation of maternal and neonatal health

Maternal mortality is still a major public health concern in Tanzania and it is one of the countries that have not attained its MDG 5 target. The target was to reduce maternal mortality ratio (MMR) to 193 per 100,000 live births by December 31st, 2015. However, the MMR has declined from 870 per 100,000 live births in 1990 to 432 per 100,000 live births (Ministry of Health and Social Welfare, 2015). This figure put Tanzania among the ten countries that account for nearly 59% of global maternal deaths, alone it contributes 8200 deaths per year (WHO, 2015b). Both maternal and neonatal deaths are mainly due to direct causes. Major maternal direct causes in Tanzania are infection (40%), abortion (25%), eclampsia (13%), post-partum hemorrhage (12%), obstructed labour (6%) and others (4%) (Sorensen et al., 2010). Effective intrapartum strategies like giving birth with the assistance of a skilled attendant can reduce the risk of preventable death or disability (Adegoke et al., 2012). Rosmans et al, (2006) have demonstrated that a large proportion of maternal deaths take place in hospitals, which raises concern about the quality of care provided by the skilled attendants (Ronsmans and Graham, 2006, Afnan-Holmes et al., 2015). Furthermore, not all institutions offering maternity services meet minimum standards for safe childbirth and newborn care: absence of health-care providers, outdated knowledge and inadequate skills, lack of essential medicines, supplies and equipment, overcrowding and inadequate hygiene are far too common (Hanson et al., 2013, Tancred et al., 2016, Agha, 2010, Singh et al., 2016, Hirschhorn et al., 2015).

1.5 Proven basic interventions for maternal and neonatal survival

Table 1 presents a summary of proven effective interventions for maternal and neonatal survival (Darmstadt et al., 2005). It is estimated universal implementation of these packages of interventions potentially will avert approximately 41-72% of maternal and neonatal mortality (Darmstadt et al., 2005). Quality of care is currently the main issue that needs to be addressed in order to achieve positive impact of these interventions in health outcomes. Closure of the quality gap through the provision of these effective interventions for all

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women and newborn babies delivered in health facilities could prevent an estimated 113 000 maternal deaths, 531 000 stillbirths, and 1. 325 million neonatal deaths annually by 2020 (Bhutta et al., 2014a).

Table 1: Proven interventions to facilitate maternal and neonatal survival

Preconception	Antenatal	Intrapartum	Postnatal
Folic acid supplementation	Tetanus toxoid immunization	Labour surveillance (including partograph)	Resuscitation of newborn baby
	Syphilis screening and treatment	Skilled attendant at birth;	Breastfeeding
	Pre-eclampsia and eclampsia: prevention	Clean delivery practices	Prevention and management of hypothermia
	Intermittent presumptive treatment for Malaria	Emergency obstetric care package	Kangaroo mother care (low birthweight)
	Physical examination	Active management of third stage of labour	Family planning (birth spacing) [Mother]
	Counselling on birth preparedness and complications readiness		
	Counselling on pregnancy and neonatal danger signs		

1.6 Tanzania health policy, guidelines and health system

Here we explain the political commitments and existing policies that the Tanzanian government implements to support Reproductive and Child Health Services (RCHS), quality improvement initiatives and the overall healthcare system structure of Tanzania.

1.6.1 Tanzania health policy, strategies and guidelines

The Government of Tanzania has developed a number of enabling blueprints in an effort to strengthen its health sector, including the National Health Policy 2007 and National Vision 2025. In addition to these, there are Health Sector Strategic Plans, Primary Health Services Development Programme (PHSDP) which are being followed and implemented by health sector governing bodies. Furthermore, the Ministry of Health Community Development Gender Elderly and Children (MoHCDEGEC), together with its collaborating partners, has developed several frameworks and guidelines targeting improving services and quality of care. These include the National Reproductive Maternal, Newborn, Child and Adolescent Health Clinical Mentorship Guideline, The Tanzania Quality Improvement Framework in Health Care 2011 – 2016, Implementation Guideline for 5S-CQI-TQM Approaches in Tanzania “Foundation of all Quality Improvement Programme”, The National Road Map Strategic Plan to Improve Reproductive, Maternal, Newborn, Child & Adolescent Health in Tanzania (2016 - 2020).

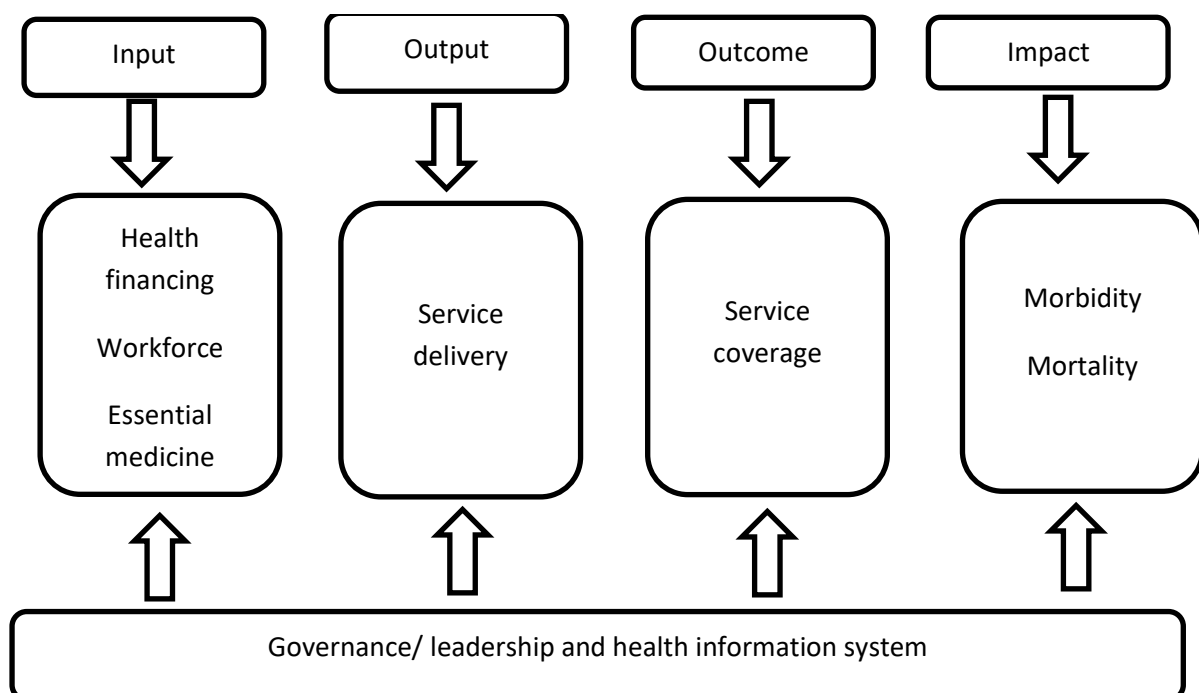
Since 1974, the Government of Tanzania has committed itself to address the problem of high maternal and child mortality and low quality of care (Ministry of Health and Social Welfare, 2008). It has developed and adapted strategies and guidelines which put improvement of RCHS as one of top priority areas for the nation. Neonates were almost unmentioned in the policy timeline pre-2005 (Afnan-Holmes et al., 2015). Vision 2025 is a wider government official roadmap (Planning Commission, 1995). The main objective is to achieve high quality livelihood for all Tanzanians including: access to quality primary health care for all, access to quality reproductive health service for all individuals of appropriate ages and reduction in infant and maternal mortality rates by three quarters of the levels in 1995 when the document was prepared. Tanzania is also one of the signatory countries of MDG and Sustainable Developing Goals (SDG), hence it strived to achieve the then MDGs and now the current SDGs. The Government is committed to take responsibility to further transform the way it works in the period from 2016 to 2030 to be more efficient and effective.

1.6.2 Health systems

Health system is defined by WHO as: (i) all the activities whose primary purpose is to promote, restore and/or maintain health; (ii) the people, institutions and resources, arranged together in accordance with established policies, to improve the health of the population they serve, while responding to people’s legitimate expectations and protecting them against the cost of ill-health through a variety of activities whose primary intent is to improve health (World Health Organization, 2010). The health system delivers preventive, promotive, curative and rehabilitative interventions through a combination of public health actions and the pyramid of health care facilities that deliver personal health care by governmental and nongovernmental actors (World Health Organization, 2010).

WHO has categorized health systems into six building blocks, which are health service delivery, health work force, health financing, essential medicine, health information and leadership/governance (Savigny and Adam, 2009). Day to day functions of health systems components are interlinked with one another. However, in order to understand their individual contribution in health systems performance, health systems components are sorted out under the evaluation framework to understand the processes and resources needed to maximize impact of health outcomes. Figure 1 shows the health system evaluation framework (WHO, 2009).

Figure 1: Health systems evaluation framework



Service coverage is one of the key components in this evaluation framework; however, the aspect of quality of care is missing. It is suggested to couple quality of care with coverage in order to get maximum benefit of health systems function. This is important especially now that we enter the new era of SDGs. For instance, both the UN and WHO report that the proportion of women and children receiving health care in the poorest countries is increasing (World Health Organization, 2015, United Nations, 2015), but, markers of improved health outcomes, such as falling maternal or newborn mortality have not matched expectations from the gains in the coverage of care (Graham et al., 2013). This disconnect between increased levels of care and expected rise in improved health outcomes, may be need to be addressed by an increased focus on quality of care (World Health Organization, 2016).

1.7 Health systems influence on RCHS in Tanzania

Maternal and neonatal mortality are important measures of women's health and indicative of the performance and functionality of health care system in any country (Carla AbouZahr and Tessa Wardlaw, 2001).

1.7.1 Health care financing: This is one of the key and very important inputs to the health care system; it has an impact on almost every other component within the health systems. Lately, Tanzania has been on a growing demand for access to high quality and affordable care for all, thus the government has responded with a process of developing a health financing strategy by improving the prepayment mechanisms which is assumed to be a potential facilitator in the progress towards universal health coverage.

Tanzania health spending is still far less than the 15% (fifteen percent) of country's annual budget that was agreed by African Union heads of state during the Abuja Declaration (Ministry of Health and Social Welfare, 2011, WHO, 2011). Total health expenditure as a percent of GDP increased from 5% (five percent) in 2002/03 to 8% (eight percent) in 2009/10 (Ministry of Health and Social Welfare, 2011). Donors were the major financiers of health services, contributing 40% (forty percent) of total health expenditure in 2009/10 (Ministry of Health and Social Welfare, 2011, Ministry of Health Community Development Gender Elderly and Children, 2016). In 2012 the general government expenditure on health as a percent of total government expenditure was 11.2% (world health report). Health insurance coverage is still low in Tanzania. Only 6% (six percent) of households reported having at least one of their members in National Health Insurance Fund or Community Health Fund social security scheme (The United Republic of Tanzania, 2014).

The total health expenditure for RCHS (THE_{RH}) as a percent of total health expenditure ranged between 11%(eleven percent) to 18%(eighteen percent) from 2005/06 to 2011/2012(Ministry of Health and Social Welfare, 2011, Ministry of Health Community Development Gender Elderly and Children, 2016). There was a significant decline in public sector financing for THE_{RH} , from 44% (forty-four percent) in 2005/06 to 21% (twenty-one percent) in 2009/10 and 30% (thirty percent) in 2011/2012(Ministry of Health and Social Welfare, 2011). Donors financing of reproductive health doubled between 2009/10 and 2011/12 making it the largest financing source for reproductive health, accounting for 39.2% (39.2 percent) of THE_{RH} (Ministry of Health Community Development Gender Elderly and Children, 2016). There was a 78% (seventy-eight percent) increase in capital formation in reproductive health services between 2009/10 and 2011/12 indicating greater emphasis on investment in physical and human capital to improve and expand service delivery (Ministry of Health Community Development Gender Elderly and Children, 2016).

1.7.2 Human resource for health: Globally there is a growing shortage of 7.2 million healthcare workers; and approximately 90% of all maternal deaths and 80% of still births occur in countries that lack trained healthcare workforce (Campbell J et al., 2013, Lassi et al., 2014). It is recommended by WHO that a minimum density threshold of 23 professional health workers (doctors, nurse and midwives) per 10000 population is required to at least offer effective health service delivery (Campbell J et al., 2013). The African Region accounts for a skilled health workforce deficit of 1.8 million (25% of the global total) (Campbell J et al., 2013). The Health Sector in Tanzania is understaffed and operating at less than the international standards (Ministry of Health and Social Welfare, 2013). The Ministry of Health staffing levels versus existing staff shows an enormous HRH shortage across all main cadres and there is a heavy urban/rural imbalance. 55% of health workers are serving the rural population which is 75% of the total Tanzanian population (Ministry of Health and Social Welfare, 2013). The hard to reach regions (Mtwara, Lindi, Kigoma, Rukwa) have a lower percentage of the highly trained health workers compared with the other regions (Ministry of Health and Social Welfare, 2013). In 2010, United Republic of Tanzania had an active supply of 49 900 health workers, which translates into a staff per population ratio of 148 per 100 000. Other studies show that physicians (MD and above) account for 1% of the health workforce, keeping the physician per population ratio at 4.2 per 100 000 people(Beatus K Leon and Kolstad, 2010). In the WHO estimates of health personnel in 1998, the United Republic of Tanzania had the lowest ratio of qualified staff to population of all African countries. Literature shows in Tanzania support staff clinical workers

(including medical attendants) working in the health sector form approximately one third of the whole workforce. These health workers are not appropriately trained but a large proportion of the population depend exclusively on them for health care services particularly in the rural areas of the country. There is a positive correlation between health worker density and various health indices, most notably infant mortality rate, maternal mortality rates, and various disease specific mortality and morbidity rates (Beatus K Leon and Kolstad, 2010). An increase in the number of health workers per capita is associated with a notable decline in the rates mentioned above (Beatus K Leon and Kolstad, 2010)

1.7.3 Service Delivery: Tanzania health care services are offered in pyramidal structure with primary health care (PHC) services forming the largest part (>90%) of the countries health services. The PHC comprises of community based care, dispensaries, health centers and district hospitals. These levels of service delivery are managed by district councils according to decentralization by devolution of powers and local government system that is being implemented in Tanzania since the 1990s (L. Massoi and Norman, 2009). Dispensaries and health centers alone contribute about 95% of the health services (refer Table 2). (Ministry of Health and Social Wefare, 2016). In addition to PHC, there are secondary, tertiary and national level facilities. Figure 2 presents the pyramid of health services delivery in Tanzania.

The National Health Policy Plan outlines specific governmental objectives such as improving the partnership between public, private and faith-based sectors. This collaboration between sectors was initiated in 1994 with Health Sector Reforms (HSR), which specifically addressed improving access, quality and efficiency in health service delivery.

Figure 2: Pyramid of health services delivery in Tanzania

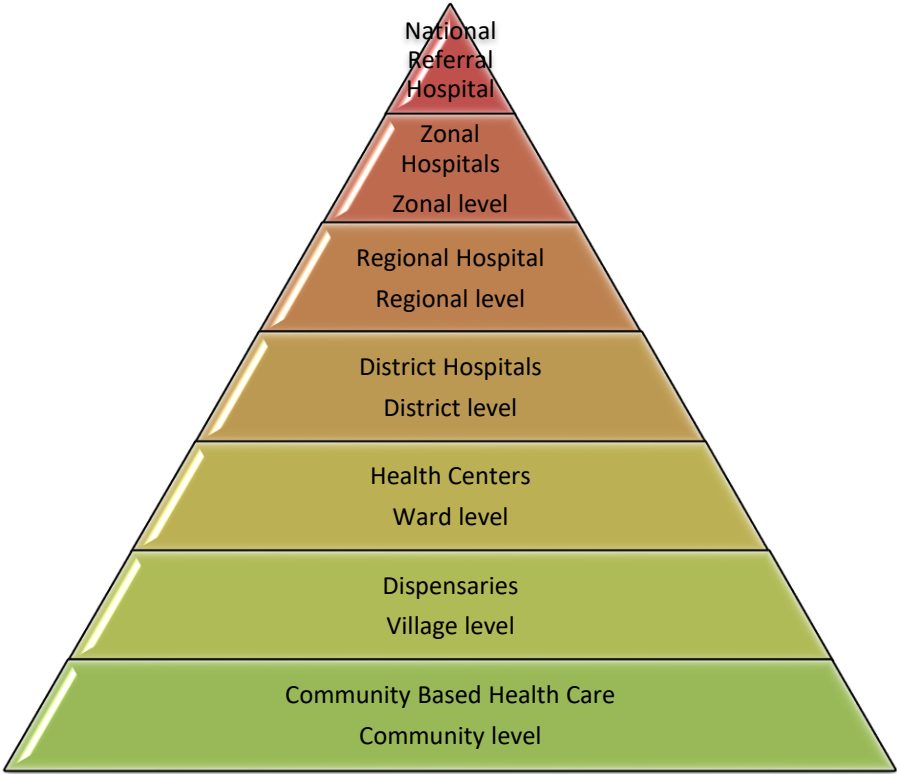


Table 2: Number of health facilities in Tanzania

Type of health facilities	2009	2010	2011
Dispensaries	5400(87%)	5469(86%)	5607(86%)
Health Centres	582(9%)	633(10%)	684(10%)
Hospitals	232(4%)	240(4%)	264(4%)
Total	6214	6342	6555

Pyramid of health services delivery in Tanzania is described below

1.7.3.1 Community based health care: Community based health care services includes preventive services which can be provided at homes; it is usually provided by two community health workers chosen by the village government from amongst the villagers who are given a short training before they start providing services (Ministry of Health and Social Welfare, 2013).

1.7.3.2 Dispensary: A standard dispensary consists of outpatient department, maternal and child health services, community health services within its catchment area. In addition, it should have toilets and a minimum of two staff quarters. It caters for population between

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6,000 and 10,000 people and supervises all the village health posts in its area. Services offered are ideally headed by a Clinical Officer and they are all outpatient except for deliveries (Ministry of Health and Social Welfare, 2013, Ministry of Health and Social Welfare, 2007).

1.7.3.3 Health Centre: A standard health center consists of outpatient department, maternal and child health services, 24 beds medical ward for female and male, obstetrics theatre, diagnostic services, mortuary, surf-burner (improvised incinerator), kitchen, store, and a minimum of 10 staff quarters 2 out of them being grade 'A staff quarters'. Recommended services for Reproductive and Child Health (RCH) services covers the following services Family Planning; Safe Motherhood Initiative; Prevention of Mother-to-Child Transmission of HIV (PMTCT); Newborn and Child Health; Immunization and Vaccine Development; Reproductive Health Cancers; Adolescent Reproductive Health; Gender Based Violence and Violence Against Children; Reproductive and Child Health Commodities.

1.7.3.4 District hospitals: District hospitals are an integral part of the PHC system forming the apex of a system of dispensaries and health centres. In addition to the services offered at a health centre, other general services are provided including in-service training, consultation and research to community based health care programmes. (Ministry of Health and Social Welfare, 2007)

1.7.3.5 Regional hospitals: Serves >1,000,000 population. In addition to services offered at the district hospital, regional hospitals have specialists in various fields. Such services include; psychiatry, ear, nose and throat, ophthalmology, dentistry, intensive care, gynaecology and obstetrics, radiology, pathology, higher level surgical and medical services.

1.7.3.6 Zone, Specialised, Consultant and National Hospitals: These provide comprehensive specialist services. In addition, they are involved in teaching and research.

1.7.4 Essential medicines, commodities and infrastructure: Drugs and medical supplies used by public health facilities in Tanzania are purchased through the Medical Stores Department (MSD). MSD is classified as an autonomous government department under MoHCDGEC. Each primary health facility has its own facility level account with MSD for the purchase and distribution of drugs and medical supplies, although it appears that in practice, facilities rely on district level officials to manage their accounts with MSD. MSD was the sole supplier of drugs and health commodities until recently when the health facilities have been permitted to purchase their requirements from private sector suppliers in case of MSD stock outs.

1.7.5 Health Information System: The Tanzanian Government through the MoHCDGEC is implementing a Health Management Information System (HMIS) as standard tools for collecting health records across all health facilities in Tanzania. The HMIS is divided into paper based tools consisting of registers, tally, and summary sheets and an electronic base referred to as District Health Information System (DHIS2)(Ministry of Health and Social Welfare, 2013). The register and tally sheets are recorded on case basis, while summary forms are computed and recorded on monthly basis, but can also be weekly, quarterly, semi-annual or annual, depending on specific needs. Summary forms contain facility's aggregated records of individual cases. The DHIS2 contains data entered on monthly basis from summary forms at the district level. Information on the DHIS2 is aggregated and shared with higher levels such as regional and national but only at district level the data can be manipulated. Among information that is being collected by the HMIS includes outpatient, in patient, immunization, antenatal care, postnatal, child health, labor and delivery. Unfortunately, the HMIS system is faced with a lot of challenges including data accuracy, completeness and timeliness(Wilms et al., 2014). These challenges limit its use in routine district health care planning, monitoring and evaluation (Salam et al., 2014). Other factors associated with poor quality data in resource constrained settings include duplicate, parallel reporting channels and insufficient capacity to analyze and use data for decision making (Salam et al., 2014).

1.7.6 Good governance and leadership: Tanzania has opted for decentralization by devolution of its power to lower geographical levels. The mandate to decentralize the country came from the Local Government Act (1982) which aimed at ensuring good governance and democratic participation. Under decentralization the lower level structures

have been given responsibility to plan, implement and manage development activities not only for health rather for other sectors as well. The central government is now mainly concerned with policy formulation, standard-setting, and quality assurance; resource mobilization, capacity building and technical support, provision of nationally coordinated services such as epidemic control, coordination of health services, monitoring and evaluation of the overall sector performance and training. The district councils are now implementers of the health and other policies. In principle, the transfer of power, resources and responsibilities from central government to council level should substantially improve health service delivery. In practice, decentralization also poses important risks and challenges, as it often must be combined with efforts to reform obsolete and bureaucratic civil service structures. It also requires capacities that are not always available (Dussault and Franceschini, 2006).

1.8 Quality improvement in health care

1.8.1 History of QI in health care: Quality improvement in healthcare can be dated back to Florence Nightingale, a public health pioneer who addressed the link between paltry hospital sanitation and the high fatality rate among wounded soldiers during the Crimean War of 1854 (Chassin and E., Sheingold and Hahn, 2014). It is interesting to note that during the similar time period (between 1860 and 1960) industries were using quality improvement efforts to improve their production (Sheingold and Hahn, 2014). For example, in 1908, Henry Ford's assembly lines were employing efficient management systems that reduced waste and increased productivity (Sheingold and Hahn, 2014). In the late 1980s, health care organizations began moving away from retrospective review of processes and outcomes, which was called quality assurance, to proactive analysis, referred to as quality improvement (Colton, 2000). QI has gained acceptance, it is being applied to a broadening array of organizational processes, both administrative and clinical (Donabedian, 1978). A book by Johnson and McLaughlin in 1998 described the use of eight tools for measurement and statistical analysis in QI which are still in use to date. Institute for Healthcare Improvement together with Associates in Process Improvement have further improved the science of quality improvement (Institute for Healthcare Improvement, 2016c). 1. Flow charts or diagrams, 2. Cause-and-effect diagrams, 3. Check sheets, 4. Pareto diagrams or charts, 5. Frequency distributions (histograms), 6. Run charts, 7. Regression analysis, 8. Control charts In addition to these tools for describing processes and collecting data, QI makes use of Statistical Process Control (SPC) as the primary analytical tool for identifying variation

(Benneyan J.C et al., 2003). SPC uses probability sampling to determine when a process is unstable and in need of correction (Colton, 2000, Timmerman et al., 2010). The QI teams (health care providers) are responsible for collecting and analyzing data about work processes and applying that information to improve the process. This differs from the typical evaluation approach, which involves service providers as stakeholders but where data collection and analysis are conducted by a professionally trained evaluator (scientists). Implementing QI programs requires extensive training of staff on QI methods and supervision.

Historically after healthcare researchers adopted the industry theory and methodology of improving quality, they started using quality control, later shifted to quality assurance and now focus on quality improvement. These three theories of thought are similar in terms of seeking to improve the outcomes, however, they differ in some aspects. Table 3 presents the differences between the three terminologies and throughout this thesis we will be using quality improvement.

Table 3: Differences in quality control, assurance and improvement

Quality control	Quality assurance	Quality improvement
<ul style="list-style-type: none"> is product oriented and focuses on defect identification 	<ul style="list-style-type: none"> is process oriented and focuses on defect prevention 	<ul style="list-style-type: none"> A continuous process to review, critique, and implement positive change
<ul style="list-style-type: none"> activities whose purpose is to control the quality of products or services by finding problems and defects. 	<ul style="list-style-type: none"> developed from the realisation that quality could be improved by looking 'further up the line'. It is aimed at preventing nonconformities/defect 	<ul style="list-style-type: none"> Emphasizes systems thinking and management systems.
<ul style="list-style-type: none"> is inspecting, testing or checking service or product to make sure it's OK. Anything that isn't OK, either fix it or eliminate it, to make sure it conforms to the specifications, and functions as required 	<ul style="list-style-type: none"> in addition to testing and checking it consider related activities or processes (such as training, document control and audits) that may be resulting in defects further down the line. 	
<ul style="list-style-type: none"> is typically done at the end of the line, before it 'goes out the door' 	<ul style="list-style-type: none"> It is done throughout the process of production 	

<ul style="list-style-type: none"> • QC is something like doing periodic checks to see that a horse is still in its stable 	<ul style="list-style-type: none"> • QA would aim to make sure that the stable doors and gate locks work properly and that all the stable hands are trained and aware of the need to close and bolt doors properly 	
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1.8.2 QI in Tanzania: A desk review of ground work was done to determine the different QI initiatives and approaches which have been implemented in Tanzania. This was done in order for the project team to decide which QI approach to use for its health facility intervention. For learning purposes, a few more interventions have been added which were not present at the time of inception of this study.

Tanzania’s third and fourth health sector strategic plans aim to achieve objectively measurable quality improvement of primary health care services, delivering a package of essential services in communities and health facilities (Ministry of Health and Social Welfare, 2015). Evidence based standards and guidelines already exist for most of the world’s health priorities, particularly those embodied in the previous MDGs. Yet, evidence from countries around the world suggests that the health care provided for much of the world’s population is of very poor quality and does not meet evidence-based standards (Erum Nadeem et al., 2013). Assessing quality of care can be difficult because it covers both the complex processes of evaluating (World Health Organization, 2010), diagnosing and treating a patient as well as the outcomes of that treatment for the patient. The quality of health service delivery depends on the willingness and drive of health workers to perform their tasks, the availability of adequate resources, and health workers’ competency (Das et al., 2014). Adapted from system change in industry and business, modern quality improvement emerged forging important quality improvement concepts like standardizing work processes, data-driven decision making, and commitment from workers and managers to improving work practices. Tanzania has been engaged into several QI in health care initiatives since 1990s.

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Examples of QI initiatives are:

University Research Co., LLC under USAID Applying Science to Strengthen and Improve Systems (ASSIST) Project works with the MoHCDGEC and other implementing partners to scale up evidence-based strategies and best practices on how to improve the delivery of services to PMTCT and of antiretroviral treatment (ART) services to regions. The focus includes an analysis of barriers to implementation and finding solutions to identified gaps. For PMTCT, the target is to support national efforts to reduce mother to child transmission from the estimated 26% in 2011 to 4% in 2015. ASSIST's strategic focus is on strengthening supply chain management; developing institutional human capacity in PMTCT; and improving paediatric HIV care, treatment, and support. The project will also strengthen the integration of PMTCT and paediatric HIV care, treatment, and support services at all levels. For ART, ASSIST's focus is to build the capacity of Regional Health Management Teams (RHMTs) and Council Health Management Team (CHMTs) to coach and mentor facility-based improvement teams.

Jhpiego (an international, non-profit health organization affiliated with The Johns Hopkins University dedicated to improving the health of women and families) is using a QI approach called Standards Based Management and Recognition. They are implementing quality improvement initiatives within framework of Infection Prevention and Control in Tanzanian hospitals with funding from CDC. Using a whole-site quality improvement approach, Jhpiego and the MoHCDGEC work with teams in each hospital to address infection control and develop targeted interventions for provider and patient safety, health care waste management, injection safety and the provision of post-exposure prophylaxis for HIV/AIDS. Building on past efforts in this area, Jhpiego is supporting the government to develop and disseminate guidelines and standards, train health care workers, provide essential supplies, and promote behaviour change and communication. The goal of the program is to reduce the toll of health care associated infections in Tanzania.

PharmAccess uses Safe Care quality improvement program which introduces stepwise improvement of the level of services in healthcare facilities. The standards of Safe Care enable the healthcare providers' facilities to measure and improve the quality, safety and efficiency of their services. Safe Care introduces innovative tools, instruments and training modules to assist facilities on a journey that begins with the achievement of minimal safety principles, includes manageable steps of quality improvement along the way and if executed

appropriately will lead to substantial compliance with safety and quality standards and accreditation. The Safe Care standards are accredited by the International Society for Quality in Healthcare, the global leader in healthcare quality that “accredits the accreditors.” By using the Safe Care standards as the basis for a stepwise improvement in the quality improvement methodology, healthcare providers are empowered to deliver quality health services and facilitate on going quality improvement in order to ensure the safety of their patients, staff, and visitors. Built upon the Donabedian Model of healthcare quality, the Safe Care standards evaluate the structures and processes that guide the delivery of healthcare services.

The stepwise improvement and certification

1: Very modest quality strength. The facility is licensed to provide healthcare services but the day-to-day processes are not guided by policies or procedures resulting in potential high risk of unsafe procedures.

2: Modest quality strength. The facility is starting to operate according to structured processes and procedures, some of which are captured in written guidelines and SOPs. However, healthcare quality is still likely to fluctuate.

3: Medium quality strength. The facility is accustomed to operating according to standardized procedures, and has started to monitor implementation. Healthcare quality can still fluctuate in high risk situations due to lack of securing of procedures.

4: Strong quality systems. The facility is regularly monitoring the implementation of treatment guidelines and standard operating procedures through internal record reviews and (clinical) audits. Most high risk processes and procedures are controlled.

5: Continuous quality improvement systems. The facility has instituted measures to monitor and evaluate policy implementation and the findings are reviewed to ensure that appropriate corrective action is taken if necessary. The management team is engaged in evaluating quality of care, and the facility is ready to begin the process of applying for accreditation from an international agency.

Accreditation status: Excellent quality systems. The facility has a proven track record of continuous quality improvement, is in substantial compliance with the Safe Care standards, and meets the decision rules for accreditation by an independent organization such as Council for Health Service Accreditation of Southern Africa.

Tanzanian German Programme to Support Health(TGPSH) is a bilateral development cooperation programme between the United Republic of Tanzania and the Federal Republic

of Germany. Using a multilevel approach, they support policy development at the central level and implementation at the regional and district levels in the four regions of Lindi, Mbeya, Mtwara and Tanga. The German organizations, Gesellschaft für Internationale Zusammenarbeit (GIZ) and Kreditanstalt für Wiederaufbau (KfW) contribute to TGPSH. TGPSH uses an indicator based quality management in sexual reproductive health and rights. Using a hospital performance assessment tool, the quality of health services is regularly monitored and reviewed.

The Japan International Cooperation Agency (JICA) support Tanzania primarily on: 1) economic growth toward poverty reduction, 2) infrastructure development sustaining economic growth and poverty reduction, and 3) improvement of public services to all citizens. Strengthening Development of Human Resource for Health is a four-year technical cooperation project, started in November 2010 in order to contribute to improving the situation of human resource crisis in Tanzanian health sector within the framework of Tanzania Human Resource for Health Strategy 2008-2013.

The project had two pillars; one was to strengthen data management for HRH. Adequate production of human resource for health, deployment and retention are critical for provision of improved health services. It requires effective management of human resource based on accurate and appropriate information. The project supported the MoHCDGEC on development and rollout of HRH Information System (HRHIS), which plays a vital role in data based HRH planning, development and management.

Another pillar was to strengthen hospital management and delivery of quality health care services. Delivery of health care services was made possible not only with adequate supply of human resources but supported by improvement of quality. In view of this, the project supported rollout of 5S-KAIZEN-TQM, a Japanese management approach.

Big Results Now healthcare lab is a Government of Tanzania initiative since 2014 funded by World Bank, DANIDA and Basket Fund. By year 2018, the target is to achieve 1) 80% of primary health facilities to be rated 3 Stars and above; 2) 100% balanced distribution of skilled health workers at primary level; 3) 100% stock availability of essential medicines 4) 20% reduction in maternal mortality ratio and neonatal mortality rate in 5 regions.

These targets will be achieved through 1) Performance Management: All PHC facilities in the country will first undergo a “Star Rating” assessment, which is in essence a stepwise accreditation scheme. On the basis of baseline assessment, a facility improvement program will be implemented nation-wide to help facilities improve their performances and star ratings. 2) Human Resources for Health: This includes a set of interventions to improve the distribution of skilled health workers, especially the 7 cadres of clinicians (medical doctors and allied health practitioners) and nurses (including midwives) at the PHC level in nine regions with lower than national average human resources in the above cadres. 3) Health Commodities: This work stream tackles key issues along the health commodities supply chain - finance and business model, procurement and distribution, inventory management as well as governance. 4) Mother and Neonatal Child Health: This work stream focuses on measures to improve both coverage and quality of MNCH along the continuum of care, which includes (a) ensuring dispensaries and health centers meet Basic Emergency Obstetric and Neonatal Care (BEmONC) requirements, (b) expanding Comprehensive Emergency Obstetric and Neonatal Care (CEmONC) to selected hospitals and health centers, (d) strengthening the corresponding satellite blood banks which serve facilities with CEmONC, and (e) extending MNCH services to communities through the use of community health workers and awareness campaigns. Five regions that are poorly performing on maternal and neonatal mortality indicators were selected for priority focus (Ministry of Health and Social Welfare, 2014).

Initiative to strengthen affordability and quality of healthcare in Tanzania (ISAQH)

Between 2003 and 2012 the ACCESS program aimed to improve access to prompt and effective malaria treatment by targeting both users and providers. To reach its goal the ACCESS program considered five dimensions of access to health care (availability, accessibility, affordability, adequacy, and acceptability) and implemented interventions on supply and demand side addressing all these dimensions. For the successor initiative, the Initiative to Strengthen Affordability and Quality of Health Care (ISAQH), it was decided from 2013 onwards to mainly focus and scale up two previous components: (1) assessing

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and improving quality of health care on the supply side and (2) strengthening and expanding coverage of the Community Health Funds (CHF) on the demand side. This was done because it was clear that good quality of care was a prerequisite for the people's willingness to contribute to the CHF, and conversely increased contributions were linked to more financial, material and personal resources leading to quality improvements. Thus, the goal of ISAQH was to improve financial access to and quality of health services in all health facilities in the Morogoro Region of Tanzania. With regard to quality of care, a systematic annual assessment of health care quality augmented by follow-up management processes was introduced by the ACCESS project in 2007. In a recent development, the assessment was transformed into an electronic tool called electronic Tool to Improve Quality of Health Care (e-TIQH). After an assessment is done (taking half a day per health facility), feedback is immediately provided to the health care providers to address quality gaps within their reach. Findings, including identified strengths, quality gaps and options for improvement, are also disseminated to key health governing structures at district level. These findings are then meant to be used for district planning and budgeting, which should ultimately lead to more efficient resource allocation. Within the CHF component, ISAQH conducts capacity building at health facility level and for the district CHF coordinator to facilitate CHF data collection and reporting. Activities also aim to increase understanding of members of the government structures regarding their roles and responsibilities. In addition, the initiative strengthens the management and governance of the CHF at district level through the provision of manuals for effective CHF implementation, data management and monitoring. Furthermore, in order to increase CHF enrolment rates, the initiative developed communication strategies at all levels, it implemented CHF forums at district level to facilitate the development of district action plans on CHF promotion, and conducted CHF sensitization meetings at ward and village level as well as at schools and colleges. In addition, CHF information, education and communication materials are produced and disseminated.

PART II OBJECTIVES AND METHODOLOGY

This part of the thesis presents the implementation of a health facility QI intervention, its lessons learned and health workers' perspectives on the intervention, together with a general overview of implementing QI interventions in sub Saharan Africa countries.

CHAPTER 2: OBJECTIVES

2.1 General objective:

To describe the development, implementation and evaluation of a health facility QI intervention on maternal and neonatal health services in rural Southern Tanzania as part of the INSIST project.

2.2 Specific objectives:

- I. To describe the development and implementation of a health facility QI intervention used in the INSIST project.

- II. To understand barriers and facilitators of a health facility QI intervention implemented among health care providers in Ruangwa district.

- III. To understand implementation of QI approaches in sub Saharan Africa through a systematic review of published literature.

CHAPTER 3: METHODS

3.1. Study area

The INSIST study was conducted in six districts of rural Southern Tanzania. Three districts in the Lindi region (Lindi Rural, Nachingwea and **Ruangwa**) and other three districts in the Mtwara region (**Mtwara Rural**, Newala and Tandahimba). The population estimate for these six districts was over 1,000,000 according to 2002 census. The annual growth rate for each district according to 2002 census was Lindi Rural 0.6 per 1000, Nachingwea 2.3 per 1000, **Ruangwa** 2.6 per 1000, Tandahimba 2.4 per 1000, **Mtwara Rural** 1.3 per 1000 and Newala 0.9 per 1000. The facility based QI intervention was tested in Mtwara Rural district and further implemented at Ruangwa district. The proposal was to implement this intervention in all mentioned six districts, however, due to financial constrains the intervention was limited to those two districts in bold.

The majority of the indigenous people of this region are of Bantu origin, with the dominant ethnic group in Mtwara region being the Makonde and the Mwera in Lindi region. Others are Makua and Yao for Mtwara and Ngindo for Lindi. Although most people speak the language of their own ethnic group, Swahili is widely spoken (Mrisho et al., 2012).

The climate of all the districts is similar with temperature ranging from 22°C to 30°C. There are two main seasons; rainy season starting from November and continuing through May and a dry season from June through October. Newala and Tandahimba are situated on the Makonde plateau 900m above the sea level. Lindi Rural, Mtwara Rural, Nachingwea and Ruangwa have hilly areas as well as low-lying plains (Schellenberg et al., 2008).

The most common occupations are subsistence farming, fishing and small scale trading. Cashew nuts, sesame and groundnuts are the major cash crops while food crops are cassava, maize, sorghum and rice. Most people live in mud-walled and thatched-roof houses: up to one-third of houses have corrugated iron roofs. Common water supplies are hand-dug wells that rely on seasonal rain, communal boreholes, natural springs and river water. Most rural roads are unpaved: some are not passable during rainy seasons while others are too steep for vehicles to pass (Ruangwa District Council, 2012).

3.2 Study design

This PhD study aimed at conducting a mixed method analysis on quantitative and qualitative evaluation of the QI intervention. In addition to a systematic review of literature on

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evaluation of QI approaches in sub Saharan Africa. However, due to competing interests and time constrains the quantitative evaluation was not included in this thesis

Each study design will be explained according to its study objective.

3.2.1 Objective I: A case study

A locally relevant QI program was developed and implemented incorporating key district and health facility level staff. The project adapted the breakthrough series collaborative improvement model from Institute for Healthcare Improvement, USA (Institute for Healthcare Improvement, 2003). This model seeks to help organizations decrease the knowledge gap that prevents good practices from being adopted in a timely manner and applies evidence based standards for rapid change and large scale impact (USAID Health Care Improvement Project, 2008, Institute for Healthcare Improvement, 2003, Kilo, 1998.). Using the improvement collaborative model, health staff from different facilities in Mtwara Rural and Ruangwa districts were brought together to learn from each other and accelerate improvement across the collaboratives. Model for improvement is the core of the breakthrough series collaborative improvement (Gerald J. Langley et al., 2009). The model for improvement requires the development of clear and ambitious means that are shared within the collaborative, transparent and frequent monitoring of data to determine the effect of changes to the system, and ideas for improvement that are tested through a plan-do-study-act (PDSA) cycle for learning and continuous improvement (USAID Health Care Improvement Project, 2008, Kilo, 1998., Gerald J. Langley et al., 2009). Figure 3 presents the structure of model for improvement (Institute for Healthcare Improvement, 2016a).

Figure 3 Model for Improvement

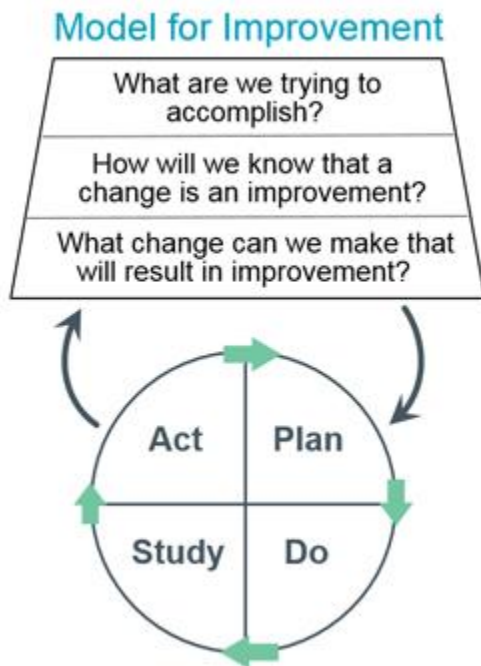


Figure 4 explains in detail the components of a PDSA cycle. QI guru Mr Edward Deming recommends that organizations should adopt the real time use of multiple PDSA cycles results that accumulate over time to develop a profound knowledge about achieving quality(Speroff and O'Connor, 2004). We used the PDSA cycles to test the changes and come up with a change package.

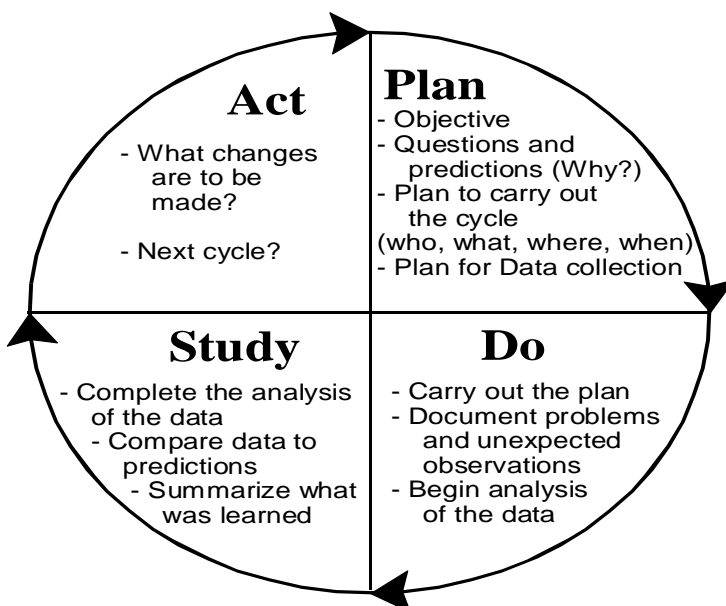
3.2.1.1 Data analysis

The data collected was analyzed through a time-series analysis using line graphs and statistical process controls which relied on continuous observations over time and the theory of common cause variation referring to the natural variation inherent in a process on a regular basis. Special cause variation refers to unnatural variation due to events, changes, or circumstances that have not previously been typical or inherent in the regular process. Special cause variation can be the result of either a deliberate intervention or an external event over which we have little control (Benneyan J.C et al., 2003). The change ideas tested in our study were deliberate attempts to introduce special causes of variation in QI and is presented in form of simple run charts.

The rules used to detect variation (run chart rules)

1. A single point outside the control limits
2. Eight or more consecutive points above or below the centerline
3. Six consecutive points increasing (trend up) or decreasing (trend down)
4. Two out of three consecutive points near a control limit (outer one-third)
5. Fifteen consecutive points close to the centerline (inner one-third)

Figure 4 The PDSA cycle



3.2.2 Objective II: Qualitative study

Originally, the plan was to conduct in depth interviews with health care providers and district leaders who were involved in the intervention. Then, further conduct focused group discussions with community members who were part of the QI teams. Unfortunately, the project had financial and time constraints, therefore the focused group discussions from community members were excluded from the study.

The aforementioned in-depth interviews conducted, were aimed at understanding barriers and facilitators influencing the quality improvement approach implemented by INSIST.

3.2.3 Objective III: Systematic review

We conducted a narrative systematic review of literature (Jennie Popay et al., 2006). This was done to identify QI approaches implemented in maternal and neonatal health in sub-Saharan Africa, how they were implemented, and what are the maternal and neonatal health outcomes. We searched MEDLINE, EMBASE, CINAHL, Africa wide and Cochrane databases from 2000 to June 2014. Following PRISMA checklist to guide the review and SQUIRE guidelines to assess the quality of the studies. Emerging themes were identified and discussed.

3.3 Description of the study

The study was implemented as part of Improving Newborn Survival in Southern Tanzania (INSIST) project. The INSIST project was divided into a facility based and a community based intervention. The community based intervention is explained elsewhere (Hanson et al., 2015). This thesis will focus on the implementation of a facility based quality improvement intervention that was implemented in 27 health facilities, two regions of southern Tanzania.

Implementation

PART III: THE IMPLEMENTATION

Implementation

CHAPTER 4: Improving Tanzanian childbirth services quality

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Submitted

4.1 ABSTRACT

Purpose: This article shares experience of implementing a quality improvement intervention in primary health facilities providing childbirth care in rural Southern Tanzania.

Design/Methodology/Approach: A quality improvement collaborative model involving district managers and health facility staff was piloted for six months in four health facilities in the Mtwara Rural district and was implemented for 18 months in 23 primary health facilities in the Ruangwa district. The model foster bringing together healthcare providers from different health facilities in interactive workshops; health facility supervision visits; applying QI methods to generate and test change ideas; using local data to monitor improvement and decision making. The topics covered were health facility deliveries and partographs.

Results: Median monthly health facility deliveries increased in four months from 38 (IQR 37-40) to 65 (IQR 53-71) in Mtwara Rural district; and in 17 months in Ruangwa district from 110 (IQR 103-125) to 161 (IQR 148-174). The women for which partographs were used to monitor labour progress in Ruangwa health facilities increased from 10% to 57% in 17 months.

Research Limitations: Time for quality improvement innovation, testing and implementation phases was limited and only looked at trends over time. The outcomes were limited to process rather than health outcome measures.

Originality: Healthcare provider engagement, generating and testing their own change ideas and observing improvements taking place gave them confidence in the quality improvement method. The findings suggest that quality improvement is feasible in a rural, low-income setting.

Keywords: Birth plan; Pregnancy danger signs; Health facility delivery; Quality improvement; Partograph; Tanzania.

4.2 INTRODUCTION

Tanzania is one of the developing countries that suffers from high maternal and neonatal morbidity and mortality. The 2004-5 Tanzania Demographic and Health Survey (TDHS) reported a countrywide maternal mortality ratio (MMR) estimate of 578 deaths per 100,000 live births and neonatal mortality rate (NMR) of 32 deaths per 1000 live births (National Bureau of Statistics (NBS) [Tanzania] and ORC Macro, 2005). The southern Tanzania estimate for neonatal deaths was the highest in the country; 47 deaths per 1000 live births (National Bureau of Statistics (NBS) [Tanzania] and ORC Macro, 2005). In addition, a study conducted in five Southern Tanzania districts from 2004 to 2007 estimated MMR at 729 per 100,000 live births (Hanson, 2013). Many of these deaths could be prevented through known interventions that have proven to be effective and affordable (Khan et al., Bhutta et al., 2012), including counselling on birth plan and danger signs during pregnancy, monitoring of labour with a partograph, active management of the third stage of labour, immediate drying of the newborn, cord care, immediate breast feeding just to mention a few (Ollerhead and Osrin, 2014, Bhutta et al., 2014a).

According to 2005 TDHS data, 94% of pregnant women attended antenatal clinic at least once and (62%) of women received the recommended 4+ ANC visits. However, only 47% of births occurred in health facilities (National Bureau of Statistics (NBS) [Tanzania] and ORC Macro, 2005). In 2010 TDHS similar trend of high coverage of at least one ANC visit was reported (96%), yet, the 4+ ANC visits coverage went down to 43% and facility births were 50% (National Bureau of Statistics (NBS) [Tanzania] and ICF Macro, 2011). Although high coverage of at least one ANC visit is encouraging, worrying gaps exist in the quality of the services provided to effectively utilize these visits. Hence, there is a need to seize this opportunity to offer quality services and help women best prepare for birth, as well as inform them about pregnancy related complications, and the advantages of skilled delivery care. (Magoma et al., 2013, Magoma et al., 2010). This is because improving institutional deliveries is one of the strategies advocated to reduce maternal and neonatal deaths among the rural poor (Fogliati et al., 2015).

Tanzania has a vast primary health facilities network serving the majority of the rural population (Saronga et al., 2014, Hanson et al., 2013). However, most professional health workers are based in urban settings. (National Bureau of Statistics (NBS) [Tanzania] and ICF Macro, 2011). The gap created is compensated by informal task shifting; for instance,

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Medical Attendants perform nursing duties and Nurses perform Clinical Officer's duties (Table I) (Manzi et al., 2012) This has implications on the quality of healthcare services provided (Dawson et al., 2014b, Wiedenmayer et al., 2015).

Evidence has shown that poor quality of facility based care is one of the major contributing factors for the elevated rates of maternal and neonatal morbidity and mortality (Austin et al., 2014). To improve quality of healthcare services using existing personnel, several quality improvement (QI) approaches and models were introduced in Tanzania (Ministry of Health and Social Welfare, 2011). Most QI programs and studies focus on hospitals (Faye et al., 2014, Dumont et al., 2013, Das et al., 2014, Anatole et al., 2013, Berman et al., 2012, Ishijima et al., 2014) and it is unclear if their benefits could be reproduced at lower levels of dispensaries and health centres.

Applying QI approaches to improve health outcomes in dispensaries and health centres might be added advantage to hospital-based initiatives because it could help to reduce high patient burden in hospitals, which is partly due to community by-passing lower health facilities (Kruk et al., 2009, Kahabuka et al., 2011). Studies from different parts of the world used QI methods to improve maternal and neonatal health. A study in Malawi used rapid cycles at community and health facilities to improve maternal, neonatal and perinatal mortality through women's group (Colbourn et al., 2013). In Nicaragua, one study reported improved neonatal sepsis in hospital setting using rapid cycles (Lopez et al., 2013) A systematic review on effectiveness of collaborative improvement in low middle income countries concluded that collaborative improvement is associated with significant gains in health systems performance (Franco and Marquez, 2011).

Ifakara Health Institute (IHI) and its collaborators, through its Improving Newborn Survival in Southern Tanzania (INSIST) project (Penfold et al., 2014, Hanson et al., 2015), together with the Ministry of Health and Social Welfare, Mtwara Rural and Ruangwa Council Health Management Teams (CHMT), explored use of collaborative QI approach as a driver to improve healthcare processes during antenatal and childbirth care. Therefore, we describe the development and implementation of an intervention aimed at increasing health facility deliveries and women in labour for whom a partograph was used via breakthrough series collaborative improvement model.

4.3 METHODS

Study objectives

General objective: To implement a quality improvement intervention to improve maternal and neonatal health services in rural Southern Tanzania.

Specific Objectives

1. Applying QI approach to increase number of health facility deliveries in Mtwara Rural and Ruangwa districts
2. Applying QI approach to increase partograph use among women in labour ward in Ruangwa peripheral health facilities

Study setting and participants

The intervention was piloted and implemented in dispensaries and health centres located in two southern Tanzania regions, Lindi and Mtwara (Figure 5). In Mtwara, the intervention was piloted in Mtwara Rural district (four of 34 health facilities). The intervention was then implemented in Lindi region (23 of 24 health facilities) in Ruangwa district (Figure 6). Mtwara Rural had a 204,157 population in 2002 (Statistics and Ministry of Planning, 2006). Ruangwa district had 124,009 inhabitants in 2002 (Statistics and Ministry of Planning, 2006). These health facilities have different healthcare providers working in reproductive and child health services as explained (Table 4), mainly clinical officers, nurses and medical attendants (Munga and Maestad, 2009, Huicho et al., 2008). In Mtwara Rural district, QI teams comprised five clinical officers, seven nurses, and five medical attendants. In Ruangwa district, there were 11 clinical officers, 12 nurse midwives/nurses and 25 medical attendants.

Figure 5: Map of Tanzania showing Ruangwa and Mtwara Rural districts

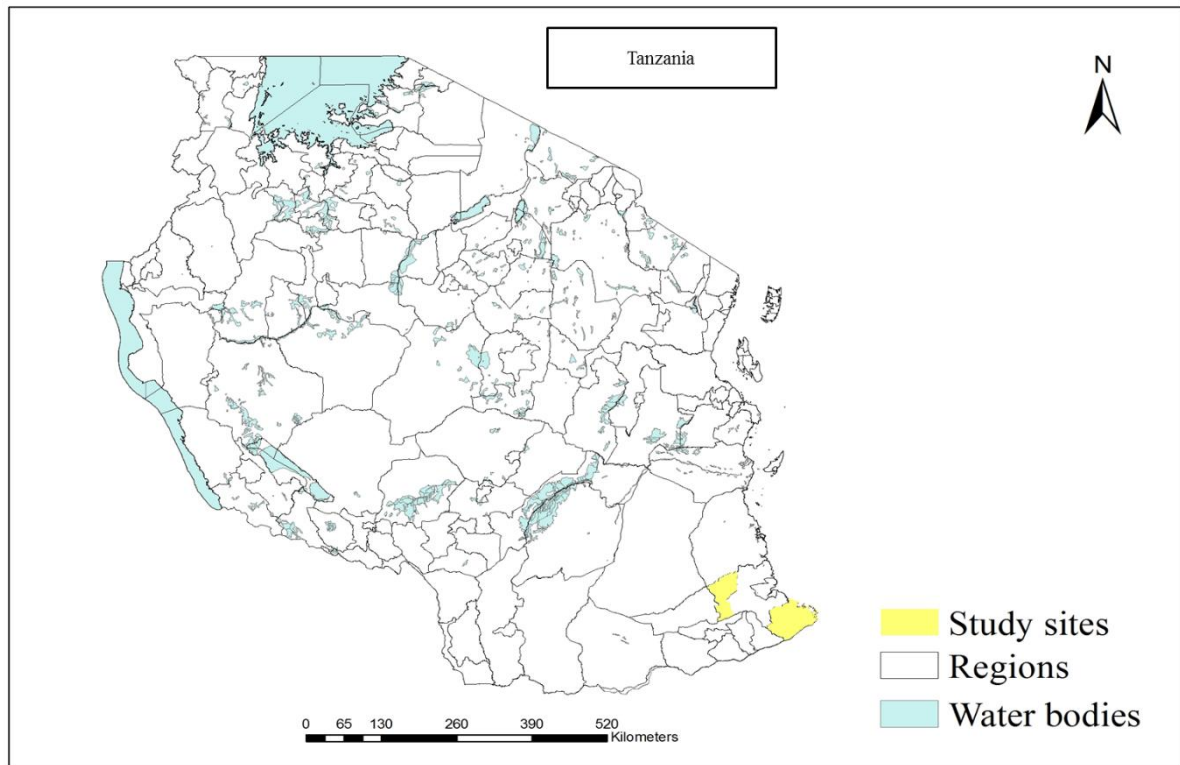


Figure 6: Map of Mtwara Rural and Ruangwa districts showing study sites

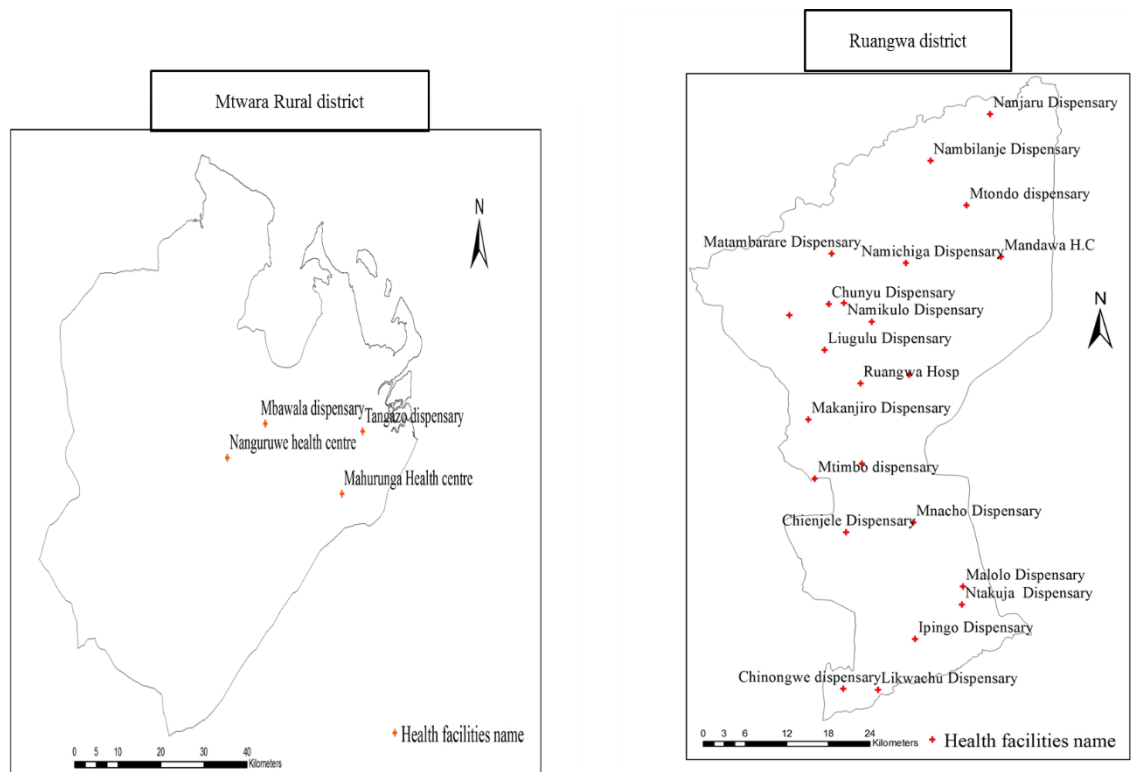


Table 4: Table showing health cadres trainings, roles and responsibilities

Healthcare worker cadre	Pre-service training	Pre-service training	Roles and responsibilities
Clinical Officer	Post-secondary school	2-4 years	<ul style="list-style-type: none"> • Identify and treat common diseases and perform minor surgery • Participate in the planning and implementation of basic health services • Keep records of equipment and tools for offering services • Keep records, prepare and provide implementation report • Supervise performance of subordinate health staff
Nurse	Post-secondary school	2- 3 years	<ul style="list-style-type: none"> • Provide nursing care to all clients in the catchment area served by their facility. • Collect vital health statistics. • Direct and supervise subordinate nurses. • Provide counselling • Provide services to patients at home. • Provide preventive services like vaccination and childbirth services
Medical Attendant	Post- primary school	1 year	<ul style="list-style-type: none"> • Clean equipment, wards and surrounding environment • Help patients with disabilities to use toilet and shower • Feed patients who need support • Take patient samples to the laboratory for testing and monitor results • Prepare materials for cleaning and close wounds

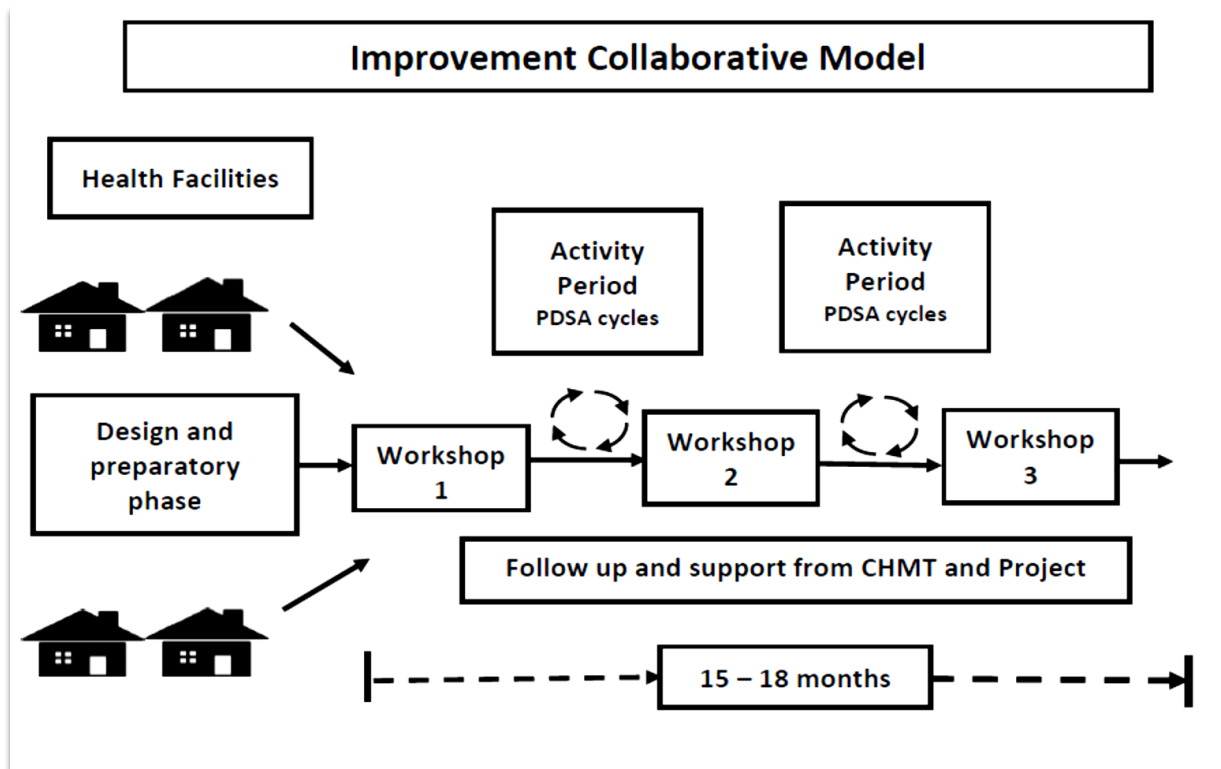
Implementation

			<ul style="list-style-type: none">• Follow up patients' medication requirements from drug store.
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The QI approach

The concept of a breakthrough series collaborative QI model was used as the approach for this improvements work (Figure 7). We decided this over many other QI approaches because it fostered rapid, data driven improvements based on existing resources within short period of time (Institute for Healthcare Improvement, 2003). This approach encouraged healthcare providers to develop aims, identify ideas for improvement that were shared amongst each other and test the ideas through improvement cycles (PDSA cycle) (Taylor et al., 2014). Throughout the process, data were collected and analyzed to determine change effects, ensure data quality and build capacity to use data in decision making.

Figure 7: Improvement Collaborative Model



The intervention

Mtwara Rural district

The maternal and neonatal mortality figures for southern Tanzania were shared with the Mtwara Rural district CHMT, followed by discussions on what should be done to change the situation. The CHMT together with project staff agreed on using the QI approach to try and improve these outcomes. The district medical officer (DMO) and reproductive child health (RCH) coordinator selected four health facilities based on their readiness to take part in QI activities. Additionally, a QI mentor was selected from the healthcare workers in the district, to mentor and coach healthcare providers in health facilities that formed QI teams. At the initial workshop, QI team members, QI mentor, district managers and project staff discussed maternal and neonatal mortality and interventions. Pareto charts (Sokovic et al., 2005) were used to prioritize problems; e.g., most babies were born at home and care seeking behavior for sick newborns was poor. Furthermore, healthcare providers pointed out that they did not properly counsel and advise women about childbirth and pregnant danger signs. From this meeting, it was agreed to focus first on interventions that would encourage women to give birth in a health facility.

Ruangwa district

A similar introductory process was used in Ruangwa district with CHMT and healthcare providers and they came up with similar problems. In Ruangwa, all primary health facilities (23) were involved in the intervention and the QI teams adapted what was done in Mtwara Rural. They added ways to improve childbirth services using partographs to monitor and detect problems during labour because they noticed gaps in care for women in labour and wanted to improve service quality by providing appropriate care, detecting complications and referring complicated cases to the district hospital (Worku et al., 2013, Wall et al., 2010, Bosse et al., 2002, Lavender et al., 2013). The QI teams and the district managers met during three to five months. In five iterative workshops, QI methods and how to apply them were taught by project staff together with the QI mentor. Maternal and newborn topics were revised; QI teams shared their experiences and learnt from each other's successes and challenges. After each workshop, the QI teams were visited every six weeks by project staff and the QI mentor and were encouraged to test changes likely to bring improvement in their own facilities (Institute for Healthcare Improvement, 2003, USAID Health Care Improvement Project, 2008).

Implementation

Change topics

Mtwara Rural district staff chose to improve pregnant women counseling during ANC. The main focus was on birth preparedness planning and pregnancy danger signs (Table 5) because there was a gap between what the providers should have been doing and what was happening; and there was also variability between provider performances in counseling pregnant women, which led to women not having enough knowledge about childbirth for them to make appropriate decisions. A pregnancy danger sign is defined as a symptom experienced by the woman that indicates a life threatening condition in pregnancy that requires immediate action such as seeking help at the clinic or alerting a healthcare worker immediately (Ministry of Health, 2010). To improve partograph use in Ruangwa district, four indicators were monitored: (i) foetal heart rate to be measured half-hourly; (ii) cervix dilatation to be measured four hourly; (iii) descent of the presenting part to be measured four-hourly; and (iv) maternal blood pressure (BP) to be measured half-hourly. If all four aspects were observed, then the partograph was considered complete.

Table 5: Contents of birth preparedness plan and pregnancy danger signs

Birth preparedness plan	Pregnancy danger signs
<ul style="list-style-type: none"> • Reminding the woman of her expected date of delivery • Identifying the place of birth • Identifying a health facility with skilled personnel • Identifying someone to take care of her family in her absence • Preparing essential items necessary for a clean birth and warmth for both mother and baby such as cloths or clothes • Preparing transport or funds and any other available resources in case of an emergency during labour • Identifying decision-making family member to accompany the pregnant woman to the health facility • Helping the pregnant woman to recognize the importance of delivering in a health facility 	<ul style="list-style-type: none"> • Lethargy, fatigue, breathlessness • Vaginal bleeding during pregnancy • Severe headache and/or blurred vision • Loss of consciousness or convulsions • Severe oedema (hands or face) • Severe abdominal pain. • Early rupture of membranes before 37 weeks • Leaking of amniotic fluid from the vagina • Foul-smelling vaginal discharge • Fever, chills, vomiting • Decreased or absent foetal movement • Contractions before 37 weeks (premature labour)

Implementation

Execution

At Mtwara Rural district, IHI organized and led the project throughout with support from the CHMT, the QI mentor and QI teams. The district QI mentor had one full days training on QI methods. Using that knowledge, the QI mentor facilitated three, full day QI workshops together with the QI project coordinator. These workshops were held between August and December 2009. Follow-up visits were done by the QI mentor, Project Coordinator and sometimes the District RCH Coordinator at least once every six weeks in between the workshops. The teams were also encouraged to hold QI meetings at their health facilities to discuss how the improvement work was going and how to improve further. However, this was rarely done because of shortages of staff, absenteeism and other competing responsibilities. To address the discontinuity caused by high staff turnover, it was agreed after every workshop the QI team should give feedback to all staff at the health facility and should inform new staff about the QI activities. The QI intervention was rolled out to all primary healthcare facilities in Ruangwa district in 2010 using a similar approach.

Three improvements were implemented:

1. Mtwara Rural district QI teams aimed to increase the median monthly health facility deliveries from 38 (January – August) to 57 by December 2009, a 50% increase. Facility staff hoped to secure this improvement by testing and implementing the following change ideas: (i) counsel every pregnant woman who attends ANC on birth preparedness and pregnancy danger signs and documentation; (ii) attend village meetings to raise awareness about health facility deliveries and newborn care in the community; (iii) conduct meetings with traditional birth attendants to raise awareness of facility deliveries and home delivery disadvantages; and (iv) to foster friendly cooperation, so that women in labour would be referred to the facility.
2. Ruangwa district QI teams aimed to double the median monthly health facility deliveries from 110 to 220 between February 2010 and March 2011. The team adopted the change ideas from Mtwara Rural collaborative, but added: (i) health facility staff invited husbands or mothers to accompany the ANC client to discuss birth preparedness and the plan for childbirth; (ii) community volunteers conducted home visits to pregnant women to give health education on the importance of facility deliveries.

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3. Partograph studies were implemented in Ruangwa district only. The aim was to increase the proportion of deliveries with a completed partograph from 10% to 100% between February 2010 to June 2011.

Change ideas included:

1. Conducting refresher training among healthcare providers during workshops and follow-up visits.
2. Partographs were translated in to Swahili to make them understandable and consistent.
3. Using reminders to conduct checks at regular intervals, such as mobile phone alarms or prompts by relatives accompanying a woman in labour.

Data collection and analysis

Individual data were collected monthly from the Health Management Information System (HMIS) and partographs. To verify HMIS data quality, we compared data from three different sources: (i) facility delivery register; (ii) partograph; and (iii) HMIS report book. Where there was a discrepancy, data from the delivery register were used. Outcome data were health facility deliveries and the completed partograph.

Data were analysed by time-series analysis using line graphs and statistical process control which helps to determine whether changes in processes are making a real difference in outcomes. (Benneyan J.C et al., 2003, Timmerman et al., 2010, Taylor et al., 2014).

Logistics and resources

In both districts, IHI covered meeting venues, stationery, refreshments and sitting allowance costs. The sitting allowance was approximately 20 USD per participant. No other compensation was provided to the QI teams. Workshop participants were the QI teams, QI mentor and one a district manager, often the RCH coordinator. The IHI provided approximately six USD per day for the QI mentor during follow-up visits. The IHI usually provided transport for follow-up visits, although occasionally the district provided the vehicle and IHI provided fuel.

Technical input

The project QI coordinator from IHI (JJ) had a medical background and received QI advice from an experienced external QI Advisor (CG). In June 2010, JJ undertook an Institute for Healthcare Improvement QI professional development program.

Ethics

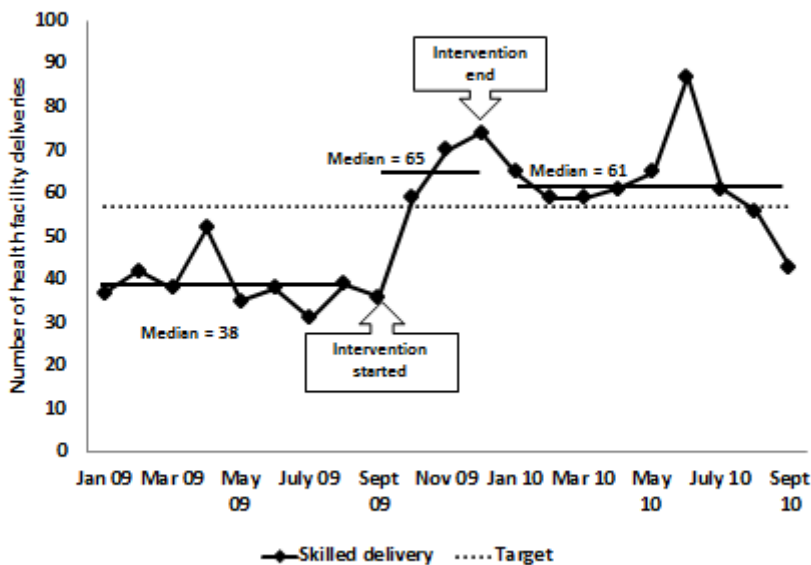
This work was part of the INSIST study that received ethical clearance through the National Institute of Medical Research Tanzania (NIMR/HQ/R.8c/Vol II/177), the Institutional Review Board of IHI and LSHTM (LSHTM Reference No A358-5316). The study is registered on clinicaltrials.gov, number NCT01022788.

4.4 RESULTS

Pilot phase

From January to August 2009, the Mtwara Rural collaborative had baseline median of 38 (IQR 37-40) health facility deliveries per month (Figure 8). During the intervention phase (Sept to Dec 2009), the median was 65 (IQR 53-71) per month, a 71% increase. This surpassed the increasing health facility deliveries goal by 50% at December 2009. After December 2009, IHI staff ended the QI pilot in four Mtwara Rural health facilities. From January 2010 to September 2010, the improvement was sustained with a median of 61 (IQR 59-65) health facility deliveries per month. However, performance declined in the last three months: no clear explanation for this was obtained from health facility staff.

Figure 8: Health facility deliveries in Mtwara Rural



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The 23 health facilities in the Ruangwa collaborative had a baseline median of 110 (IQR 103-125) deliveries per month from January 2009 to January 2010. During the 17 months over which the improvement work was undertaken, the median health facility deliveries was 161 (IQR 148-174), a 46% increase, missing the 54% target (Figure 9).

Figure 9: Health facility deliveries Ruangwa District

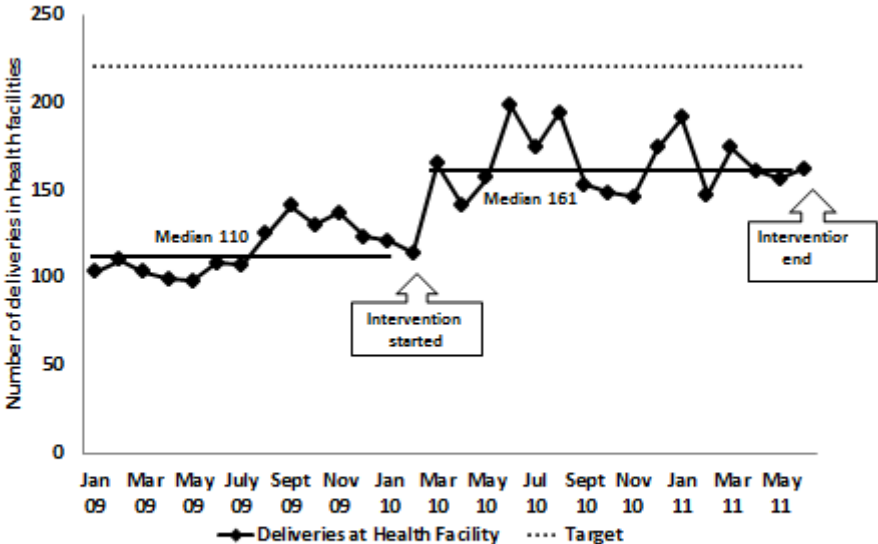
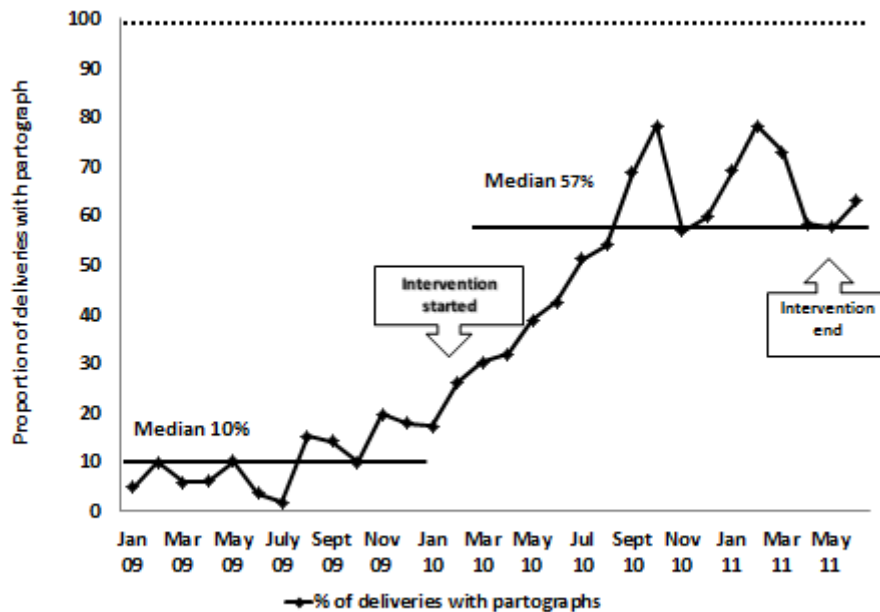


Figure 10 shows the health facility deliveries with completed partographs. Between January 2009 and January 2010, median deliveries with completed partographs was 10% (IQR 6-15%). At the intervention outset in February to June 2011, the median deliveries with completed partographs went up to 57% (IQR 42%-69%) - an 47% increase, missing the 90% target.

Figure 10: Partograph use



4.5 DISCUSSION

The study proved that it was possible to demonstrate improvement by providing counselling, by the use of a partograph and by the number of increasing facility deliveries within rural settings through the use of QI methods. Both pilot and implementation districts demonstrated improvement in their QI topics. Mtwara Rural district maintained more than 50% improvement in number of health facility deliveries for 12 months. Ruangwa district, the number of facility deliveries increased by slightly less than 50%. Partograph use, despite missing the target, increased over five times from 10% to 57%. These results are impressive considering that bringing women to deliver in health facilities requires a multi sectorial approach and involvement of many players (Gabrysch and Campbell, 2009). In our work, we only focused on one aspect, that is improving processes of service delivery. Observed improvements in QI topics encouraged healthcarers and the district managers to be more supportive in terms of availability and resources allocation to back up the intervention. In addition, the opportunity for healthcarers to generate their own change ideas, test and then observe any resulting improvements, created ownership of the whole process and was an important motivating factor for the healthcarers. This was also reported from a study in South Africa that concluded that networking all the clinics of a health system referral unit into a natural improvement ‘unit’ rapidly increased integrated care of that population (Webster et al., 2012). Some Ruangwa district health facilities were not able to demonstrate

Implementation

much improvement in the QI topics, which may be because there is considerable variation in improvement capacity and capability among collaborative participants (Timmerman et al., 2010).

Lessons learned from the implementation process

Technical support

For both acceptability and sustainability, local leaders need to spearhead the intervention. We found that our direct involvement in driving the improvement work delayed the district managers' acceptance of the intervention. This experience supports the suggestion from Berman *et al.*, (2012) that external assistance in developing QI approaches should focus on facilitation that supports local leadership in prioritizing improvement projects and local healthcarer mentorship (Berman et al., 2012). In fact, we found that contrary to the expectation that the QI teams would hold monthly meeting in the absence of project staff, most of the QI meetings were prompted by project staff, similar to the experience reported by Webster (Webster et al., 2012).

Healthcare worker competence

Medical attendants formed most of the QI teams despite the fact that they are not considered competent to provide childbirth services according to the WHO definition of skilled personnel (World Health Organization, 2004b, Spangler, 2012). To date, they are not officially recognized as professional healthcare personnel and hence they are not invited to relevant technical training, such as lifesaving skills, which are essential for childbirth services (Spangler, 2012). However, they are key to childbirth cares in rural facilities. Spangler reported that due to inconsistencies in pre-service training and regulation, a good many doctors, nurses, midwives, and clinical officers did not possess or perform many of the competencies that would qualify them as skilled. At the same time, some birth attendants who were not considered accredited professionals practiced some degree of skilled care everyday (Spangler, 2012). During the current work, the medical attendants were actively involved without consideration being given to their limited level of education. This created a positive impact on their performance, but led to delays in understanding technical trainings. For example, most of the medical attendants were learning how to complete partographs for the first time during this study (Jaribu et al., 2016).

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Continuing the intervention

While the results were promising, the extent to which the intervention has been sustained by the district managers is not known. It was made clear to the district managers up-front that the QI initiative would have external support from the project for 18 months and thereafter they would need to take over the implementation of the project if it was found to be successful. One major challenge was that, the district activities were dictated by the comprehensive council health plan, which prioritized and approved budgets and the interventions to be implemented at the district level. Therefore, a district level buy-in needed to be established early on if similar programmes were to be launched in the future.

Implication of the study for policy and practice

This study observed the existence of clinical guidelines such as FANC at all health facilities, although their usage was very limited. In some facilities, the published guidelines were piled up in a cupboard which was out of reach. When we printed a one-page job aid for counselling on the birth plan and pregnancy danger signs, the healthcare attendants complied well in using it for pregnant women. However, we are unsure of its sustainability after the project was over. This is only one guideline among many. We suggest a study to explore simplification of guidelines or even use of electronic versions that will be easily accessed and understandable(Lund et al., 2016).

Building a culture of quality in the entire health system is needed in order to effectively utilize and see the benefit of the fast growing QI initiatives introduced in the country(Atherton et al., 1999). Tanzania is practicing decentralization of services at district level, which could be a good platform to study adoption and application of QI methods at CHMT, led by CHMT rather than by donor partners as it is the case currently.

Implications for research

The findings of this study suggested that healthcare attendants needed to improve their counselling practices to all pregnant women so that they do not miss the opportunity to increase women's knowledge and help them to make informed decisions regarding childbirth care. This is critical considering the existing platform of high ANC coverage of more than 95% for at least one ANC visit(National Bureau of Statistics (NBS)[Tanzania] and ICF Macro, 2011). An observational study in ANC clinics is needed to ascertain barriers and facilitators to conducting counselling services at ANC to ascertain what are the existing

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barriers to conducting counselling services, and what facilitates providing such counselling services during the ANC. In addition, community involvement is an area to explore for the improvement of quality of childbirth services. For instance, one barrier to overcome is increasing the number of facility deliveries which is the community preference for giving birth with the assistance of traditional birth attendants. A study is needed to explain the reasons for this community preference and how to overcome it or incorporate it to promote skilled childbirth services in rural Southern Tanzania.

The use of the partograph as a tool to improve quality of labour services in health centers and dispensaries needs to be further studied, taking into consideration different levels of education or formal training of healthcare cadres that work at these facilities and especially how the partograph results can help to improve referral system to district hospitals. This could include the development and testing of a Swahili partograph.

Limitation

Use of time series analysis is affected by changes in external variables over time that are unrelated to the intervention. Having a comparison group would have improved validity. Additionally, HMIS data recording was inconsistent and data storage was poor. The study had limited time for QI innovation, testing and implementation phases and the outcomes were limited to process rather than health outcomes such as mortality.

Conclusion

In the fight to lower maternal and neonatal deaths in developing countries, we have evidence that the QI approach could accelerate implementation of existing evidence-based interventions. Bearing in mind that there are different healthcare cadres with different competences working in rural health facilities in Tanzania, planning how to teach and support them in the use of QI tools and to understand basic subject matter materials, regardless of their level of qualification, will be beneficial.

The use of the partograph at primary health facilities built knowledge of healthcare attendants on the childbirth process, especially for the ones who were learning it for the first time. This could be further emphasized in order to ensure that women in rural settings receive quality services during labour (Gabrysch and Campbell, 2009).

Implementation

These findings add to the evidence suggesting that QI can help to improve provision of childbirth services in rural health facilities in Tanzania. Further research on institutionalization and scale up of QI is needed to generate robust evidence of the long-term effects of QI in low-income settings.

Implementation

CHAPTER 5: Improving institutional childbirth services in rural Southern Tanzania: a qualitative study of healthcare workers' perspective

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5.1 ABSTRACT

Objective: To describe health workers' perceptions of a quality improvement (QI) intervention that focused on improving institutional childbirth services in primary health facilities in Southern Tanzania.

Design: A qualitative design was applied using in-depth interviews with health workers.

Setting: This study involved the Ruangwa District Reproductive and Child Health Department, 11 dispensaries and 2 health centres in rural Southern Tanzania.

Participants: 4 clinical officers, 5 nurses and 6 medical attendants from different health facilities were interviewed.

Results: The healthcare providers reported that the QI intervention improved their skills, capacity and confidence in providing counselling and use of a partograph during labour. The face-to-face QI workshops, used as a platform to refresh their knowledge on maternal and newborn health and QI methods, facilitated peer learning, networking and standardisation of care provision. The onsite follow-up visits were favoured by healthcare providers because they gave the opportunity to get immediate help, learn how to perform tasks in practice and be reminded of what they had learnt. Implementation of parallel interventions focusing on similar indicators was mentioned as a challenge that led to duplication of work in terms of data collection and reporting. District supervisors involved in the intervention showed interest in taking over the implementation; however, funding remained a major obstacle.

Conclusion: Healthcare workers highlighted the usefulness of applying a QI approach to improve maternal and newborn health in rural settings. QI programmes need careful coordination at district level in order to reduce duplication of work.

5.2 INTRODUCTION

Antenatal care (ANC) and childbirth services in Tanzania

Tanzania faces multiple problems in delivering essential healthcare interventions such as

Strengths and limitations of this study
<p>This study provides in-depth understanding of healthcare workers experiences regarding the implementation of an innovative quality improvement (QI) intervention.</p> <ul style="list-style-type: none"> ▪ It highlights benefits as well as challenges related to the implementation of the QI intervention and thus allows for important insights for scientists and also policymakers and practitioners. ▪ The small number of participants and the specific geographical focus limits the generalisability of the results. ▪ The results might have been influenced by the researcher’s personal biases and idiosyncrasies

antenatal or childbirth services(Blank et al., 2013, Penfold et al., 2013, Gross et al., 2011, Pembe et al., 2010). About 96% of pregnant women in Tanzania attend ANC services at least once during their pregnancy(National Bureau of Statistics (NBS)[Tanzania] and ICF Macro, 2011, Pembe et al., 2009, Rockers et al., 2009, Spangler and Bloom, 2010, Mpembeni et al., 2007). Despite this high utilisation, the quality of preventive diagnostic and treatment services during ANC, and childbirth services are still poor.(Gross et al., 2011, Duysburgh et al., 2013, Hanson et al., 2013, Spangler, 2012).Low quality of care in delivery service contributes to high maternal and neonatal mortality rates(Ministry of Health and Social Welfare, 2014b, van den Broek and Graham, 2009, Darmstadt et al., 2014, Austin et al., 2014).Intrinsic factors contributing to the low quality of care include poor infrastructure, lack of skilled personnel, lack of an enabling environment for human resources and missing technical know-how for providing essential healthcare services.(Penfold et al., 2013, Hanson et al., 2013, Ministry of Health and Social Welfare, 2014a) Extrinsic factors include lack of funds and political commitment, lack of com-munity participation in health-related issues and cultural beliefs. Context-specific customs, norms and beliefs play a major role in influencing healthcare-seeking behaviour, especially in rural communities(Haws et al., 2010, Mrisho et al., 2012).

Quality of care

The Institute of Medicine defined quality of care as the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge.(Institute of Medicine, 1990) According to the Institute of Medicine six main core needs are essential for quality of care (box 1)(Institute of Medicine, 2001).

Donabedian suggested that inferences in the quality of care could be grouped into three categories: ‘structure’, ‘process’ and ‘outcome’.(Donabedian, 1988) ‘Structure’ refers to the setting where care occurs. ‘process’ includes what is actually done in giving and receiving care.(Berman et al., 2012, Boucar et al., 2014) ‘Outcome’ covers the effects of care on health.(Institute of Medicine, 2001, Heiby, 2014) In African settings a central issue for low health systems performance may be the relative neglect of healthcare processes.(Heiby, 2014) Building on these observations, a quality improvement (QI) intervention was implemented in rural Southern Tanzania aiming at improving the process of delivering antenatal and childbirth services taking into consideration three core quality needs; patient centeredness, effectiveness and safety.

Improving Newborn Survival in Southern Tanzania (INSIST): QI intervention

The intervention was implemented under the umbrella of the INSIST project.(Borghini et al., 2013)The QI intervention used the QI approach known as the ‘Collaborative Quality Improvement Model’(Institute for Healthcare Improvement, 2003) The strategy comprised of forming QI teams from different health facilities in order to create a collaborative network that is aimed at working together to achieve common goals. Twenty-three QI teams, one team per health facility, were formed each comprising a minimum of two health workers (health facility QI team) and one community representative in Ruangwa district. The community representatives were selected by the health staff and community members. They included traditional birth attendants, village leaders or community volunteers. The QI teams were responsible for testing and implementing changes and were coached and mentored by a district QI mentor. An initial pilot phase was conducted in four health facilities in Mtwara Rural district. Refer to Table 6

<p>Box 1 Core needs for quality in healthcare(Institute of Medicine, 2001)</p> <ul style="list-style-type: none"> ▶ Safety: avoiding injuries to patients from the care that is intended to help them. ▶ Effectiveness: providing services based on scientific knowledge to all who could benefit, and refrain from providing services to those not likely to benefit. ▶ Patient-centred: providing care that is respectful of and responsive to individual patient preferences, needs and values, and ensuring that patient values guide all clinical decisions. ▶ Timely: reducing wait times and sometimes harmful delays for both those who receive and those who give care. ▶ Efficiency: avoiding waste, including waste of equipment, supplies, ideas and energy. ▶ Equitable: providing care that does not vary in quality because of personal characteristics such as gender, ethnicity, geographic location and socioeconomic status.

for clear project timeline. The district QI mentor was selected by the Council Health Management Team (CHMT) and trained by the project staff on QI methods. A variety of QI methods were used to initiate the Plan-Do-Study-Act (PDSA) cycles, which formed the basis of the QI intervention. These included: identifying gaps in clinical care processes (process mapping and root cause analysis) and prioritising problems to be solved using a Pareto chart.(Institute for Healthcare Improvement, 2016b) This is a combined bar and line chart with the bars showing individual values in descending order and the line showing the cumulative total. The purpose of the Pareto chart is to highlight the most important points among a (typically large) set of factors. Thus it assists at identifying priorities.(Institute for Healthcare Improvement, 2016b) Data was used to inform the improvement process presented in the form of run charts(Institute for Healthcare Improvement, 2003, USAID Health Care Improvement Project, 2008, Kilo, 1998., Benneyan J.C et al., 2003, Gerald J. Langlely et al., 2009).

The QI teams, QI mentor and District Reproductive and Child Health (RCH) Coordinator met every 3– 5 months in a series of five iterative workshops to ensure familiarity with the aforementioned QI tools, to participate in refresher training programmes on maternal and neonatal care services, to share their experiences and to learn from each other. Between these workshops the QI teams had activity periods where they practiced what they had learnt. Four to six weeks after each workshop, the QI teams received coaching and mentoring during on-

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site follow-up visits from the project staff and the QI mentor. During the visits they obtained assistance on the maternal and neonatal problems they wanted to improve, and application of QI methods. Furthermore, they were encouraged to assess their own work using data they had generated and in order to develop new ideas for improvement.

The intervention centred on two improvement objectives selected during the QI workshops by the participating healthcare providers. The first was aimed at increasing health facility deliveries through counselling on birth preparedness and pregnancy danger signs. The assumption was that improving the quality of counselling will increase the knowledge and understanding of pregnant women and allow them to make informed decisions to utilise health facilities for care, including delivery of their babies. This is important in order to avoid delay in deciding to seek care and delay in reaching the health facility (Thaddeus and Maine, 1994). The second topic aimed at improving the quality of health facility deliveries by using partographs. (Bosse et al., 2002, Ollerhead and Osrin, 2014, Yisma et al., 2013, Gans-Lartey et al., 2013) A partograph is a graphic display of the progress of labour, which helps skilled birth attendants to recognise emerging difficulties and take action according to a clinical management protocol. (Ollerhead and Osrin, 2014) The overall health facility deliveries improved by 46% from a median of 110 to 161 deliveries per month in a collaborative of 23 health facilities from February 2010 to June 2011. The target was to achieve a median of 220 deliveries per month. The use of partograph improved health facility deliveries by ~50 percentage points from a median of 10% to 57% in all the 23 health facilities during the same time period.

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Table 6: Project timeline

	2009	2010												2011					
Activities	Jun - Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Pilot (Mtwara Rural)	x																		
Start of Project (Ruungwa)		x																	
Workshop			x			X			x				x			x			
Follow visits					x			x			x				x			x	
Activity period				x	x		x	x		x	x	X		x	x		x	x	x
End of project																			x

Justification of the QI improvement topics

When we started the project many of the health facilities in Ruangwa had very low to no deliveries in up to six consecutive months. As a project our original aim was to improve neonatal services. Based on the data, there were no or few neonates in the health facilities. Therefore, when we prepared Fishbone and Pareto charts, the main indication which emerged was the lack of women delivering in health facility. And this became our area of focus, in order to improve women knowledge through counselling and later improve the services they receive.

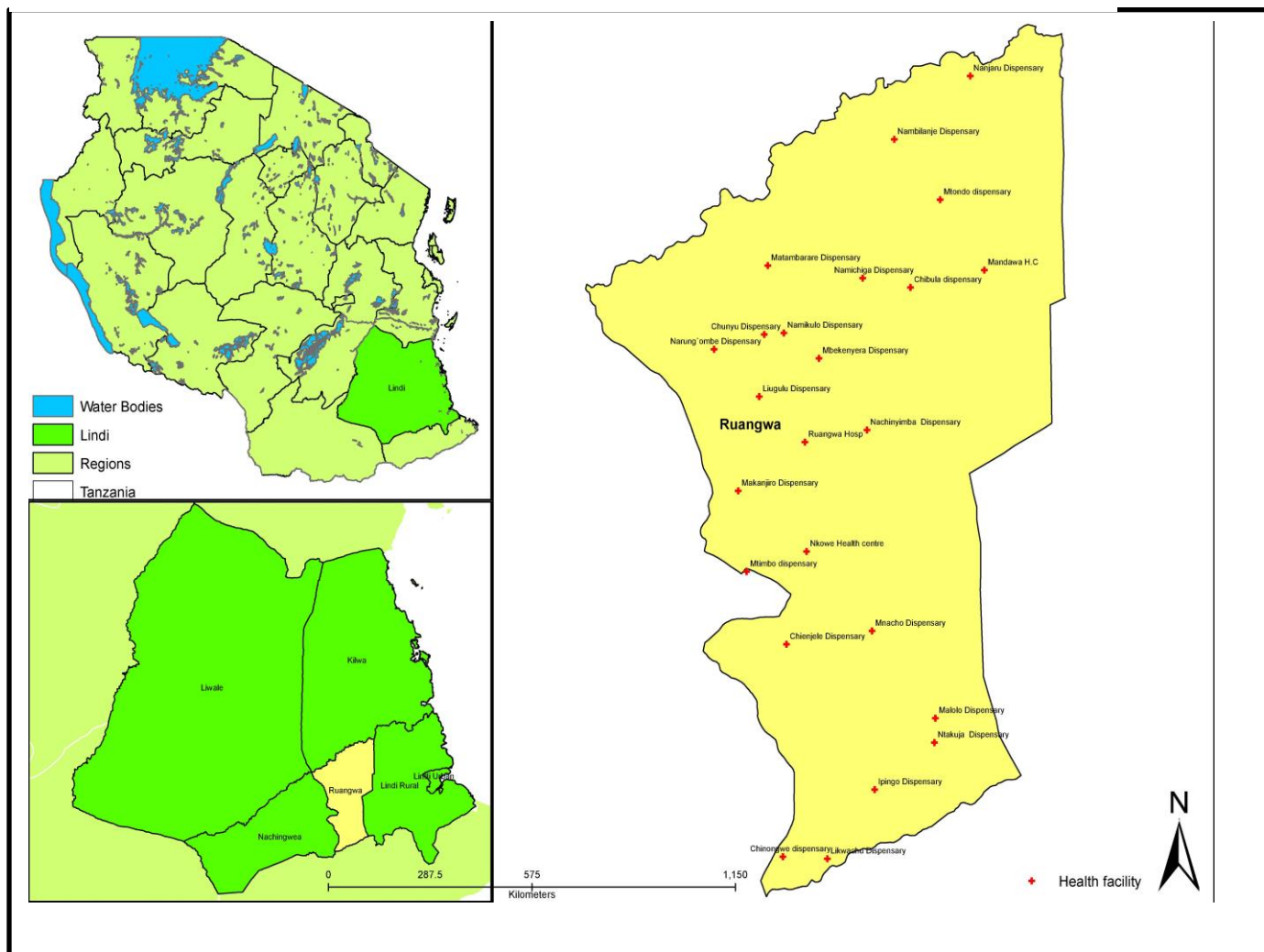
A growing number of healthcare QI interventions are implemented worldwide; increasing number of studies in low-income settings have used qualitative approaches to learn about perceptions and experiences of QI implementers.(Alhassan et al., 2013, Afari et al., 2014, Puchalski Ritchie et al., 2016) The present study is aimed at collecting evidence by conducting a qualitative study in a rural setting. We used in-depth interviews with health workers at various levels in the health system to explore their perception of the QI intervention and to identify facilitators and barriers in relation to QI implementation.

5.3 METHODS

Study setting

At the time of the study, Ruangwa district, located in Lindi Region, Southern Tanzania, had an estimated population of 124 000 with 89 registered villages. (Ruangwa District Council, 2012) It was served by 24 functional health facilities, one district hospital, two health centres and 21 dispensaries. (Ruangwa District Council, 2012). Figure 11 shows the location of Ruangwa district in Tanzania and distribution of the health facilities. The QI intervention focused on the dispensaries and health centres because they are the main access point for maternal and child health services in rural areas (Rockers et al., 2009). The health facilities were staffed primarily by clinical officers, nurses and medical attendants. Table 4 provides an overview of their roles and responsibilities. Each health facility offered a range of services with dispensaries having fewer services and staff compared with health centres.

Figure 11: Map of Ruangwa district showing health facilities



Data collection and analysis

Qualitative data using in-depth interviews were collected in March 2013 by the INSIST QI project coordinator (JJ), a female medical doctor from Tanzania.

Data was collected using a multilevel approach: RCH coordinator and QI mentor at district level, and clinical officers, nurse midwives and medical attendants at health facility level. Out of the 23 health facilities that participated in the QI intervention, RCH staff from only 18 health facilities were available for interviews and 5 were not available because they were attending training outside the district. Among the available staff, health workers from five facilities were selected for presenting the interview guides because of their accessibility and proximity to Ruangwa town. Building of the pre-test and interview guides were carefully revised. One staff member from each of the 13 remaining health facilities and two representatives from the district level were purposely selected for the interview because they were the main implementers of antenatal and childbirth services. Three types of interview guides were developed based on the role played by each member: (1) for the QI team members as implementers, (2) for the QI mentor as facilitator and (3) for the RCH coordinator as supervisor. The questions were focused on how the intervention was conducted, that is, the QI process and structure and the maternal health topics (interview guides are attached in the online supplementary file). The interview guides considered topics and activities covered during the implementation of the intervention and were designed to elicit the perceptions of the study participants.

A set of 10 open-ended questions and additional relevant prompts were developed. The tools were designed in English and translated into Swahili. The translation of local terms was cross-checked with experts working in the field. The health workers were interviewed at their place of work, and the interviews took on average 45 min to 1 hour. Interviews were audio taped and transcribed verbatim. Data was analysed using content analysis (Graneheim and Lundman, 2004) focusing on how the QI intervention was structured (PDSA cycle approach, face-to-face work-shops, follow-up visits). In maternal and newborn health, we looked at the birth preparedness counselling and pregnancy danger signs, health facility deliveries and partograph use. Furthermore, we wanted to know about challenges and sustainability plans for the QI work. All transcripts were analysed with the assistance of MAXQDA software V.11, in order to identify meanings and patterns related to the QI intervention and its influence on provision of ANC. Emerging themes were coded building

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on discussions within the interdisciplinary project team. Three major thematic areas emerged during data analysis: (1) reflections about the QI process, (2) the contribution of the QI component regarding capacity building and (3) challenges related to the QI intervention. In addition, the first author maintained a research diary in which personal observations were noted during follow-up visits. Data from these observations complemented the findings from the in-depth interviews and allowed for triangulation and a deeper understanding of the context.

Ethical considerations

INSIST is registered on clinicaltrials.gov (NCT01022788). Written informed consent from participants was obtained before the interview and interviews were conducted in an environment where confidentiality was maintained.

5.4 RESULTS

The study engaged 15 respondents, among them 11 were female, six were medical attendants, five nurses and four clinical officers. Their age ranged from early 20s to late 50s with the majority in their 30s and 40s.

QI process

PDSA cycles

On probing during the interviews 9 of the 15 respondents (one clinical officer, four nurses and four medical attendants) could remember some of the key aspects of PDSA process.

We were looking for the root cause, why women do not come to deliver in health facility and then prepared a work plan for women to come to deliver in the facility.

Nurse, from a health centre

A medical attendant explaining a PDSA and QI process said,

My [QI] plan will be this, I will implement this, I will study it this way and I will decide later on how it will be. Therefore, everyone was doing this at their own health facilities. This was very helpful to plan our work and even the graphs we used to draw to assess our situation, it worked very well.

Medical attendant, from a dispensary

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Two respondents (one clinical officer and one nurse officer) reported using it in other aspects of their work.

I used it to improve family planning because we had a lot of underage and student pregnancies; we set a goal to reach 500 clients (new, old and defectors). We conducted health education about family planning to women. After a month we analysed our data and we reached 600 clients.

Clinical officer, from a dispensary

QI workshops

All of the 15 respondents reported the QI workshops gave an opportunity to learn from, help and remind each other about technical issues. One clinical officer, two medical attendants and one nurse midwife reported that the workshops enabled them to offer standardised care, at least in terms of the messages provided during counselling and partograph use.

The community thought the changes are only implemented in our facility, but whenever different people meet and discuss, those who went to other facilities say the same thing. So they realized it's all over not only here, we did not create our own thing.

Medical attendant, from a dispensary

Follow-up visits

Fourteen respondents found the onsite follow-up visits useful to remind them of what was learnt during the workshop, provide practical assistance and to use their data to make informed decisions. The coaching and mentoring visits were regarded as being more important than the workshops because the respondents felt appreciated and noticed. Two providers commented that other programmes had promised to come for supervision after trainings; however, they never did so. Five health workers perceived the follow-up visits to be regular and focused. Seven respondents said the QI follow-up visits differ from CHMT supervision, mentioning that CHMT were short tempered, did not come regularly, did not solve problems and covered many things at the same time.

The follow up was not like fighting; you just explained and reminded us. Not like the one we received from the district when someone addresses you with anger because they have a university degree.

Clinical officer, from a dispensary

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Even if there will be no more workshops, it's better to visit us in our health facilities, then you realize what are our problems and help us. In addition, it motivates us, knowing that our work is seen and appreciated.

Medical attendant, from a dispensary

CHMT visits differ with what you were doing. You targeted specific topics. However, the CHMT when they come, they just look in general,

“have you measured children”?

“Yes”.

“Have you delivered babies”?

“Yes”.

“What is going on here?”

“Do you give vaccination”?

“Yes”.

“No gas available”?

“Yes”

Aah OK. That's it.

Medical attendant, from a dispensary

The QI mentor explained how the INSIST QI and the CHMT worked in synergy to improve service delivery.

The follow up visits assisted the CHMT to know which health facility had shortage of equipment or supplies because we used to note facilities with problems during follow up visits. Then inform the CHMT that the following facility does not have a delivery bed or a weighing scale and the CHMT followed up and supplied the required. For example, they supplied a delivery bed, fridge and weighing scale to [Facility name] after we notified them.

Nurse, from the district level

Partograph training

Partograph refresher training was useful for all respondents, those who learnt it as part of their professional training (such as the clinical officers and nurse mid-wives) and those who never had previous training (such as medical attendants). Prior to the QI training the medical attendants did not know how to fill the partograph. Three clinical officers also acknowledged

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that the partograph training improved their understanding on how to fill a partograph. The nurse midwives seemed to be more competent compared with the other healthcare cadres.

I did not know how to use partograph at all, I am a Medical Attendant, when I finished school and started working, I was just told to help women deliver. However, I have never used a partograph until we learnt it in this project.

Medical attendant, from a dispensary

Partograph training reminded us to monitor women in labour, and helped us to detect women who had prolonged labour or obstructed labour and made us take appropriate decisions.

Nurse, from a health centre

Seven respondents reported that the intervention helped to improve referral of women in labour.

That emphasis of telling healthcare providers to refer pregnant women who have poor progress in labour has increased number of referral cases from dispensaries to district hospital. We have an ambulance, therefore when they call for it; it comes to pick up patients. And these referrals were based on induction from partograph if the labour is not progressing well.

Nurse, from the district level

However, one respondent reported challenges in using it in a resource-poor setting.

In times of power cut we cannot use partograph, we can't see. We use a torch to deliver the baby.

Nurse, from a health centre

Birth preparedness and pregnancy danger signs counselling

Thirteen healthcare workers reported that they appreciated providing counselling during ANC and some emphasised differences before and after the counselling sessions in terms of increasing health facility deliveries.

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Before we started a lot of women were delivering at home but I think it's because we did not provide appropriate counselling, after learning in the workshop and your follow ups in the facilities. Now we are providing counselling to women and their husbands at antenatal clinic and they come to deliver in the facility.

Medical attendant, from a dispensary

We knew about danger signs and birth plan counselling. However, when you came and emphasised its importance, then we realized aah! This is important; you know we were not used to emphasize it during health education.

Nurse, from a health centre

However, despite these counselling services cultural beliefs still play a major role in decision-making at family level especially in situations when families viewed the health problems as spiritual rather than physical in nature, influenced by their traditional understandings of disease aetiologies. A medical attendant highlighted this in her narrative below:

A young teenage couple came and reported “This is the second week we are not sleeping; my wife has difficulty in breathing as you taught us the danger signs”. When I checked her, her haemoglobin level was 5g/dl. I asked him, how much money do you have? And he said “500Tzs”; I asked him, did I not tell you about preparing for emergency you will need to save money? He said, “You told us but at home, they are preparing a traditional dance for her to chase away evil spirits, we sneaked out”. I had to call an ambulance and referred them to the district hospital, there she received 3 units of blood transfusion and her pregnancy is still young.

Medical attendant, from a dispensary

Challenges faced during the intervention

The healthcare workers mentioned implementation of similar interventions as a major challenge to them, leading to duplication of work.

At the time INSIST implemented its QI component other interventions such as ‘Mtunze Mtoto Mchanga’ (INSIST community arm) and the ‘Clinton Health Access Initiative’ (CHAI)(Clinton Foundation, 2013) were implemented simultaneously. Seven healthcare providers reported that both these interventions aimed at increasing health facility deliveries.

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This brought some confusion to healthcare workers and made them question whether there was sufficient harmonisation of activities among different stakeholders. In addition, being involved in similar interventions was challenging to frontline workers in terms of time and data collection. In all these interventions, they needed to collect data and provide reports on top of their routine work leading to duplication of effort. The confusion they felt about interventions was evident when respondents were asked to describe the present QI intervention during the in-depth interviews. Several respondents referred to other interventions. Four healthcare workers, for instance, highlighted the role of incentives linked to the CHAI intervention.

The community proposed a lot of things such as providing bicycles to go around with, registers, exercise books and uniforms for the volunteers, very nice things were given.

Clinical officer, from a dispensary

The things we did together and that with CHAI were all related because you all had one task of improving mother and newborn that is why I am confusing them. For example, CHAI was providing wraps (locally known as khanga), soap and nappies as incentive to women who gave birth in the health facility and INSIST community arm was teaching the same things.

Clinical officer, from a dispensary

Sustainability of the intervention

Building on the positive responses and influence of the QI intervention, the issue of continuation, however, is not decided by the healthcare workers even if they want to. The CHMT decides on interventions to be implemented at district level based on their planning and budget in the Council Comprehensive Health Plan (CCHP). However, the RCH activities have less priority compared with others such as HIV/AIDS or malaria(Lawn et al., 2009)

A respondent summarised these district level challenges as follows:

It was good bringing facilities together, learning from each other, but its continuation is a problem. We need to put it in the budget, but when you put it, during quarterly meetings it does not pass. They say the money is not enough, very few RCH activities get approved, like last year they approved only outreach services.

5.5 DISCUSSION

We found health workers' perception suggested that the QI intervention improved their capacity, their counselling skills for birth preparedness and pregnancy danger signs as well as the use of the partograph. In addition, they favoured the onsite follow-up visits over workshops, because it gave them the opportunity to learn and solve problems. Not all study participants could remember important details of the QI approach used, 21 months after their last learning session. Duplication of work was mentioned as one of the challenges due to different projects intervening in similar areas and the lack of sustainability of the intervention despite potential for improving healthcare process delivery. Similar findings were reported by a study in Rwanda rural health centres,(Manzi et al., 2014) that QI activities built confidence and capacity of health workers and that the mentorship visits were more supportive than classical district management supervision.(Rowe et al., 2005) conclude in their review on QI approaches that multifaceted interventions (e.g., trainings and supervision) are more likely to improve performance, and that supervision with feedback was more effective than single interventions. This was also reported by the healthcare providers in our study. Most of the healthcare providers involved in the INSIST QI intervention had no previous knowledge of QI methods. However, they were motivated to engage in the intervention as they saw changes in improvement indicators taking place as a result of their efforts without using any additional resources.(Boucar et al., 2014) However, at the same time the risk of duplicating work for frontline health workers was identified as a challenge(Mwidunda and Eliakimu, 2015). This finding highlights the need to harmonise interventions. A study in South Africa reported harmonisation by involving various different stakeholders and creating a strong network. This network comprised of non-governmental organisations, district departments and the South African National Department of Health. By doing so they reduced duplication of work, lack of coordination and thus dilution of the intervention effects(Mate et al., 2013). In Tanzania many QI strategies are donor-funded and donor-driven projects focusing on HIV/AIDS leading to HIV-specific QI strategies that are not easily applicable in other fields especially in terms of resources and competing interest of the implementers(Mwidunda and Eliakimu, 2015). However, there is a need to integrate QI interventions in the whole health system including the maternal and newborn services. The Tanzania Ministry of Health and Social Welfare recognised the importance of building a culture of quality and institutionalising QI approaches in the healthcare system in general, through engaging the regions and districts. District councils should continuously invest in QI activities and integrate these in the CCHP to ensure sustainability(Mwidunda and

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Eliakimu, 2015). These suggestions have not yet been implemented, therefore at the moment the sustainability of QI efforts remains one of the main challenges. In line with Bardfield et al (Bardfield et al., 2015) it is argued that the sustainability of QI interventions requires development of government systems and execution of processes essential to build national QI frameworks, promote country ownership and infuse a culture of QI to build capacity at the local, regional and national levels. As much as the positive effects of the INSIST QI intervention are encouraging, the long-term effects are as yet unclear.

Limitations

The role of the project implementer as the interviewer might have influenced the way healthcare providers responded and might have felt obliged to highlight successes. However, the interviewer was aware of this and spoke with the respondents openly about her two roles prior to the interview. In addition, she dealt with it by encouraging the respondents to be open and share their positive as well as negative experiences. In addition, the contextual knowledge of the project implementer in terms of the culture, language and health systems could be advantageous.

Owing to limited resources in this study we did not ask the opinions of pregnant women or community members. Their information and that of health workers who did not participate would have provided useful additional insights. The evaluation was carried out in March 2013, and the project activities ended in June 2011, hence the results could be affected by recall bias. This was evident as some providers tended to remember activities of more recent projects. The selection of healthcare providers was restricted to those who actively participated in the QI intervention. The small number of participants and the specific geographical focus limits the generalisability of the results. However, the inputs identified add to the knowledge of implementing QI studies in rural settings and results could apply to other similar settings.

We started to conduct our study in Ruangwa district with an idea of spreading to all six INSIST study sites. However, due to limited funding we could only conduct the QI intervention in Ruangwa district. We chose to start with Ruangwa because it is the smallest among the six study districts and we wanted keep on learning about QI implementation. We focused on lower level health facilities because from our experience of working in this area, many QI intervention studies are conducted at district hospital, not giving opportunity to the

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lower facilities which cater to people more closely than the district hospital. Even though we used facilities near Ruangwa town for pretesting, however, all the facilities are in rural areas and therefore, there is not much difference in terms of the context and qualifications of the healthcare providers and they all had the same QI exposure.

Conclusion and Recommendations

The findings suggest that the applied QI intervention contributed to improving the quality of care of maternal and newborn health services in Southern Tanzania. Healthcare workers highlighted the potential of the problem-solving QI intervention. However, health systems capacity at district level to sustain this type of intervention is still challenging. Both sustainability and harmonisation of maternal and neonatal interventions aiming at QI need to be addressed in order to avoid duplication of work and the development of parallel systems.

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Contributors

All the authors contributed substantially to the conception of the study, design of the manuscript, and analysis and interpretation of the data. JJ drafted the manuscript and SP, FM, JS and CP revised it critically for important intellectual content. All the authors provided final approval of the version to be published and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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Competing interests: None declared.

Ethics approval: The QI intervention formed part of the INSIST project that received ethical clearance through the National Institute of Medical Research Tanzania (NIMR/HQ/R.8c/Vol II/177), Institutional Review Board of the Ifakara Health Institute (IHRDC/ IRB/No: A 350) and the London School of Hygiene and Tropical Medicine (LSHTM; reference number A358-5316).

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Data sharing statement: No additional data are available.

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CHAPTER 6: Overview of quality improvement approaches in maternal and neonatal health care services in sub-Saharan Africa: A systematic review

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Working paper

6.1 ABSTRACT

Background: Despite global reduction of maternal and neonatal deaths of approximately 45% each. Sub Saharan Africa still accounts for unacceptably high numbers of these deaths globally even though simple and cost effective interventions are already established. Gap in quality of care provided to women during obstetric period is suggested to be one of the contributing factor for the high adverse obstetric outcomes and increased risk of maternal and neonatal mortality. Interventions using quality improvement approaches are implemented in order to overcome the quality problem. This review aims to understand individual components of the QI implementation in detail for reproducibility in resource limited settings.

Methods and Findings: Five electronic databases were searched for publications on evaluation of quality improvement approaches in maternal and neonatal health in sub Saharan Africa. Two reviewers independently assessed the selection and quality of the included studies using study design, type of intervention, outcome measured, settings and time period as inclusion criteria.

From a total of 2003 publications identified, 15 were selected for full-text assessment and 12 were included for final analysis and synthesis. Data was extracted using predefined parameters and analysed thematically. The review identified that there is a similar pattern on how QI methods were implemented. However, similar QI approaches differed in the way they were implemented. The most common QI approach reported was the collaborative quality improvement approach and HIV in pregnancy was the most common topic for improvement. Most of the interventions were evaluated using before and after uncontrolled or quasi experimental study designs.

Conclusion: This adds in to the literature, what other systematic reviews found about QI approach implementation and the challenges of lack of standardization in QI and inherent variations on implementation of the same QI approach. We recommend more QI studies using more reliable study designs to be conducted and evaluated so as to create robust evidence about the effect of the QI approaches in maternal and neonatal healthcare in sub-Saharan.

6.2 INTRODUCTION

The maternal and neonatal health situation in sub Saharan Africa

The global maternal mortality ratio fell by 44% over the past 25 years from an estimated 385 maternal deaths per 100,000 live births in 1990 to 216 maternal deaths per 100,000 live births in 2015 (WHO, 2015b). Developing regions account for approximately 99% of the global maternal deaths in 2015 with sub-Saharan Africa alone accounting for roughly 66% (WHO, 2015b). Subsequently globally, the neonatal mortality rate fell by 47% from 36 deaths per 1,000 live births in 1990 to 19 deaths per 1,000 live births in 2015 (UNICEF, 2015). Despite this reduction these figures are still unacceptably high although simple and cost effective interventions are known which can be implemented in low-recourse settings.

In sub-Saharan Africa more than 70% of maternal deaths are due to direct causes, including obstetric haemorrhage (25%), hypertensive disorders in pregnancy (16%) and infections (10%) (Say et al., 2014). Major indirect causes are HIV/AIDS (6%) and malaria (9%-23%) (Say et al., 2014, Singh et al., 2014). The neonatal deaths, categorized as early neonatal (0 – 6 days) and late neonatal (7 – 28 days) period (Wang et al., 2014); are mostly caused by preterm birth complications 15.4%, intrapartum related complications (birth asphyxia) 10.5% and neonatal sepsis 6.7% (Liu et al., 2015)

WHO has identified and recommended scientifically proven cost effective and high impact maternal and neonatal health interventions, that can be used in routine care and in cases of complications (The Partnership for Maternal, 2011). Theoretically, implementation of these effective interventions could reduce maternal and neonatal mortality by 40–70% (Bhutta et al., 2012, Kerber et al., 2007, Darmstadt et al., 2005). However, their implementation is still challenging especially in rural areas, where 63% of the sub-Saharan African population live (Statista, 2015). Such rural areas face limited distribution of all types of resources leading to poor quality of care within a weak health system and unsatisfactory health outcomes (Wall et al., 2010). In addition, there is a gap between knowledge and clinical practices of health workers leading to suboptimal performance of healthcare delivery (Zakane et al., 2014). In 2014, it was estimated that 52% of pregnant women in sub-Saharan Africa gave birth with assistance from skilled personnel (United Nations, 2015). However, relatively high adverse obstetric outcomes and increased risk of maternal mortality have been reported in those who delivered in health facilities, suggesting there may be a gap in quality of care provided (Chinkhumba et al., 2014, Souza et al., 2013).

Why quality improvement in healthcare?

WHO defined quality improvement (QI) in healthcare as a way to continuously improve performance and quality of service delivery in any healthcare setting (World Health Organization, 2006). We defined the QI approach as a distinct management process and set of coordinated tools and techniques to ensure that organizations consistently meet their communities' health needs and strive to improve the health status of their populations (Riley et al., 2010). Techniques are defined as a set of practices used to explore the quality of care and tools are defined as the instruments used to describe processes and collect data on quality (Raven et al., 2011, Paul E. Plsek, 1999). Sub-Saharan Africa has been introduced to QI initiatives through donors, development agencies and consultant groups since the 1990s mainly in HIV/ AIDS and family planning projects (World Health Organization, 2006, Lynam P, 1993, Kumar S et al., 1989). More recently, QI approaches have been used in implementing many other interventions, including maternal and neonatal health care services.

There are several previous reviews summarising QI approaches and suggesting QI frameworks to improve maternal and neonatal health. Raven and colleagues (2011) gave an overview of the approaches, methodologies, and tools to improve the quality of maternal and neonatal health in low-income countries (Raven et al., 2011). They concluded that none of those identified were sufficient by themselves to improve quality of care and pointed out that more information was needed on how to implement QI methods. Raven et al. 2012 identified definitions and models of quality of care for maternal and neonatal health (Raven et al., 2012). A review of systematic reviews on approaches to improve quality of care for women and neonates found that at district level there was evidence to support the effect of conditional cash transfers and maternal voucher schemes on a range of MNH outcomes (Bhutta et al., 2014b). At health facility level, there is evidence to suggest that in-service training and speciality teams lead to improved maternal health outcomes; and that at community level packaged care involving outreach, referral, community mobilization and training leads to better maternal and neonatal health outcomes (Austin et al., 2014, Bhutta et al., 2014b). Furthermore, they reported evidence that strategies to improve professional practice did affect the desired practice. However, they illustrated the scarcity of evidence on community, district and facility-level interventions, particularly for issues specific to quality of maternal health care and MNH outcomes in low income countries (Bhutta et al., 2014b, Austin et al., 2014).

Why this review

Previous reviews highlighted the need to understand individual components of the QI implementation in detail for reproducibility in resource limited settings (Bhutta et al., 2014b, Raven et al., 2011, Raven et al., 2012). This is important because currently the culture of QI is quickly being introduced in sub Saharan countries and ministries of health are adopting the approaches. Therefore, clear understanding on how QI exactly works and what is needed to have it in place, up and running through the existing health system is needed. For this review we will focus on identifying QI approaches implemented in maternal and neonatal health in sub-Saharan Africa, how they were implemented, and what are the maternal and neonatal health outcomes.

6.3 METHODS

Search strategy for studies identification

Studies reporting on evaluation of quality improvement approaches for maternal and neonatal care in sub-Saharan Africa were searched in MEDLINE, EMBASE, CINAHL, Africa wide and Cochrane databases. Initially a search was done in MEDLINE using Medical Subject Headings (MeSH) terms and free text with keywords and the steps were repeated for the other databases. The terms used were (quality improvement intervention, quality improvement in healthcare, quality improvement of healthcare, PDSA(Plan-Do-Study-Act), PDCA(Plan-Do-Check-Act), collaborative approach, quality management, quality control, quality assurance) and (maternal health services, maternal health, maternal care, maternal mortality, neonatal infant, neonatal care, neonatal care, neonatal mortality, neonatal mortality, intrapartum care, natal care, labour/ labor and delivery, antenatal care, antepartum care, postnatal care/services, postpartum care/services) and (Africa, sub Saharan, low income countries, low resource countries) and English language.

Criteria for considering studies for the review

Study design: cluster randomised controlled trials, individually randomised controlled trials, quasi – experimental studies, controlled or uncontrolled before and after studies and interrupted time series studies. Intervention: Studies that described clearly the QI approach used. Outcome: Studies that reported antenatal, intrapartum or postnatal care outcomes across all healthcare settings and professionals. Setting: Studies conducted in countries

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within sub-Saharan Africa. Time: Studies published from January 2000 to June 2014. We excluded commentaries, editorials, letters, review articles, newspaper articles and books.

Selection of studies and quality assessment

The first reviewer (JJ) filtered the studies by title, which included terms describing improving quality of care in maternal and neonatal care in Africa or countries within Africa. Articles that were found relevant were exported to Endnote 7 (Thomson Reuters, New York). A second reviewer (IE) performed a quality check on the selection of included and excluded studies using the inclusion criteria. Consensus was reached for disagreements between the first and second reviewer through discussion.

Quality of the articles was assessed using SQUIRE guideline (Ogrinc et al., 2008). The categories looked at were title, abstract, background knowledge, local problem, intended improvement, study question, ethical issues, and setting, planning the intervention, methods of evaluation, analysis and outcomes. Each item was categorised according to whether it was explained according to the SQUIRE checklist (Ogrinc et al., 2008). Study reports are often brief to keep within journal word length requirements: if the study reported at least three or more of what was required per guided item, we categorised it as “mentioned”.

Data extraction and synthesis

Data was extracted by JJ using predefined parameters and we used narrative synthesis to bring together the findings and draw conclusions (Jennie Popay et al., 2006). Our focus was on the effects of interventions and on factors shaping the implementation of the interventions. Parameters used in extraction included study type, type of QI method, target population, setting, duration of QI implementation, duration of QI training, frequency of QI training, frequency and nature of supervision, outcome measured and results. Data was analysed thematically. Studies with similar concepts were explored for similarities and differences between them. A few themes were identified *a priori* based on facilitators or barriers of QI implementation reported in the QI in healthcare literature, including supportive supervision, data management, leadership, QI teams, learning cycles and sustainability (Dumont et al., 2013, World Health Organization, 2006, Tunçalp et al., 2015). In addition, themes emerging during synthesis were included.

Definition of themes

Supportive supervision, coaching or mentoring: as part of many QI initiatives, follow up of activities are done after some initial training. This follow up could be in the form of supportive supervision, coaching or mentoring. Coaching was defined as a facilitative process that enables individuals, groups, teams or organizations to acquire new skills, to improve existing skills, competence and performance, and to enhance their personal effectiveness or personal development or personal growth (Robert G. Hamlin et al., 2009). WHO defined clinical mentorship as a system of practical training and consultation that fosters on going professional development to yield sustainable high-quality clinical care outcomes (WHO, 2006). And supportive supervision was defined as a facilitative approach that promotes continuous improvements in the quality of care by providing the necessary leadership and support for quality improvement processes and by emphasizing mentorship, joint problem solving and two-way communication between supervisors and supervisees (Bradley et al., 2013).

Leadership was defined as administrative actions taken to support improvement activities. To build a culture of QI in an organization needs committed and interested leadership that will be ready to develop a QI vision and support implementation of QI methods, concepts and principles (Raven et al., 2011). A systematic review on the influence of context on QI success in health care found that team leadership was associated with success of QI initiatives (Kaplan et al., 2010).

Sustainability was defined as continuation of the interventions and practices that were implemented within organizations, systems, or communities after initial implementation efforts or funding ended (Blasinsky et al., 2006, Wiltsey Stirman et al., 2012).

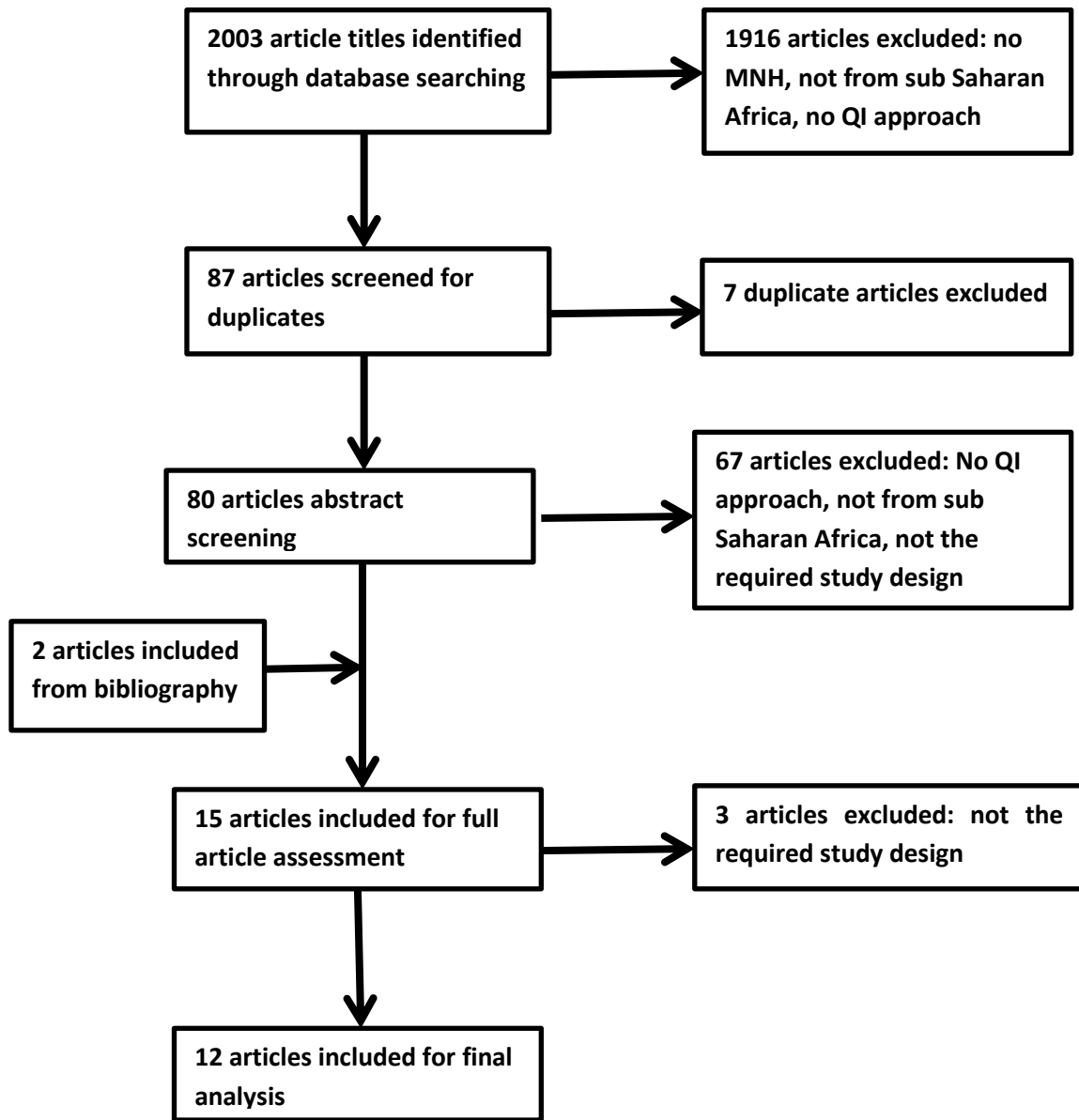
Data is a cornerstone of QI. It is used to describe how well current systems are working; what happens when changes are applied, and to document successful performance, and measuring the impact of the changes (U. S. Department of Health and Human Services and Health Resources and Services Administration, 2011). All improvements are changes, although not all changes are improvements (Berwick et al., 2003).

6.4 RESULTS

General overview

Two thousand and three relevant articles were identified and screened: Medline (n=504), Embase (n=823), CINAHL (n=549), Africa wide information (n=119), and Cochrane (n=8). After removing duplicates and title screening 80 papers remained for abstract screening, among them 13 articles satisfied the inclusion criteria for full article screening. Two additional references were identified from bibliographic sources and were included for full article screening, making 15 articles. Among the 15 articles screened, 12 satisfied the inclusion criteria mentioned at method section and were included in the final analysis and synthesis. Figure 12 displays the flow chart of the included and excluded studies. The results are presented in 3 sections: the characteristics of the studies; the QI approaches and how they were implemented; and the QI outcomes in maternal and neonatal health.

Figure 12: Flow Chart of included and excluded studies



Characteristics of the studies

This review includes 12 peer reviewed articles, with one study from Ethiopia being reported in two different articles making 11 studies: cluster randomised controlled trial (one study,9 %); quasi experimental study (two studies,18%); time series study (four studies,36%) and uncontrolled before and after study designs (four studies,36%). The studies were from Ethiopia (1), Ghana (1), Lesotho (1), Mali (1), Nigeria (1), Senegal (1), South Africa (3), Uganda (1), and Zambia (1). The scope of the intervention ranged from national to community level. The maternal and neonatal health improvement topics covered included hospital based maternal death audits – one study, emergency obstetric care (EmOC) – one study, Prevention of Mother to Child Transmission of HIV (PMTCT) – five studies, postnatal care – one study and partograph use – two studies. The implementation of these interventions focused mainly on frontline care providers and a few involved community health workers and village leaders.

The quality of the studies

Table 7 presents the quality of the included studies according to SQUIRE guideline. The dark colour signifies that the component was missing in the article and the light colour signifies that the component was mentioned in the article. Seven articles out of the twelve did not explain who funded the project. In addition, seven articles did not include information on ethics and two studies did not mention limitations. No clear reasons were given for this lack of information.

Table 7: Quality of included studies according to the SQUIRE guideline

Reference	Title	Abstract	Background Knowledge	Local problem	Intended improvement	Study question	Ethical issues	Setting	Planning the intervention	Planning the assessment of the intervention	Methods of evaluation	Analysis	Outcomes	Discussion	Relation to other evidence	Limitations	Interpretation	Conclusions	Funding	
Youngleson, 2010 South Africa																				
Berman, 2012 Lesotho																				
Dumont, 2013 Senegal and Mali																				
Galadanci, 2011 Nigeria																				
Kim, 2013 Zambia																				
Agha, 2010 Uganda																				
Bhardwaj, 2014. South Africa																				

The QI approaches identified

The QI approaches identified in the included studies were Quality Improvement Collaboratives (4); Data driven continuous quality improvement, audits, Standards Based Management and Recognition (SBM-R), and Client-Oriented, Provider-Efficient (COPE). Table 8 presents the QI approaches showing the various activities involved. These activities included, but are not limited to, formation of QI teams, providing QI and subject specific trainings, give QI teams time to implement changes, conducting onsite or workshop follow ups after trainings, conducting baseline and endline assessment of the improvement area, monitoring of improvement processes using data and involvement of leadership (Bardfield et al., 2015, U. S. Department of Health and Human Services and Health Resources and Services Administration, 2011). From this table, we see heterogeneity of the included studies in relation to these activities. None of the items listed was conducted by all studies. The most common activities were the repeated assessment of action plans and subsequent adjustments (learning cycles) (Taylor et al., 2014) and baseline assessment before implementing a QI intervention.

Table 8: Snap shot of similarities and differences in QI implementation processes across the studies

Reference	Provided QI method training	Provided technical training	Provided time to implement changes (activity period)	Follow up contact (mentoring and coaching)	Onsite follow up	Workshop follow up	Learning cycles	QI team formed	Learning from different QI teams	Active involvement of leadership	Monitor progress through data	Baseline assessment	Endline assessment
Youngleson et al, 2010	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
Berman et al, 2012	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓	
Dumont et al, 2013	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓
Galadanci et al, 2011		✓	✓				✓		✓		✓		✓
Kim et al, 2013	✓	✓	✓	✓	✓		✓	✓		✓		✓	✓
Agha et al, 2010	✓		✓	✓	✓		✓			✓		✓	✓
Bhardwaj et al, 2014.							✓			✓	✓	✓	
Ngidi et al, 2013.		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Sibley et. al, 2014.										✓	✓	✓	✓
Tesfaye et al, 2014.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Singh et al, 2013.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Doherty et al, 2009.		✓	✓	✓	✓			✓			✓	✓	✓

Legend: Where there is no tick nothing is reported about it on the paper

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Table 9 presents characteristics of QI interventions implementation including the collaborators involved, duration of intervention and follow up visits. All the 11 studies reported the QI approach employed and duration of their implementation. Most interventions were implemented for a period of 24 months; the range is 6 to 39 months. Six studies reported duration of the QI trainings conducted and reported the contents of those trainings. The trainings were divided: for supervisors, they lasted longer, up to 6 days and for QI teams on average they lasted for 1 day. Five studies mentioned how frequently these QI trainings were provided; they ranged from one to six months. All 11 studies conducted a follow up activity after the training either onsite i.e. within the implementing facility or in meetings (workshops) whereby they gather the QI teams together at one point and provide the support. Most of the follow ups were done onsite (8/12) and few studies did both onsite and workshop follow ups. Half of the studies did monthly follow ups the rest ranged from six weeks to six months. As we keep dissecting further these QI studies in order to understand their mechanisms, we realized that even if it's the same approach presented for example the collaborative approach, the way its implemented differs for each study.

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Articles	QI approach			QI trainings		Follow up visits/ supervision	
Reference	Name	Duration of intervention	Collaborators	Duration of QI training	Frequency of QI trainings	Nature of follow up visits	Frequency of follow visits
Youngleson et al, 2010, South Africa	Breakthrough series collaborative	39 months	Western Cape Provincial Department of Health Cape Town Municipality City Health departments the Institute for Healthcare Improvement	Not specified	6 monthly	Pilot: onsite Spread: sub district meetings	Pilot phase: forty nights. Spread phase: monthly
Berman et al, 2012, Lesotho	Model for Improvement	months	Lesotho-Boston University Health Alliance Lesotho Ministry of Health and Social Welfare	Not specified	Monthly	On site	Monthly
Dumont et al, 2013, Senegal and Mali	Maternal death reviews (Audits)	24months	Sainte-Justine Hospital in Montreal, Canada Hospitals in Senegal and Mali.	6 days for two local trainers Not specified for QI teams	Trainers: once a year QI teams: quarterly	Onsite	Monthly hospital audit teams
Galadanci et al, 2011, Nigeria	Total quality assurance	24months	The German Federal Ministry of Economic Cooperation and Development	Not specified	Not specified	Onsite	6 Monthly

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			through Rotary International The governments of Kano and Kaduna States				
Kim et al, 2013, Zambia	Standards Based Management and Recognition	21 months	The Zambia Defence Force Jhpiego	3 days SBMR for facility managers 6 days PMTCT training for providers 6 days PMTCT training for lay people	Not specified	Meetings	2 or 3 days' supervision 6 monthly
Agha et al, 2010, Uganda	The Client Oriented, Provider Efficient approach	6 months	International, domestic, public and private quality assurance health care service experts	1 day for providers 2 half days for supervisors	Not specified	Onsite	Not specified
Bhardwaj et al, 2014, South Africa	Data-driven approach	36 months	South Africa National Department of Health supported by partners	Not specified	Not specified	Meetings	Not specified
Ngidi et al, 2013, South Africa	Data driven approach	6 months	Health systems improvement team from the University of Kwa Zulu Natal District managers	Not specified	Not specified	Meetings	Monthly

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Sibley et al, 2014, Ethiopia	Collaborative QI approach	24 months	Emory University, Atlanta, Georgia JSI Research & Training Institute, Inc., Boston, MA University Research Company LLC Bethesda, MD Addis Ababa University, Ethiopia Ethiopian Federal Ministry of Health	1 day	Not specified	Meetings	Not specified
Tesfaye et al, 2014, Ethiopia	Collaborative QI approach	24 months	Emory University JSI Research and Training Institute, Inc. University Research Company, LLC; Addis Ababa University The Ethiopian Federal Ministry of Health The Amhara and Oromiya Regional Health Bureaus	1 day	5 times (4-6months)	Meetings	Monthly

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Singh et al, 2013, Ghana	Collaborative QI approach	18months (pilot)	National Catholic Health Service of Ghana The Institute for Healthcare Improvement The Ghana Health Service	2-3 days	4-6 monthly	Onsite	Initially every 4-12 weeks, then 4-6weeks
Doherty et al, 2009, South Africa	Data driven approach	12 months	District managers with external facilitator	half day	Not specified	Onsite	Monthly

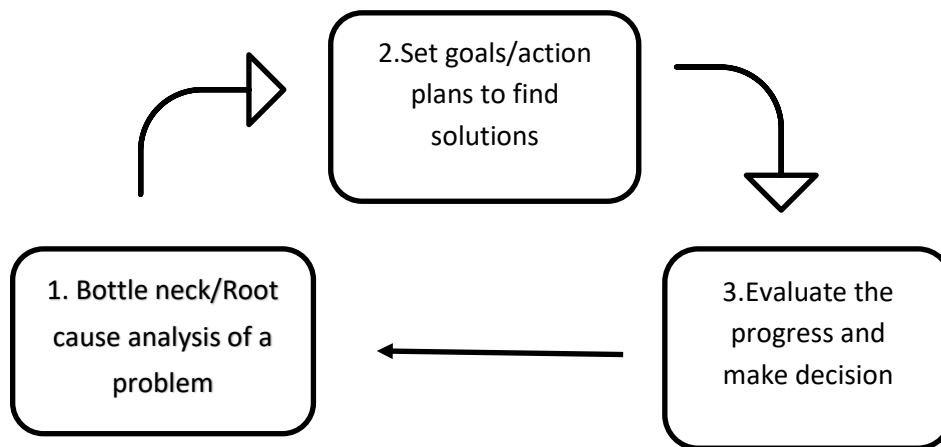
Table 9: Details of QI approaches implementation processes, timeline and collaborators

Facilitators of QI implementation

Capacity building

The capacity building theme is divided into two aspects, the QI methods and specific intervention that need improvement. Seven of the eleven studies (7 of 12 articles) reported to build capacity of their QI teams on QI methods. We observed a common cascade of QI processes in the different QI approaches were implemented as summarized in Figure 13

Figure 13: The common QI processes observed in all QI assessed approaches



The studies used different tools and terminologies such as root cause analysis, bottleneck analysis, and process mapping to ascertain what the problem that needs improvement is. Then set aims, goals and plans on how to overcome the problem after certain time period they revisit the actions plan to see if what was agreed has improved or not and make decisions based on that (Agha, 2010, Berman et al., 2012, Dumont et al., 2013, Kim et al., 2013, Singh et al., 2013, Tesfaye et al., 2014, Youngleson et al., 2010).

Eight articles (8/12 articles) reported to improve knowledge of specific areas they wanted to intervene such as partograph use, emergency obstetric care, PMTCT etc. It was found by Dumont et al that onsite training on maternal death reviews empowered the health care professionals with knowledge and confidence to implement improvements on how they provided emergency obstetric care (Dumont et al., 2013). Conducting capacity-building workshops for healthcare staff at facility level facilitated effective implementation of interventions which were identified as bottlenecks in a study by Bhardwaj (Bhardwaj et al., 2014). Kim et al reported health care providers received training on family planning counselling which results on achieve desirable improvements in their indicators (Kim et al.,

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2013). One of studies from South Africa reported training nursing staff in initiating patients on anti-retro viral treatment, however, did not mention it as a facilitator or barrier to achieving their goal on QI intervention (Ngidi et al., 2013). A study in Ghana also pointed out that staff training influenced positively QI outcomes (Singh et al., 2013). A study in Uganda reported to fail to show changes on their improvement work because they did not provide training on the improvement topic as part of intervention to improve technical competence and skills of QI teams (Agha, 2010). Lastly a study in Ethiopia which was reported by two different articles trained different cadres at community level on maternal and neonatal care. These workers then trained pregnant women in their second and third trimesters and their family caregivers in maternal and neonatal care through community maternal and neonatal health (CMNH) family meetings (Tsfaye et al., 2014, Sibley et al., 2014). The authors suggested that the success of the QI intervention reflects on the active participation of district health office, health center, health post leaders and staff in the CMNH training as well as quality improvement training, workshops and monthly coaching of guide teams and quality improvement teams (Tsfaye et al., 2014, Sibley et al., 2014).

Coaching and mentoring

Six out of the eleven studies (6/12 articles) discussed coaching, mentoring or supportive supervision as a facilitator of their improvement work. Looking at these studies one by one, a study from Uganda reported the combination of provider's self-assessment and supportive supervision had an impact on both the structural (infrastructure) and process (counselling and technical aspects of service provision in family planning and antenatal care) attributes of quality of care and services. (Agha, 2010). Furthermore, it's important for supervisors to monitor performance, check progress against initial scores, help to identify the root causes of performance problems and to find solutions during supervision visits (Agha, 2010). In addition, the Lesotho study suggested mentoring and support to local staff is important in prioritizing local improvement ideas rather than donor imposed or otherwise externally driven priorities (Berman et al., 2012). Furthermore, one of SA study reported mentoring of health staff at facility level contributed to understanding of bottlenecks and prioritising actions at local levels, leading to improvement of program performance (Bhardwaj et al., 2014). In order to ensure sustainability of improvements, another SA study recommended on-going support and supervision from experienced facilitators in order to establish a culture of data driven monitoring and to foster greater ownership of programme performance (Doherty et al., 2009). Providers at intervention facilities benefited from the

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mentoring and coaching that were integral to the supportive supervision visits conducted as part of SBM-R. Supervisors offered feedback and advice on all standards that were not met during observational visits leading to improvement of ANC skills such as preparation of supplies and equipment, history taking, individualized care, and follow up at intervention sites, while holding steady or declining at comparison sites (Kim et al., 2013). During coaching visits district health information officers were trained and coached on how to address data quality (Singh et al., 2013).

Active engagement of local leadership and management

Five studies out of 12 discussed active engagement of local leadership that facilitated the implementation of their QI intervention. For example, in a study by Kim et al. of the studies, problems identified could not be addressed by QI teams without their leaders support by involving other stakeholders to achieve their goal of constructing a maternity ward (Kim et al., 2013). A study by Doherty et al. reported that the local management was an important influencer that facilitated achievement of their QI initiative. However, they gave a caution that involvement of senior management can be either a facilitator or a barrier: the intervention relies on their support and buy in to allow mid-level managers and the QI teams the time to participate in the intervention (Doherty et al., 2009). In a study by Ngidi the intervention was facilitated by advocacy from the district health managers and leaders who spearheaded the implementation leading to sustained changes even after the project was finished (Ngidi et al., 2013). A study by Youngleson et al. pointed out the district leadership used process data feedback to district-wide learning opportunities, supported testing of new ideas and the spread of successful interventions. In addition to, deploying additional strategic resources when needed contributed to success of their QI intervention (Youngleson et al., 2010). In another study, partnership, leadership and active engagement of the Ministry of Health and local communities; regional health bureaus and zonal health departments political leadership and support; and variety of district health office, health center, and health post leaders and staff active participation on the QI intervention contributed to the success of their intervention (Sibley et al., 2014).

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Data

All studies collected data, most of them collected data in order to demonstrate improvement progress over time. This was done through agreeing on actions plans to find solutions and monitoring of changes over time, commonly known as process data. This was presented as Plan-Do-Act-Cycle or learning cycle or repeated assessment in some studies. And this collected data to monitor changes was not standard, each study designed its own way of collecting it, some used routine system tools, some developed completely new data collection tool and others used both.

Another type of data collected was to evaluate the effect of the intervention through baseline and endline surveys, however, only two articles (2/12) discussed on data use as an important factor in QI. It was reported making data visible and simplified data collection tools enabled rapid data collection and easy usage to identify bottle necks and motivated the QI teams (Doherty et al., 2009, Berman et al., 2012). However, the programme managers complained about the large amount of data they had to collect and process (Doherty et al., 2009).

Policy changes during the implementation of interventions

This was another emerging theme that influenced QI interventions and outcomes. Four out of eleven studies (4/12 articles) elaborated how policy changes facilitated the QI implementation. South Africa Department of Health changed policy and guideline in April 2010 that reinforced the value of, and opportunities for identifying and treating eligible HIV-infected pregnant women, and created greater public and provider awareness that boosted implementation of the campaign based QI intervention conducted leading to major changes (Ngidi et al., 2013). In another study, a Ghana QI initiative was boosted when one of national pillars of health services (National Catholic Health Service) developed a plan to use QI as the primary mechanism for transforming the performance of the organization (Twum-Danso et al., 2012). In addition, for the same study the Ghana Health Service proposed, in October 2008, a new post-partum policy that promotes skilled health care during labour, delivery, and the immediate post-partum period, and two surveillance visits within the first week of life to encourage healthy behaviours and detect early warning signs of illness in both mother and child. This was helpful to promote improvement of early postnatal care which was project's area of focus (Twum-Danso et al., 2013). Another project acknowledged that the protocol changes by the South Africa Department of Health in November 2007 to provide HIV PCR testing for infants at 6 weeks rather than 14 weeks was

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one of the contributing factors to the improvement in infant HIV testing rates (Youngleson et al., 2010). Ethiopia Federal Ministry of Health in 2012 modified the Health Extension Program structure, and launched a volunteer health development army with the goal of creating a network structure ensuring one volunteer per 5 households. The health development army was supervised by health development army team leaders who, in turn, were supervised by district health center specialists (for administrative support) and health extension workers (for technical support). This new structure was similar to the study team's structure, making for smooth adaptation with the new government structure in the study areas (Sibley et al., 2014).

Sustainability

We expected that sustainability plans would be an important aspect in making sure the improvements gained during initial implementation of QI approaches are maintained. However, very few articles (2/12) reported what happened after the initial implementation of their intervention. None of them reported sustainability plans. One study mentioned the impact of one component of their intervention, the use of lay workers in PMTCT, for which the Zambia Defence Force worked to expand the initiative and the Ministry of Health, was interested in copying it. However, they also pointed out serious challenges to the long term sustainability in terms of the need of continuing training, supportive supervision, and performance review and others (Kim et al., 2013). Another study mentioned further improvements after the initial intervention, but acknowledged these achievements were reinforced by a policy change, that the government of South Africa released new ART guidelines including prioritization of pregnant women for ART, empowering nurses to treat persons living with HIV and another non-governmental organization operating in the district invested heavily in training nurses and doctors on these new guidelines (Ngidi et al., 2013).

Multiple interventions

Three studies among the eleven used a synergistic approach of one to two other interventions together with QI to bring robust improvements in their areas of interest. One study combined developing opinion leaders; clinically-oriented and evidence-based outreach visits focusing on emergency obstetric care; and clinical audits-maternal death reviews (the QI intervention) (Dumont et al., 2013). Another study combined a CMNH training program; continuous quality improvement; and behaviour change communication through culturally appropriate, professionally produced films, radio and TV dramas, songs, and poetry

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contests(Sibley et al., 2014, Tesfaye et al., 2014). All three objectives of this study were met as planned and there were increases in the use of trained TBAs, coupled with substantial decreases in reliance on family members and other unskilled providers for birth care. Improvements in women's use of skilled providers and health extension workers are very encouraging and in line with national priorities and policies, particularly the engagement of health extension workers in ambulatory care. Another study reported improvements in performance of PMTCT processes and outcomes through a health systems intervention with three concurrent components: a quality improvement framework, introduction of better PMTCT protocols and the strategic addition or reallocation of resources (Youngleson et al., 2010)

Table 10: Effects on processes and outcome reported by each study

Reference	Study design & data collection method for the main outcomes	Participants	Setting	Changes made to bring improvement	Main findings
Youngleson et al, 2010	Time series analysis	Pregnant women Infants	Pilot phase: 7 primary care clinics and 2 birthing units. Spread phase: 17 PMTCT linked facilities	Introduced ANC to two clinics and three new ARV service points AZT prophylaxis was changed from 32 to 28 weeks' gestation The infants' HIV testing was changed from 14 to 6 weeks. A rapid response system to track infants who had not tested through a monthly PMTCT data review meeting	Perinatal HIV transmission rate in Eastern sub-district (intervention) improved from 7.6% to 5% in 16 months (p=0.013) Perinatal HIV transmission rate in Cape Town Metro excluding Eastern sub-district (comparison) improved from 4.2% to 3.8% in 16 months (p=0.22)
Berman et al, 2012	Time series analysis	District managers Hospital managers 40 hospital staff	Motebang district hospital	Forming dynamic maternity and OPD teams Bring nurses temporarily into the maternity ward at critical times from less active wards	Partogram completion rate improved from 12% to 90% in 10 months. OPD high-acuity patients waiting time improved from 179 to 28 minutes in 11 months The internal hospital preparation time for emergency referrals was

Implementation

				Visual cues to alert staff of high acuity patients Allocating daytime referral nurse and disseminating an internal referral protocol	lowered from 114 minutes to an average 49 minutes over the eight-month
Dumont et al, 2013	Stratified cluster-randomised parallel-group trial design	Healthcare professionals Pregnant women	District hospitals Regional and national hospitals Public referral hospitals(capital)	Train two certified instructors on maternal death audits Educational outreach visits to promote maternal death audits	Hospital based maternal mortality per 1000 patients in 4 years (intervention group) capital from 2.5 to 1.4 regional from 18.1 to 15.5 district from 16.1 to 9.5 Hospital based maternal mortality rates in 4 years (comparison group) capital from 2.8 to 3.2 regional from 13.3 to 10.2 district from 8.8 to 9.9
Galadanci et al, 2011	Uncontrolled before and after	Healthcare providers	10 rural hospitals (5 Kano and 5 Kaduna)	Train health workers on use of magnesium sulphate for eclampsia and treatment of postpartum haemorrhage	Hospital based maternal mortality ratio in 2 years ranged from 100 to 6000 per 100 000 births in the first half of 2008; and from 100 to 1500 per 100 000 births in the second half of 2009

Implementation

Kim et al, 2013	Quasi experimental design	Healthcare providers Antenatal care clients	Eight defence hospitals and clinics (4 interventions and 4 comparison) Zambia force and (4 comparison)	Provided supplies and equipment to support PMTCT services. Recruited one lay person at each facility to work on PMTCT	The overall PMTCT score at intervention sites rose from 57% to 73% in 14months (p=0.001) The overall PMTCT score at comparison sites was from 51.7% to 52.2% in 14 months
Agha et al, 2010	pre-test–post-test quasi-experimental study	Private midwives	Uganda Private Midwives Association	Group A: midwives QI training with supervisors without training Group B: midwives QI training with trained supervisors Control: midwives and supervisors without any training	Raw mean scores of quality of care process attribute indicators in 6 months Counselling Control 6.7 to 6.9 Intervention A 6.2 to 6.5 Intervention B 5.3 to 6.4 Family planning Control 26.4 to 26 Intervention A 24.5 to 25.5 Intervention B 23.2 to 25.1 Antenatal care Control to 23.9 to 24.7 Intervention A 21.3 to 23.4 Intervention B 18.7 to 21.9 Postnatal care Control to 23.6 to 23.3 Intervention A 22.6 to 23.4 Intervention B 20.7 to 19.9 Family planning, antenatal care, and postnatal care Control to 24.7 to 24.6

Implementation

					Intervention A 22.7 to 24.6 Intervention B 20.8 to 22.2
Bhardwaj et al, 2014.	Time series analysis	Pregnant women Neonates	52 districts	Link ANC, treatment and laboratory system Strengthen basic ANC All HIV+ women assessed for eligibility and CD4 count Work with community and involve partners	PMTCT indicators in 24months ANC 1st visit <20 weeks 37% to 43% ANC client CD4+ test rate 66% to 76% ANC initiated on AZT during rate 81% to 89% ANC initiated on HAART rate 0% to 80% ANC clients ≥32 weeks retesting rate 28% to 47% Postnatal care mother visits within 6 days' rate 17% to 62% Baby PCR test rate at 6 weeks 83% to 100%
Ngidi et al, 2013.	Controlled before and after	Health workers	Intervention: 65 health facilities Ugu district. Comparison: 59 health facilities	Simplification of the PMTCT care cascade Refocused routine monthly perinatal meetings.	September 2009 to September 2010. Intervention district: The number of pregnant women initiated on ART each month

Implementation

			Umzinyathi district.	ART training for nursing staff	increased from 21 to 67 (p=0.002) Control district: the average number of monthly ART initiations among pregnant HIV-infected women increased from 39 to 55 (P = 0.07)
*Sibley et al, 2014. Ethiopia	Uncontrolled before and after	Pregnant women Traditional birth attendants Paid health extension workers Community health development agent	Amhara and Oromiya regions: 3 districts in each region, 51 villages in total.	Labour and birth notification Postnatal care follow-up within 48 hours of birth by a health extension worker Pregnancy identification & ANC registration Family meetings	In the Amhara and Oromiya regions the use of health extension workers contacts with pregnant women and their families increased from 46%-70% and 31%-59%, respectively. Timing of PNC within 48hrs of birth improved from 59% – 100% and 65% - 100% in Amhara and Oromiya respectively
Tesfaye et al, 2014. Ethiopia	Uncontrolled before and after	Postnatal women	51 villages from Amhara and Oromiya regions	Labour & Birth notification CMNH family meeting attendance ANC attendance	Postnatal care from a skilled provider or health ex-tension worker within 48hours of birth increased in both regions in 24 months: from 5% to 51% in Amhara from 15% to 47% in Oromiya (both P<0.001)

Implementation

Singh et al, 2013	Interrupted time series analysis	Healthcare staff	27 health facilities	Community meetings on early ANC Increase number of days ANC is offered at the facility Consistent use of partographs Detain postpartum women for 6–48 h after delivery PNC Day 6–7 home visit	Mean % Early ANC changed from 33.9 to 32.9 Skilled delivery increased from 55.9 to 64.7 Neonatal mortality rate decreased from a mean of 2.5/1000 to 0.9/1000 Infant mortality rate decreased from a mean of 3.5/1000 to 2.3/1000 Underweight in infants decreased from 1.8 to 1.2
Doherty et al, 2009.	Before and after	Clinical staff	18 primary health care clinics	PMTCT protocol training	Ante-natal HIV testing increased from 88% to 98%, CD4 testing of HIV positive mothers increased from 40% to 97%, maternal Nevirapine increased from 57% to 96% Infant Nevirapine increased from 15% to 68%. 6-week PCR testing increase from 24% to 68%

***The study included objectives that are not related to QI approach. Here we will report QI related results only.**

Implementation

Table 10 summarize the results of the QI strategies implemented. Training of QI teams on various topics that needed improvement and re organizing of work processes were the most two common interventions in all the 12 articles. The challenge of reporting these QI outcomes is; one study having multiple end points making it difficult to conclude their results and all studies having different measures of outcome i.e. some used quality scores, some service coverage outcomes and some mortality indicators(Grimshaw et al., 2003). Majority of the studies achieved modest to robust improvements on their main outcomes of interest. However, we cannot conclude for sure if it is purely due to the reported intervention because of the weak methodology used to evaluate the studies; considering almost half are uncontrolled before – after studies. Only one study was a randomised controlled trial that and it concluded strong evidence of use of maternal deaths audits in reducing facility maternal mortality(Dumont et al., 2013). The study by Agha reported insufficient improvements of their quality of care intervention(Agha, 2010).

6.5 DISCUSSION

General overview

This review has identified a variety of QI approaches that were implemented in sub Saharan Africa in the area of maternal and neonatal health. We provide an understanding of individual components of the QI interventions processes to foster higher chances of reproducibility. The most common QI approach reported was the collaborative quality improvement approach, which uses the model for improvement to apply changes at local settings (Institute for Healthcare Improvement, 2003). Most of these QI approaches were introduced by donors or international agencies and were implemented in collaboration with local institutions. Regardless of the QI approach implemented all the approaches had similar principles, although they were explained differently, such as data collection and analysis that demonstrates improvement progress over time, the way of determining problems that need to be improved and how to find solutions. In QI collaboratives, they used the PDSA cycle, the quality assurance project called the learning cycles the quality cycle and other approaches such as SBRM and COPE performed repeated assessment of action plans and adjusted accordingly. All the studies explained their QI data collection mechanisms. However, each study collected their QI data differently for instance Bhardwaj et al, Galadanci et al developed data collection tools while Doherty et al, used routine system and Youngleson et al used both routine system and a newly developed data collection tool (Bhardwaj et al., 2014, Galadanci et al., 2011, Doherty et al., 2009, Youngleson et al., 2010). Since QI relies on data quality, there is a clear need for improvement of the routine data system so as to generate reliable information in a sustainable way. Building capacity of QI implementers through workshops and supportive supervision visits was common to most of the studies. QI teams were enabled to use the available resources, guidelines and policies to improve their healthcare delivery. This was effective in obtaining desirable QI outcomes. In addition, studies which reported local leaders at the front line of the improvement work achieved better results compare to the others who did not.

From other QI literature the issue of rewards or recognition seems to be important in motivating staff including QI teams (Necochea et al., 2015). However, in our review this did not come up clearly even though some of the QI approaches principles include recognition. Only two studies in this review touched that issue indirectly. One of them was a study reporting SBMR intervention, this study did not give much information about recognition aspect except mentioning that they provided incentive of 30\$ and bicycle to lay workers in order for them to remain committed and stay on the job (Kim et al., 2013). And another study reported to perform

Implementation

small unveiling ceremonies of new data point, which brought staff members together and reinforced the QI initiative (Berman et al., 2012). Another crucial area was follow up visits 'and' or 'or' supportive supervision, almost all the studies conducted follow up visits. However, there were some differences on how they were done. Some conducted intensive visits and later on decreased as time went by and the local leadership took over (Singh et al., 2013, Youngleson et al., 2010). Others conducted only twice a year, others conducted in health facilities and others called the teams in a common area outside their work stations. Also, the frequencies and timings differed, some conducted as soon as the technical workshops were finished and others waited for some time before visiting the sites.

HIV in pregnancy (PMTCT) was the most common topic for improvement, despite HIV not being one of the major causes of maternal deaths, rather it contributes indirectly. This could be due to donor directives with separate funding management resulting to focusing in single intervention instead of integrating services (Kerber et al., 2007). Only two studies intervened on the major direct causes of maternal death i.e. postpartum haemorrhage and eclampsia (Galadanci et al., 2011, Dumont et al., 2013). None of the studies dealt directly with major causes of neonatal deaths. The studies that were improving PMTCT are the ones that touched neonatal health indirectly.

Study designs

Randomised controlled trials are methodologically sound study designs to be sure that the effects seen are due to the interventions and not to another factor. Only one study in this review was a randomised control trial, others were before - after studies, including the quasi experimental studies. The quasi experimental studies are arguably more appropriate than randomised or observational studies in evaluating quality improvement interventions due to ethical and feasibility reasons like inability to randomize clinicians or already known intervention that works (Penfold and Zhang, 2013).

Quality of the studies

We looked at the quality of all the studies in this review according to SQUIRE guideline. Most of the quality parameters were fully or partially met except for ethical approval and funding, about half of the studies did not report these two parameters without giving any explanations. With respect to evaluation of the studies, eight studies collected independent data to evaluate

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outcome of the intervention however, not clear if it was done by an independent team or the same implementation team.

QI outcomes

Studies with large coverage of intervention sites showed less improvement compared to studies conducted in only one district or one hospital. Studies that monitored mortality data showed slow improvement in their outcome indicators such as reducing maternal death. Dumont et al. highlighted they witnessed change in maternal deaths in year four of implementation of the study (Dumont et al., 2013). At the moment, the world is aware of already proven cost effective maternal and neonatal health interventions. However, the problem of high maternal and neonatal health still persists especially in sub Saharan Africa. With this review, we have brought to light that the use of QI approaches as a catalyst to facilitate proper, context specific implementation of maternal and neonatal health interventions is beneficial. However, the use of QI needs to be explored further in order to get maximum benefit from it. None of the studies in this review explained about the costs of these interventions, or sustainability of the reported outcomes. Clear plans and effective strategies for sustainability are needed to be put in place when designing QI interventions. As we have already argued there is a know do gap with healthcare providers and managers (Bradley et al., 2013). The issue of follow up becomes paramount to make sure the knowledge impacted stays and is utilized.

Mapping and harmonization of interventions at health systems level seems to be a crucial point too. Imagine you have three different QI projects using three different approaches on the same facility, using the same healthcare provider. Considering the problem of weak health system and severe shortage of human resource for health, this healthcare provider will definitely be overwhelmed. We suggest for countries to develop a frame work which will incorporate the important key QI steps and plea with stakeholders to follow them as their guideline in order to simplify the load for the implementers and for all the stakeholders to speak the same language. This has been done in other countries such as United Kingdom (Teasdale, 2008).

Limitation

Several limitations might be considered in interpreting this review. Our search strategy did not include important unpublished data and we only reported publications made in English language, thus the review is not without publication bias. In addition, while assessing studies for inclusion, we might have omitted studies that used different vocabularies to express QI or

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did not include any of the search terms in their title or abstract. Based on our search criteria studies which used mixed methods were not included in the review. These studies might have more rich information in terms of understanding the context resulting to the obtained outcomes. Almost half of the studies reported here are uncontrolled before-after studies making it difficult to attribute directly the effect of the QI interventions. We included these studies despite of being unreliable because of limited literature reporting of QI interventions on maternal and neonatal health in sub Saharan Africa. However, despite of the flaws with this evaluating design we have learnt from all the studies the important aspects that took place in implementation of their QI interventions.

Conclusion

This systematic review of the literature is an important step in understanding how QI approaches focusing on maternal and neonatal health were implemented and what were their outcomes. This adds in to the literature, what other systematic reviews found about QI approach implementation and the challenges of lack of standardization in QI and inherent variations on implementation of the same QI approach. We recommend more QI studies using more reliable study designs to be conducted and evaluated so as to create robust evidence about the effect of the QI approaches in maternal and neonatal healthcare in sub-Sahara Africa and make informed decision about the way forward. In addition, to present cost effectiveness of the interventions and lives saved. Studies with large coverage and sustainability of QI interventions would also be beneficial especially at government level for improvement of health welfare at country level and policy recommendations.

We believe this information will add evidence and provide more insights into efforts to implement QI approaches and improve quality of care, in addition to filling some **of the** gaps identified in previous reviews.

PART IV DISCUSSION AND CONCLUSIONS

This thesis focused on the application of a quality improvement intervention to improve maternal and neonatal health outcomes in rural primary health facilities. The intervention was implemented under the routine health system with the existing RCHS interventions. This section will discuss the development and implementation of the intervention, the limitations, policy and research implications of the study.

CHAPTER 7: DISCUSSION

7.1 Methodological issues

Set up of this study started with a desk review looking at what and how QI interventions were implemented in the country. The project team adapted the collaborative QI approach because of its robustness to foster collaboration and team work, potential to implement QI intervention in short period of time 6 – 18 months (Institute for Healthcare Improvement, 2003), considering our project timeline was short. In addition, the use of PDSA cycle as a driver for improvement was very fascinating because it gives room to draw everyone actively into the process of testing changes, give sense of ownership of the improvement process, presumes that everyone will develop a basic understanding of the standards of their work, as well as the skills they need to test changes in that work (Batalden and Davidoff, 2007). Furthermore, the teamwork spirit and collaborative meetings removes the hierarchy ideology and allows the lower cadres and higher cadre staff to sit in the same room and discuss ideas for improvement without thinking of their positions. Experience from this study was that one of the QI collaborative involved in this work was able to communicate freely during the learning session with their DMO and sort out long standing administrative problems they were facing before this project. The strength of this collaborative work was the active involvement of project team, the CHMTs and frontline health workers from both Mtwara Rural and Ruangwa districts throughout the project implementation. The project team spearheaded and funded the activities, provided technical guidance to the QI teams and district leadership and foster buy in of the improvement project which is very essential component for QI project to take off (Justin Glasgow, 2011). The CHMTs provided time for the QI mentors and frontline workers to participate in the improvement project and vehicles when needed.

Ideally the demand and interest to implement a QI intervention should come from the organization that desire to improve, in our case it's the districts and not from the project team (Institute for Healthcare Improvement, 2003). However, it is a common practice in low income countries, that project teams or donors approach the existing healthcare system to implement QI projects (Colbourn et al., 2013, Mwidunda and Eliakimu, 2015, Tesfaye et al., 2014, Syed Muhammad Israr, 2005). This has effect in the sense of ownership and commitment to continue those interventions after the project life has finished. To avoid this limitation, researchers need to come up with ways to remove project mentality from implementers (Syed Muhammad Israr, 2005). In our case, we informed the CHMTs from the beginning the timeline of the project and worked hand in hand with district QI mentor and RCH coordinator in order

to impact the QI knowledge and ensure smooth transition when project ends. However, the project mentality is so common that sometimes some district officials say it loud that when this ends another one will come.

The use of case study as our study design has its limitations, because we cannot give plausible explanation that the observed outcomes are due to our intervention(Speroff and O'Connor, 2004, Habicht et al., 1999). Yet, the use of case studies or before after study designs are popular in reporting QI interventions because they are less expensive, quick to prepare and to disseminate stories of success where a change in behavior led to a change in outcome (Speroff and O'Connor, 2004). The analysis of data using a time series analysis is another caveat because the performance might change even without being triggered by the intervention in place or for reasons other than the intervention. We used Shewhart control charts to ascertain if our results fit with the run chart rules and indeed shows special cause variations after the intervention. In this study the project team documented contextual factors during the time of the study in order to be able to explain the contribution of the intervention in the observed changes reported(Victora et al., 2005). Activities of other interventions in the study area like CHAI and MTUNZE were documented and discussed in chapter 5.

In order to gain further insight for reproducibility and improvement of future implementation of similar QI interventions, a qualitative study was conducted to understand providers' perspective of the intervention. The use of inductive content analysis was our strength because it allowed the researcher to conduct open coding of themes based on the intervention conducted(Elo and Kyngäs, 2008). Limited funding and time constrains hindered collection of data from community members who were part of QI teams and the pregnant women who were involved in the QI intervention. During the course of the QI implementation, the project team collected few interviews from pregnant women to get a sense of the ongoing improvement process on birth preparedness counselling. The aim was to conduct exit interviews after the counselling session to ascertain what did the pregnant women learn and if they remember the pregnancy danger sings and the birth preparedness plan they have to do. However, this was not conducted as planned, some providers interviewed women before the counselling, some after the counselling and other even when they came for other services apart from counselling. Therefore, since the execution of these exit interviews was flawed the team omitted to report this aspect of work. During collection of qualitative data, most of the respondents were happy to share their experience and opened up to the questions asked, very few were very reserved to

give their opinion on the intervention. However, this did not affect our aim to understand their perception of the intervention and majority gave similar opinions. Even though this qualitative study was conducted by a researcher with medical and not social science background, she received constant backstopping from an experienced social scientist ensuring validity and reliability of the study.

We used systematic narrative review to get overview of implementing quality improvement approaches in maternal and neonatal health care services in sub-Saharan Africa. This type of review does not include the calculation of effect sizes that examine the strength (or lack) of the effectiveness of interventions. Even though the narrative review is subject to many subjective interpretations, the researcher made sure to follow the study objectives and PRISMA guidelines (Moher et al., 2009). The review process was very time consuming and sometimes confusing however, the reviewer is happy that through that process we could identify a lot of differences and similarities of implementing QI processes. In addition, included studies differed even in execution of the same QI methodology. Other systematic reviews on QI also have found that outcomes of QI interventions are content specific and impact is often variable (Franco and Marquez, 2011, Allen, 2013). One major obstacle faced during the synthesis was that, the findings across studies varied in types of outcomes targeted and the detail with which components are described (Erum Nadeem et al., 2013). Hence making it difficult to generalize the outcomes reported

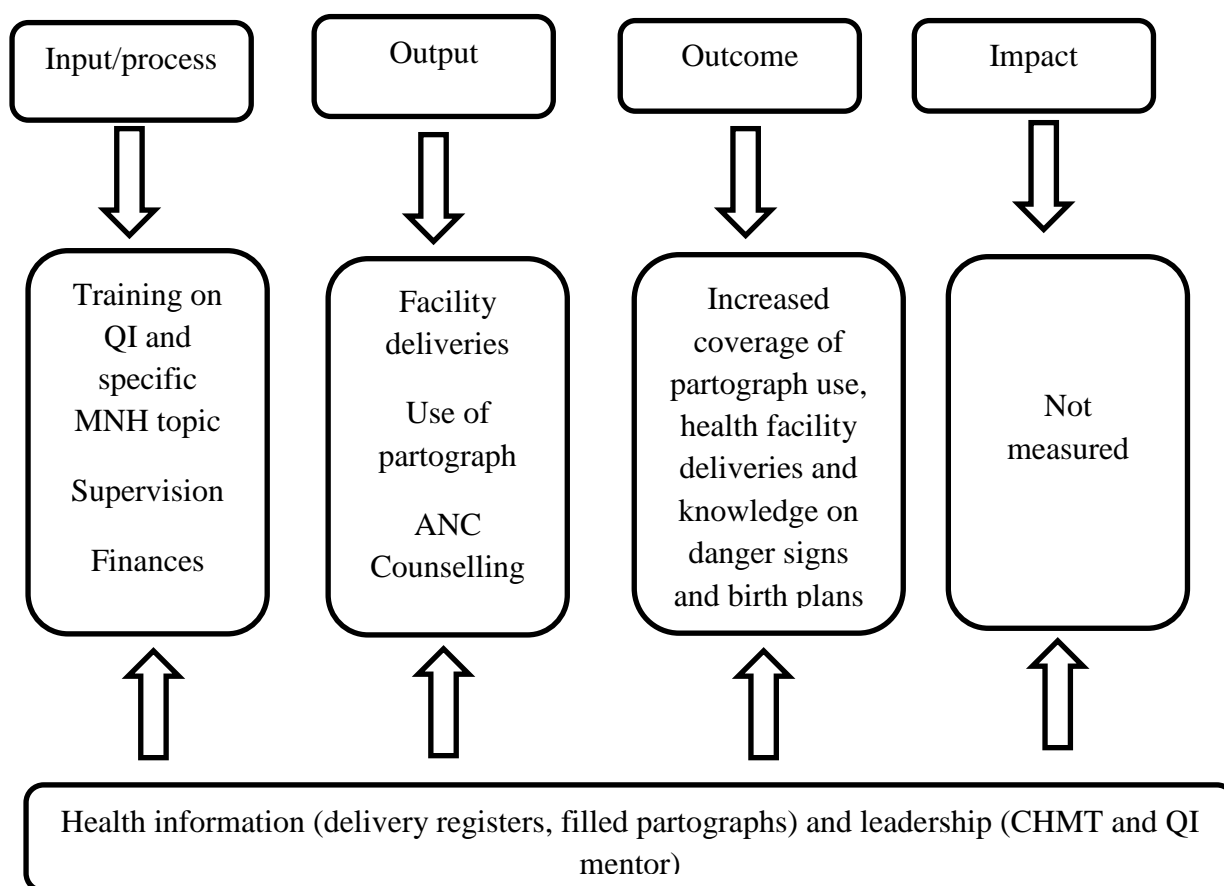
My role as implementer and evaluator of this intervention is subjected to introduce researcher bias, on the other hand it was advantageous especially when conducting the qualitative study, whereby I had knowledge of the intervention and hence it was easy to understand and to probe and structure the questions in order to get more information out of the healthcare providers. When obtaining the consent for interviews I emphasised the importance of their views regardless whether they were against me as coordinator or the project as whole in order to learn from them for the sake of the future projects.

7.2 Application of QI in health system

Quality improvement in health care is a complex science which involves not only technical skills but also inter personal relation, the human psychology for it to be effective(Campbell et al., 2000). At the moment even the high income countries are still struggling to understand how to improve quality of care, despite all the developed and implemented initiatives, frameworks and policies in place(Allen, 2013). In low income countries, we are still struggling to strengthen the health systems. Quality improvement science can be incorporated in this process as part and parcel of strengthening process rather than embedding it in service delivery component alone(Savigny and Adam, 2009). Health systems strengthening (HSS) is one of the six items on my Agenda for WHO, which clearly stated that much of the ill health, disease, premature death, and suffering we see on such a large scale is needless especially in developing countries (World Health Organization, 2007). The power of delivering existing effective and affordable interventions for prevention and treatment of health problems is not matched by the power of health systems to deliver them with high quality and in equitable way(Anna E Olafsdottir et al., 2011). Utilization of QI approaches can act in synergy with HSS initiatives to bring down the know – do gap which leads to poor health outcomes. Hirschhorn et al. highlights ways that application of QI approaches relates with all health systems six building block as follows: **Service delivery:** QI closes the gap between knowledge and actual practice. **Health workforce:** QI enhances staff motivation, individual performance, satisfaction and retention. **Information:** QI enhances data collection and the use of data for decision making. **Leadership and governance:** QI strengthens measurement capacity, stewardship, accountability and transparency. **Medical products, vaccines and technology:** QI improves the appropriate, evidence-based use of limited resources through appropriate ordering, distribution and utilization. **Financing:** QI helps optimize the use of limited resources and helps reduce the costs of financial transactions(Hirschhorn et al., 2013). Based from our experience of implementing this project, we agree with Hirschhorn in all the above aspects as we also encountered the same in this work. This combination will help to fast track the movement of ending preventable maternal and neonatal deaths(World Health Organization, 2016, Dickson et al., 2014). The time of greatest risk for both maternal and neonatal period is around childbirth(Lawn et al., 2014), hence improving quality of care for childbirth interventions is very essential. Our findings conquer with the suggestions from every newborn series that we need to invest in healthcare providers competence and skills, task shifting, dynamic leadership and community empowerment(Dickson et al., 2014). Evaluating the INSIST QI using health systems framework (Figure 14), we touched almost all the components except looking at mortality

outcomes. We invested on training of healthcare providers and provided the frequent supportive supervision visits. Other studies on QI that have invested in training health care providers and supportive supervision reported similar outcomes of improved capacity and motivation of healthcare providers (Agha, 2010, Anatole et al., 2013) Leadership was a very essential component to keep the intervention going. As most QI literature clearly points out that strong leadership interest and engagement makes implementation of QI intervention successful(Allen, 2013, Dawson et al., 2014a, Erum Nadeem et al., 2013). District and zonal RCH leaders played a big role to drive this improvement work. Presence of district RCH coordinator in all learning sessions was very motivating to the frontline health workers and in case of any discrepancies on how to perform an intervention or information on service provision it was cleared immediately. Other studies also report desirable outcomes in their QI intervention through positive engagement of leadership(Berman et al., 2012, Youngleson et al., 2010). Data was an important driver in this work. We encountered several problems relating to collection and storage of the HMIS data. All health facilities had registers and partographs, however, the storage was a bit problematic. There are times when you visit the health facility, let's say in January the register is present when you go again in March, the previous register is not seen and there is new register. When you return in May, the original register from January is back in use. This was raising problems with data consistency especially for the PDSA cycles since we used routine HMIS data. In addition, another problem with health information was inconsistency of data in different HMIS reporting systems. They have registers, tally sheets and summary forms, ideally all three should contain the same information of the same variable However, this was not the case in many occasions. Therefore, the team decided to rely on the registers only, that is the first place raw data is recorded. For the case of partographs, retrieval after being used was also a challenge since the facility do not need them anymore and the woman has already been discharged. We worked on the teams to find ways to properly store the registers and partographs, in the end all could find secure places in their cupboards. The QI work also promoted the use of the health information for decision making. Facilities started to implement this in terms of providing referral to pregnant women with prolonged or obstructed labour using the partograph few facilities used their data to solicit for medical equipment from district office. Study done in Ethiopia and India also reports the potential of districts to use their data for decision making(Bhattacharyya et al., 2016).

Figure 14: Evaluation of INSIST QI intervention



7.3 The QI approach

The QI intervention approach we used had been extensively used in high and low income countries like in USA, UK, Ghana, Ethiopia, Malawi, Nicaragua where they all reported positive achievements and desirable improvements in maternal and newborn outcomes (Lopez et al., 2013, Twum-Danso et al., 2012). The use of PDSA cycle can be integrated even with other QI approaches such as 5s to make the outcomes more robust (Stark et al., 2015). The approach is designed for local institutions to be able to run the improvement projects on their own once they grasp the concept to reduce the know-do gap (Twum-Danso et al., 2012). However, in our setting this will need longer time because first we need to build the QI culture such that the CHMTs could be the one initiating and implementing QI initiatives in their respective councils (Mwidunda and Eliakimu, 2015). From the systematic review, I found that all QI approaches have a similar basic foundation i.e. identify bottle neck, set goals or actions to overcome and lastly evaluate. This sets a ground to standardized and simplify the already

available different QI approaches especially in countries which are now introducing the QI culture, in order to make life easy especially for frontline workers who are the main implementers of healthcare QI initiatives, see chapter 6. Coaching and mentoring were the essential components for our QI work, (Jaribu et al., 2016). It is synonymous with supportive supervision conducted by CHMTs, RHMTs and central level teams, however, it differs how its conducted(Godfrey et al., 2014).

7.4 QI and RCHS challenges

Tanzania RCHS gets lower allocation of resources in health expenditure compared to other priority areas such as HIV and Malaria(Ministry of Health and Social Welfare, 2011). This has implications on the investments they put on maternal and neonatal health interventions such allocation of skilled personnel especially in rural areas and availability of equipment and commodities(Hanson et al., 2013, Penfold et al., 2013). Therefore, in order to provide standard required RCHs, harmonization of interventions and resources available would help to balance the limited resources available and reduce duplication of work, especially at council level. Ending preventable maternal and neonatal mortality need qualified skilled personnel(WHO, 2015a). The RCHS section at ministry of health have realized this and have reported to invest more on training health care providers (Ministry of Health Community Development Gender Elderly and Children, 2016). However, only increasing number of staff is not enough as the study done by Spangler to assess skilled birth attendants and emergency obstetric care in rural Tanzania showed inconsistencies in pre-service training and regulation, a good many doctors, nurses, midwives, and clinical officers did not uniformly possess or perform many of the competencies that would qualify them as skilled according to WHO(Spangler, 2012). At the same time, some birth attendants who were not considered accredited professionals (i.e. aides and rural officers) practiced some degree of skilled care every day(Spangler, 2012). Fortunately, the RCHs have a lot of available guidelines that if properly followed they would help a lot to improve service delivery, as we experienced with birth plans and pregnancy danger signs counselling from the widely available focused antenatal care guideline.

Another challenge that we noticed during implementation of this work was lack of coordination and harmonization among stakeholders implementing QI at national and district level. Many QI approaches are disease and donor specific and operate as parallel programs not absorbed at health systems structure making it difficult for them to be sustainable after the funding is finished or project ends. However, this can be tackled by responsible ministries (MoHCDGEC

and PORALG) negotiating with the respective partners on reallocation of study sites or implementing priority interventions which are of interest to the country and not the donor.

QI interventions has maximum impact when there is freedom for bottom up and top bottom interactions, room to make changes in guidelines or introduce new practices in order to constantly improve service delivery. Local levels such as councils can identify the problem areas and come up with suggestion for changes that need to be done and the central level can provide their guidance support and technical expertise. Following the top bottom systems is a challenge because priorities made at the central level often ignore local issues(Fischer and Strandberg-Larsen, 2016) and this is what happens most of the cases in developing countries, despite practicing the decentralization. We experienced this during data collection, for instance counselling sessions are part of ANC, however, there is no where it can be documented. It was hard for QI teams to document this because they could not add anything on HMIS register. We therefore propose when implementing QI initiatives, the responsible institutions should be flexible and allow room for change.

CHAPTER 8: CONCLUSIONS AND RECOMMENDATION

8.1 Conclusions

The study reported a case that shares interesting lessons from the real time project implementation experience that is worth to take into consideration when planning for other studies of this kind in similar settings. The adaption of QI methods in health systems delivery does not preclude health systems strengthening rather it facilitates it. We need to balance high coverage of services with high quality of providing them. The same pace we used to achieve high coverage we should also invest in improving the quality of those services in order to get high impact health outcomes. Active participation, coordination of government institutions, sections and other health stakeholders in fight to reduce maternal and neonatal mortality should be harmonized and well-coordinated in order to maximize utilization of limited resources. In addition, implementation of already proven cost effective interventions to promote maternal and neonatal survival should be prioritized.

8.2 Recommendations

Based on our findings, I would like to provide three practical recommendations

1. From the QI approach, we implemented, I would like to recommend that the CHMTs should adapt the mentoring and coaching techniques for their supportive supervision activities. This will be effective if included in the supportive supervision guideline that the CHMT follows during their visits.
2. Councils to exercise their decentralization authority by monitoring and harmonization of interventions implemented at their settings. They should have room to negotiate and agree what is implemented on their areas according to their needs in order to avoid duplication of work and wastage of limited resources.
3. Use of intervention guidelines such as FANC should be emphasized, and frontline workers should be supported in case they do not understand so that they can effectively

implement what is required. Frequent refresher trainings preferably on site would be advantageous for frontline workers and for improved quality of care that we need.

Recommendation for future research

1. This project was piloted in four health facilities in Mtwara Rural and implemented in 23 health facilities in Ruangwa district without any comparison district. Therefore, future study with larger sample size and comparison group would be more scientific sound to provide plausible explanation regarding the QI application and its effectiveness in maternal and newborn health.

REFERENCES

- ADEGOKE, A., UTZ, B., MSUYA, S. E. & VAN DEN BROEK, N. 2012. Skilled Birth Attendants: Who is Who? A Descriptive Study of Definitions and Roles from Nine Sub Saharan African Countries. *PLoS ONE*, 7, e40220.
- AFARI, H., HIRSCHHORN, L. R., MICHAELIS, A., BARKER, P. & SODZI-TETTEY, S. 2014. Quality improvement in emergency obstetric referrals: qualitative study of provider perspectives in Assin North District, Ghana. *BMJ Open*, 4, e005052.
- AFNAN-HOLMES, H., MAGOMA, M., JOHN, T., LEVIRA, F., MSEMO, G., ARMSTRONG, C. E., MARTÍNEZ-ÁLVAREZ, M., KERBER, K., KIHINGA, C., MAKUWANI, A., RUSIBAMAYILA, N., HUSSEIN, A. & LAWN, J. E. 2015. Tanzania's Countdown to 2015: an analysis of two decades of progress and gaps for reproductive, maternal, newborn, and child health, to inform priorities for post-2015. *The Lancet Global Health*, 3, e396-e409.
- AGHA, S. 2010. The impact of a quality-improvement package on reproductive health services delivered by private providers in Uganda. *Stud Fam Plann*, 41, 205-15.
- ALHASSAN, R. K., SPIEKER, N., OSTENBERG, P., OGINK, A., NKETIAH-AMPONSAH, E. & WIT, T. F. R. 2013. Association between health worker motivation and healthcare quality efforts in Ghana. *Hum Resour Health*, 11.
- ALLEN, D. 2013. Understanding context for quality improvement: artefacts, affordances and socio-material infrastructure. *Health (London)*, 17, 460-77.
- ANATOLE, M., MAGGE, H., REDDITT, V., KARAMAGA, A., NIYONZIMA, S., DROBAC, P., MUKHERJEE, J. S., NTAGANIRA, J., NYIRAZINYOYE, L. & HIRSCHHORN, L. R. 2013. Nurse mentorship to improve the quality of health care delivery in rural Rwanda. *Nurs Outlook*, 61, 137-44.
- ANNA E OLAFSDOTTIR, DANIEL D REIDPATH, SUBHASH POKHREL & PASCALE ALLOTEY 2011. Health systems performance in sub-Saharan Africa: governance, outcome and equity. *BMC Publ Health*, 11.
- ATHERTON, F., MBEKEM, G. & NYALUSI, I. 1999. Project report. Improving service quality: experience from the Tanzania Family Health Project. *International Journal for Quality in Health Care*, 11, 353.
- AUSTIN, A., LANGER, A., SALAM, R. A., LASSI, Z. S., DAS, J. K. & BHUTTA, Z. A. 2014. Approaches to improve the quality of maternal and newborn health care: an overview of the evidence. *Reprod Health*, 11 Suppl 2, S1.
- BARDFIELD, J., AGINS, B., AKIYAMA, M., BASENERO, A., LUPHALA, P., KAINDJEE-TJITUKA, F., NATANAEL, S. & HAMUNIME, N. 2015. A quality improvement approach to capacity building in low- and middle-income countries. *AIDS*, 29 Suppl 2, S179-86.
- BATALDEN, P. B. & DAVIDOFF, F. 2007. What is "quality improvement" and how can it transform healthcare? *Quality and Safety in Health Care*, 16, 2-3.
- BEATUS K LEON & KOLSTAD, J. R. 2010. Wrong schools or wrong students? The potential role of medical education in regional imbalances of the health workforce in the United Republic of Tanzania. *Human Resources for Health*, 8.
- BENNEYAN J.C, LLOYD R.C & PLSEK P.E 2003. Statistical process control as a tool for research and healthcare improvement. *Qual Saf Health Care*, 458-464.
- BERGLUND, A. & LINDMARK, G. 2016. Preconception health and care (PHC)-a strategy for improved maternal and child health. *Ups J Med Sci*, 1-6.
- BERMAN, J., NKABANE, E. L., MALOPE, S., MACHAI, S., JACK, B. & BICKNELL, W. 2012. Developing a hospital quality improvement initiative in Lesotho. *International Journal of Health Care Quality Assurance*, 27, 15-24.
- BERWICK, D. M., JAMES, B. & COYE, M. J. 2003. Connections between quality measurement and improvement. *Medical care*, 41, I-30-I-38.
- BHARDWAJ, S., BARRON, P., PILLAY, Y., TREGER-SLAVIN, L., ROBINSON, P., GOGA, A. & SHERMAN, G. 2014. Elimination of mother-to-child transmission of HIV in South Africa: rapid scale-up using quality improvement. *S Afr Med J*, 104, 239-43.

- BHATTACHARYYA, S., BERHANU, D., TADDESSE, N., SRIVASTAVA, A., WICKREMASINGHE, D., SCHELLENBERG, J. & IQBAL AVAN, B. 2016. District decision-making for health in low-income settings: a case study of the potential of public and private sector data in India and Ethiopia. *Health Policy and Planning*, 31, ii25-ii34.
- BHUTTA, Z. A., CABRAL, S., CHAN, C.-W. & KEENAN, W. J. 2012. Reducing maternal, newborn, and infant mortality globally: An integrated action agenda. *International Journal of Gynecology & Obstetrics*, 119, Supplement 1, S13-S17.
- BHUTTA, Z. A., DAS, J. K., BAHL, R., LAWN, J. E., SALAM, R. A., PAUL, V. K., SANKAR, M. J., BLENCOWE, H., RIZVI, A., CHOU, V. B. & WALKER, N. 2014a. Can available interventions end preventable deaths in mothers, newborn babies, and stillbirths, and at what cost? *The Lancet*, 384, 347-370.
- BHUTTA, Z. A., SALAM, R., LASSI, Z., AUSTIN, A. & LANGER, A. 2014b. Approaches to improve Quality of Care (QoC) for women and newborns: conclusions, evidence gaps and research priorities. *Reproductive Health*, 11, S5.
- BLANK, A., PRYTHERCH, H., KALTSCHMIDT, J., KRINGS, A., SUKUMS, F., MENSAH, N., ZAKANE, A., LOUKANOVA, S., GUSTAFSSON, L. L., SAUERBORN, R. & HAEFELI, W. E. 2013. "Quality of prenatal and maternal care: bridging the know-do gap" (QUALMAT study): an electronic clinical decision support system for rural Sub-Saharan Africa. *BMC Medical Informatics And Decision Making*, 13, 44-44.
- BLASINSKY, M., GOLDMAN, H. & UNÜTZER, J. 2006. Project IMPACT: A Report on Barriers and Facilitators to Sustainability. *Administration and Policy in Mental Health and Mental Health Services Research*, 33, 718-729.
- BORGHI, J., COUSENS, S., HAMISI, Y., HANSON, C., JARIBU, J., MANZI, F., MARCHANT, T., MKUMBO, E., MSHINDA, H., PENFOLD, S., SCHELLENBERG, D., SCHELLENBERG, J., SHAMBA, D. & TANNER, M. 2013. STUDY PROTOCOL: Improving newborn survival in rural southern Tanzania: a cluster-randomised trial to evaluate the impact of a scaleable package of interventions at community level with health system strengthening.
- BOSSE, G., MASSAWE, S. & JAHN, A. 2002. The partograph in daily practice: it's quality that matters. *International Journal Of Gynaecology And Obstetrics: The Official Organ Of The International Federation Of Gynaecology And Obstetrics*, 77, 243-244.
- BOUCAR, M., HILL, K., COLY, A., DJIBRINA, S., SALEY, Z., SANGARE, K., KAMGANG, E., HILTEBEITEL, S. & USAID APPLYING SCIENCE TO STRENGTHEN IMPROVE SYSTEMS UNIVERSITY RESEARCH CO, L. L. C. 2014. Improving postpartum care for mothers and newborns in Niger and Mali: a case study of an integrated maternal and newborn improvement programme. *BJOG: An International Journal of Obstetrics & Gynaecology*, 121, 127-133.
- BRADLEY, S., KAMWENDO, F., MASANJA, H., DE PINHO, H., WAXMAN, R., BOOSTROM, C. & MCAULIFFE, E. 2013. District health managers' perceptions of supervision in Malawi and Tanzania. *Hum Resour Health*, 11, 43.
- CAMPBELL J, DUSSAULT G, BUCHAN J, POZO-MARTIN F, GUERRA ARIAS M, LEONE C, SIYAM A & A, C. G. 2013. A universal truth: no health without a workforce. *Third Global Forum on Human Resources for Health*. Geneva: Global Health Workforce Alliance and World Health Organization.
- CAMPBELL, S. M., ROLAND, M. O. & BUETOW, S. A. 2000. Defining quality of care. *Soc Sci Med*, 51, 1611-25.
- CARLA ABOUZAHR & TESSA WARDLAW 2001. Maternal mortality at the end of a decade: signs of progress? *Bulletin of the World Health Organization*,.
- CHASSIN, M. R. & E., O. K. M. History of the Quality Improvement Movement.
- CHINKHUMBA, J., DE ALLEGRI, M., MUULA, A. S. & ROBBERSTAD, B. 2014. Maternal and perinatal mortality by place of delivery in sub-Saharan Africa: a meta-analysis of population-based cohort studies. *BMC Public Health*, 14, 1014.

- CLINTON FOUNDATION. 2013. *Eliminating Mother to Child Transmission* [Online]. Available: <https://www.clintonfoundation.org/our-work/clinton-health-access-initiative/programs/eliminating-mother-child-transmission> [Accessed 24.06.2015 2015].
- COLBOURN, T., NAMBIAR, B., BONDO, A., MAKWENDA, C., TSETEKANI, E., MAKONDA-RIDLEY, A., MSUKWA, M., BARKER, P., KOTAGAL, U., WILLIAMS, C., DAVIES, R., WEBB, D., FLATMAN, D., LEWYCKA, S., ROSATO, M., KACHALE, F., MWANSAMBO, C. & COSTELLO, A. 2013. Effects of quality improvement in health facilities and community mobilization through women's groups on maternal, neonatal and perinatal mortality in three districts of Malawi: MaiKhanda, a cluster randomized controlled effectiveness trial. *International Health*, 5, 180-195.
- COLTON, D. 2000. Quality improvement in health care. Conceptual and historical foundations. *Eval Health Prof*, 23, 7-42.
- DARMSTADT, G. L., BHUTTA, Z. A., COUSENS, S., ADAM, T., WALKER, N. & DE BERNIS, L. 2005. Evidence-based, cost-effective interventions: how many newborn babies can we save? *The Lancet*, 365, 977-988.
- DARMSTADT, G. L., KINNEY, M. V., CHOPRA, M., COUSENS, S., KAK, L., PAUL, V. K., MARTINES, J., BHUTTA, Z. A. & LAWN, J. E. 2014. Who has been caring for the baby? *The Lancet*, 384, 174-188.
- DAS, J., KUMAR, R., SALAM, R., LASSI, Z. & BHUTTA, Z. 2014. Evidence from facility level inputs to improve quality of care for maternal and newborn health: interventions and findings. *Reproductive Health*, 11, S4.
- DAWSON, A., BRODIE, P., COPELAND, F., RUMSEY, M. & HOMER, C. 2014a. Collaborative approaches towards building midwifery capacity in low income countries: A review of experiences. *Midwifery*, 30, 391-402.
- DAWSON, A. J., BUCHAN, J., DUFFIELD, C., HOMER, C. S. E. & WIJEWARDENA, K. 2014b. Task shifting and sharing in maternal and reproductive health in low-income countries: a narrative synthesis of current evidence. *Health Policy and Planning*, 29, 396-408.
- DICKSON, K. E., SIMEN-CAPEU, A., KINNEY, M. V., HUICHO, L., VESEL, L., LACKRITZ, E., DE GRAFT JOHNSON, J., VON XYLANDER, S., RAFIQUE, N., SYLLA, M., MWANSAMBO, C., DAELMANS, B. & LAWN, J. E. 2014. Every Newborn: health-systems bottlenecks and strategies to accelerate scale-up in countries. *The Lancet*, 384, 438-454.
- DOHERTY, T., CHOPRA, M., NSIBANDE, D. & MNGOMA, D. 2009. Improving the coverage of the PMTCT programme through a participatory quality improvement intervention in South Africa. *BMC Public Health*, 9, 406.
- DONABEDIAN, A. 1978. The Quality of Medical Care.
- DONABEDIAN, A. 1988. The quality of care: How can it be assessed? *JAMA*, 260, 1743-1748.
- DUMONT, A., FOURNIER, P., ABRAHAMOWICZ, M., TRAORÉ, M., HADDAD, S. & FRASER, W. D. 2013. Quality of care, risk management, and technology in obstetrics to reduce hospital-based maternal mortality in Senegal and Mali (QUARITE): a cluster-randomised trial. *The Lancet*, 382, 146-157.
- DUMONT, A., GAYE, A., BERNIS, L. D., CHAILLET, N., LANDRY, A., DELAGE, J. & BOUVIER-COLLE, M.-H. 2006. Facility-based maternal death reviews: effects on maternal mortality in a district hospital in Senegal. *Bulletin of the World Health Organization*, 84, 218-224.
- DUSSAULT, G. & FRANCESCHINI, M. C. 2006. Not enough there, too many here: understanding geographical imbalances in the distribution of the health workforce. *Hum Resour Health*, 4, 12.
- DUYSBURGH, E., ZHANG, W. H., YE, M., WILLIAMS, A., MASSAWE, S., SIÉ, A., WILLIAMS, J., MPEMBENI, R., LOUKANOVA, S. & TEMMERMAN, M. 2013. Quality of antenatal and childbirth care in selected rural health facilities in Burkina Faso, Ghana and Tanzania: similar finding. *Tropical Medicine & International Health*, 18, 534-547.
- ELO, S. & KYNGÄS, H. 2008. The qualitative content analysis process. *Journal of Advanced Nursing*, 62, 107-115.

- ERUM NADEEM, S. SERENE OLIN, LAURA CAMPBELL HILL, KIMBERLY EATON HOAGWOOD & HORWITZ, S. M. 2013. Understanding the Components of Quality Improvement Collaboratives: A Systematic Literature Review. *The Milbank Quarterly*, 91, 354-394.
- EVJEN-OLSEN, B., HINDERAKER, S. G., LIE, R. T., BERGSJØ, P., GASHEKA, P. & KVÅLE, G. 2008. Risk factors for maternal death in the highlands of rural northern Tanzania: a case-control study. *BMC Public Health*, 8, 52-52.
- FAYE, A., DUMONT, A., NDIAYE, P. & FOURNIER, P. 2014. Development of an instrument to evaluate intrapartum care quality in Senegal: Evaluation quality care. *International Journal for Quality in Health Care*, 26, 184-189.
- FINLAYSON, K. & DOWNE, S. 2013. Why Do Women Not Use Antenatal Services in Low- and Middle-Income Countries? A Meta-Synthesis of Qualitative Studies. *PLoS Med*, 10, e1001373.
- FISCHER, S. E. & STRANDBERG-LARSEN, M. 2016. Power and Agenda-Setting in Tanzanian Health Policy: An Analysis of Stakeholder Perspectives. *International Journal of Health Policy and Management*, 5, 355-363.
- FOGLIATI, P., STRANEO, M., BROGI, C., FANTOZZI, P. L., SALIM, R. M., MSENIGI, H. M., AZZIMONTI, G. & PUTOTO, G. 2015. How Can Childbirth Care for the Rural Poor Be Improved? A Contribution from Spatial Modelling in Rural Tanzania. *PLoS ONE*, 10, e0139460.
- FRANCO, L. M. & MARQUEZ, L. 2011. Effectiveness of collaborative improvement: evidence from 27 applications in 12 less-developed and middle-income countries. *BMJ Quality & Safety*, 20, 658-665.
- GABRYSCH, S. & CAMPBELL, O. M. 2009. Still too far to walk: literature review of the determinants of delivery service use. *BMC Pregnancy Childbirth*, 9, 34.
- GALADANCI, H., KÜNZEL, W., SHITTU, O., ZINSER, R., GRUHL, M. & ADAMS, S. 2011. Obstetric quality assurance to reduce maternal and fetal mortality in Kano and Kaduna State hospitals in Nigeria. *International Journal Of Gynaecology And Obstetrics: The Official Organ Of The International Federation Of Gynaecology And Obstetrics*, 114, 23-28.
- GANS-LARTEY, F., O'BRIEN, B. A., GYEKYE, F. O. & SCHOPFLOCHER, D. 2013. The relationship between the use of the partograph and birth outcomes at Korle-Bu teaching hospital. *Midwifery*, 29, 461-467.
- GERALD J. LANGLEY, RONALD MOEN, KEVIN M. NOLAN, THOMAS W. NOLAN, CLIFFORD L. NORMAN & PROVOST, L. P. 2009. *The Improvement Guide: A Practical Approach to Enhancing Organizational Performance, 2nd Edition*, A Wiley Imprint, Jossey Bass Wiley.
- GODFREY, M. M., ANDERSSON-GARE, B., NELSON, E. C., NILSSON, M. & AHLSTROM, G. 2014. Coaching interprofessional health care improvement teams: the coachee, the coach and the leader perspectives. *J Nurs Manag*, 22, 452-64.
- GRAHAM, W. J., MCCAUBINNS, A. & MUNJANJA, S. 2013. Translating coverage gains into health gains for all women and children: the quality care opportunity. *PLoS Med.*, 10.
- GRANEHEIM, U. H. & LUNDMAN, B. 2004. Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse Educ Today*, 24, 105-12.
- GRIMSHAW, J., MCAULEY, L., BERO, L., GRILLI, R., OXMAN, A., RAMSAY, C., VALE, L. & ZWARENSTEIN, M. 2003. Systematic reviews of the effectiveness of quality improvement strategies and programmes. *Quality & safety in health care*, 12, 298-303.
- GROSS, K., SCHELLENBERG, J., KESSY, F., PFEIFFER, C. & OBRIST, B. 2011. Antenatal care in practice: an exploratory study in antenatal care clinics in the Kilombero Valley, south-eastern Tanzania. *BMC Pregnancy and Childbirth*, 11, 36.
- HABICHT, J. P., VICTORA, C. G. & VAUGHAN, J. P. 1999. Evaluation designs for adequacy, plausibility and probability of public health programme performance and impact. *Int J Epidemiology*, 28, 10-8.
- HANSON, C. 2013. *The Epidemiology of Maternal Mortality in Southern Tanzania*. PhD, London School of Hygiene and Tropical Medicine.
- HANSON, C., MANZI, F., MKUMBO, E., SHIRIMA, K., PENFOLD, S., HILL, Z., SHAMBA, D., JARIBU, J., HAMISI, Y., SOREMEKUN, S., COUSENS, S., MARCHANT, T., MSHINDA, H., SCHELLENBERG, D.,

- TANNER, M. & SCHELLENBERG, J. 2015. Effectiveness of a Home-Based Counselling Strategy on Neonatal Care and Survival: A Cluster-Randomised Trial in Six Districts of Rural Southern Tanzania. *PLoS Med*, 12, e1001881.
- HANSON, C., RONSMANS, C., PENFOLD, S., MAOKOLA, W., MANZI, F., JARIBU, J., MBARUKU, G., MSHINDA, H., TANNER, M. & SCHELLENBERG, J. 2013. Health system support for childbirth care in Southern Tanzania: results from a health facility census. *BMC Research Notes*, 6.
- HAWS, R., MASHASI, I., MRISHO, M., SCHELLENBERG, J., DARMSTADT, G. & WINCH, P. 2010. "These are not good things for other people to know": how rural Tanzanian women's experiences of pregnancy loss and early neonatal death may impact survey data quality. *Soc Sci Med*, 71, 1764 - 1772.
- HEIBY, J. 2014. The use of modern quality improvement approaches to strengthen African health systems: a 5-year agenda. *International Journal for Quality in Health Care*.
- HIRSCHHORN, L., BAYNES, C., SHERR, K., CHINTU, N., AWOONOR-WILLIAMS, J., FINNEGAN, K., PHILIPS, J., ANATOLE, M., BAWAH, A., BASINGA, P., IMPLEMENTATION, W. I. F. T. P. H. & COLLABORATIVE, T.-A. H. I. D. 2013. Approaches to ensuring and improving quality in the context of health system strengthening: a cross-site analysis of the five African Health Initiative Partnership programs. *BMC Health Services Research*, 13, S8.
- HIRSCHHORN, L. R., SEMRAU, K., KODKANY, B., CHURCHILL, R., KAPOOR, A., SPECTOR, J., RINGER, S., FIRESTONE, R., KUMAR, V. & GAWANDE, A. 2015. Learning before leaping: integration of an adaptive study design process prior to initiation of BetterBirth, a large-scale randomized controlled trial in Uttar Pradesh, India. *Implementation Science*, 10, 1-9.
- HUICHO, L., SCHERPBIER, R. W., NKOWANE, A. M. & VICTORA, C. G. 2008. How much does quality of child care vary between health workers with differing durations of training? An observational multicountry study. *The Lancet*, 372, 910-916.
- INSTITUTE FOR HEALTHCARE IMPROVEMENT 2003. The Breakthrough Series: IHI's Collaborative Model for Achieving Breakthrough Improvement. *IHI Innovation Series white paper*. Boston: Institute for Healthcare Improvement.
- INSTITUTE FOR HEALTHCARE IMPROVEMENT. 2016a. *How to Improve* [Online]. Available: <http://www.ihc.org/resources/Pages/HowtoImprove/default.aspx> [Accessed 5.9. 2016].
- INSTITUTE FOR HEALTHCARE IMPROVEMENT. 2016b. *Pareto Diagram* [Online]. Cambridge, Massachusetts, USA. Available: <http://www.ihc.org/resources/Pages/Tools/ParetoDiagram.aspx> [Accessed 23.03 2016].
- INSTITUTE FOR HEALTHCARE IMPROVEMENT. 2016c. *Science of Improvement* [Online]. Available: <http://www.ihc.org/about/Pages/ScienceofImprovement.aspx> [Accessed 5.9. 2016].
- INSTITUTE OF MEDICINE 1990. *Medicare: A Strategy for Quality Assurance, Volume I*, Washington, DC, The National Academies Press.
- INSTITUTE OF MEDICINE 2001. *Crossing the quality chasm: A new health system for the 21st century*.
- ISHIJIMA, H., ELIAKIMU, E., TAKAHASHI, S. & MIYAMOTO, N. 2014. Factors influencing national rollout of quality improvement approaches to public hospitals in Tanzania. *Clinical Governance*, 19, 137-152.
- JARIBU, J., PENFOLD, S., MANZI, F., SCHELLENBERG, J. & PFEIFFER, C. 2016. Improving institutional childbirth services in rural Southern Tanzania: a qualitative study of healthcare workers' perspective. *BMJ Open*, 6.
- JENNIE POPAY, HELEN ROBERTS, AMANDA SOWDEN, MARK PETTICREW, LISA ARAI, MARK RODGERS, NICKY BRITTEN, KATRINA ROEN & STEVEN DUFFY 2006. *Guidance on the Conduct of Narrative Synthesis in Systematic Reviews : A Product from the ESRC Methods Programme*.
- JUSTIN GLASGOW, M. 2011. *Introduction to Lean and Six Sigma Approaches to Quality Improvement.pdf* [Online]. Available: <https://www.qualitymeasures.ahrq.gov/expert/expert-commentary/32943#> [Accessed].
- KAHABUKA, C., KVALE, G., MOLAND, K. & HINDERAKER, S. 2011. Why caretakers bypass Primary Health Care facilities for child care - a case from rural Tanzania. *BMC Health Services Research*, 11, 315.

- KAPLAN, H. C., BRADY, P. W., DRITZ, M. C., HOOPER, D. K., LINAM, W. M., FROEHLE, C. M. & MARGOLIS, P. 2010. The Influence of Context on Quality Improvement Success in Health Care: A Systematic Review of the Literature. *The Milbank Quarterly*, 88, 500-559.
- KERBER, K. J., DE GRAFT-JOHNSON, J. E., BHUTTA, Z. A., OKONG, P., STARRS, A. & LAWN, J. E. 2007. Continuum of care for maternal, newborn, and child health: from slogan to service delivery. *The Lancet*, 370, 1358-1369.
- KHAN, K. S., WOJDYLA, D., SAY, L., GÜLMEZOGLU, A. M. & VAN LOOK, P. F. A. WHO analysis of causes of maternal death: a systematic review. *The Lancet*, 367, 1066-1074.
- KILO, C. M. 1998. A Framework for Collaborative Improvement: Lessons from the Institute for Healthcare Improvement's Breakthrough Series. *Quality Management in Health Care*.
- KIM, Y. M., CHILILA, M., SHASULWE, H., BANDA, J., KANJIPITE, W., SARKAR, S., BAZANT, E., HINER, C., THOLANDI, M., REINHARDT, S., MULILO, J. C. & KOLS, A. 2013. Evaluation of a quality improvement intervention to prevent mother-to-child transmission of HIV (PMTCT) at Zambia defence force facilities. *BMC Health Services Research*, 13, 345.
- KRUK, M. E., MBARUKU, G., MCCORD, C. W., MORAN, M., ROCKERS, P. C. & GALEA, S. 2009. Bypassing primary care facilities for childbirth: a population-based study in rural Tanzania. *Health Policy Plan*, 24, 279-88.
- KUMAR S, JAIN A & BRUCE J 1989. Assessing the quality of family planning services in developing countries *popline*, 41.
- L. MASSOI & NORMAN, A. S. 2009. Decentralisation by devolution in Tanzania: Reflections on community involvement in the planning process in Kizota Ward in Dodoma. *Journal of Public Administration and Policy Research*, 1, 133-140.
- LASSI, Z., DAS, J., SALAM, R. & BHUTTA, Z. 2014. Evidence from community level inputs to improve quality of care for maternal and newborn health: interventions and findings. *Reproductive Health*, 11, S2.
- LAVENDER, T., HART, A. & SMYTH, R. M. 2013. Effect of partogram use on outcomes for women in spontaneous labour at term. *The Cochrane database of systematic reviews*, 7, CD005461.
- LAWN, J. E., BLENCOWE, H., OZA, S., YOU, D., LEE, A. C. C., WAISWA, P., LALLI, M., BHUTTA, Z., BARROS, A. J. D., CHRISTIAN, P., MATHERS, C. & COUSENS, S. N. 2014. Every Newborn: progress, priorities, and potential beyond survival. *The Lancet*, 384, 189-205.
- LAWN, J. E., KERBER, K., ENWERONU-LARYEA, C. & MASSEE, B. O. 2009. Newborn survival in low resource settings, are we delivering? *BJOG: An International Journal of Obstetrics & Gynaecology*, 116 Suppl 1, 49-59.
- LIU, L., OZA, S., HOGAN, D., PERIN, J., RUDAN, I., LAWN, J. E., COUSENS, S., MATHERS, C. & BLACK, R. E. 2015. Global, regional, and national causes of child mortality in 2000–13, with projections to inform post-2015 priorities: an updated systematic analysis. *The Lancet*, 385, 430-440.
- LOPEZ, S., WONG, Y., URBINA, L., GOMEZ, I., ESCOBAR, F., TINOCO, B. & PARRALES, A. 2013. Quality in practice: preventing and managing neonatal sepsis in Nicaragua. *Int J Qual Health Care*, 25, 599-605.
- LUND, S., BOAS, I., BEDESA, T., FEKEDE, W., NIELSEN, H. & SØRENSEN, B. 2016. Association between the safe delivery app and quality of care and perinatal survival in ethiopia: A randomized clinical trial. *JAMA Pediatrics*, 170, 765-771.
- LYNAM P 1993. COPE: helping to improve the quality of family planning services in Africa. - See more at: <http://www.popline.org/node/329641#sthash.F1Q0e4AK.dpuf>. *popline*, 2, 7-8.
- MAGOMA, M., REQUEJO, J., CAMPBELL, O., COUSENS, S., MERIALDI, M. & FILIPPI, V. 2013. The effectiveness of birth plans in increasing use of skilled care at delivery and postnatal care in rural Tanzania: a cluster randomised trial. *Tropical Medicine & International Health: TM & IH*, 18, 435-443.
- MAGOMA, M., REQUEJO, J., CAMPBELL, O. M., COUSENS, S. & FILIPPI, V. 2010. High ANC coverage and low skilled attendance in a rural Tanzanian district: a case for implementing a birth plan intervention. *BMC Pregnancy and Childbirth*, 10, 1-12.

- MANZI, A., MAGGE, H., HEDT-GAUTHIER, B., MICHAELIS, A., CYAMATARE, F., NYIRAZINYOYE, L., HIRSCHHORN, L. & NTAGANIRA, J. 2014. Clinical mentorship to improve pediatric quality of care at the health centers in rural Rwanda: a qualitative study of perceptions and acceptability of health care workers. *BMC Health Services Research*, 14, 275.
- MANZI, F., SCHELLENBERG, J., HUTTON, G., WYSS, K., MBUYA, C., SHIRIMA, K., MSHINDA, H., TANNER, M. & SCHELLENBERG, D. 2012. Human resources for health care delivery in Tanzania: a multifaceted problem. *Human Resources for Health*, 10, 3.
- MATE, K. S., NGUBANE, G. & BARKER, P. M. 2013. A quality improvement model for the rapid scale-up of a program to prevent mother-to-child HIV transmission in South Africa. *Int J Qual Health Care*, 25, 373-80.
- MINISTRY OF HEALTH 2010. Huduma Muhimu za Afya ya Uzazi Wakati wa Ujauzito. Dar es Salaam.
- MINISTRY OF HEALTH AND SOCIAL WELFARE 2011. Tanzania Mainland National Health Accounts 2009/10.
- MINISTRY OF HEALTH AND SOCIAL WELFARE 2014. BRN.
- MINISTRY OF HEALTH AND SOCIAL WELFARE. 2016. *Health Facility Registry* [Online]. Available: <http://hfrportal.ehealth.go.tz/> [Accessed 17.07 2016].
- MINISTRY OF HEALTH AND SOCIAL WELFARE 2007. Primary Health Services Development Programme- MMAM 2007-217.
- MINISTRY OF HEALTH AND SOCIAL WELFARE 2008. The National Road Map Strategic Plan To Accelerate Reduction of Maternal, Newborn and Child Deaths in Tanzania 2008 - 2015.
- MINISTRY OF HEALTH AND SOCIAL WELFARE 2011. The Tanzania Quality Improvement Framework in Health Care 2011 - 2016.
- MINISTRY OF HEALTH AND SOCIAL WELFARE 2013. Human Resource for Health Country Profile 2012/2013.
- MINISTRY OF HEALTH AND SOCIAL WELFARE 2014a. The National Road Map Strategic Plan To Accelerate Reduction of Maternal, Newborn and Child Deaths in Tanzania 2008-2015: Sharpened One Plan.
- MINISTRY OF HEALTH AND SOCIAL WELFARE 2014b. Women And Children First. Countdown to Ending Preventable Maternal, Newborn and Child Deaths in Tanzania.
- MINISTRY OF HEALTH AND SOCIAL WELFARE 2015. Health Sector Strategic Plan July 2015 – June 2020: Reaching all Households with Quality Health Care.
- MINISTRY OF HEALTH COMMUNITY DEVELOPMENT GENDER ELDERLY AND CHILDREN 2016. National Health Accounts Year 2011/2012.
- MOHER, D., LIBERATI, A., TETZLAFF, J. & ALTMAN, D. G. 2009. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *Annals of Internal Medicine*, 151, 264-269.
- MPEMBENI, R., KILLEWO, J., LESHABARI, M., MASSAWE, S., JAHN, A., MUSHI, D. & MWAKIPA, H. 2007. Use pattern of maternal health services and determinants of skilled care during delivery in Southern Tanzania: implications for achievement of MDG-5 targets. *BMC Pregnancy Childbirth*, 7, 29.
- MRISHO, M., SCHELLENBERG, D., MANZI, F., TANNER, M., MSHINDA, H., SHIRIMA, K., MSAMBICHAKA, B., ABDULLA, S. & SCHELLENBERG, J. A. 2012. Neonatal deaths in rural southern Tanzania: care-seeking and causes of death. *ISRN Pediatr*, 2012, 953401.
- MUNGA, M. & MAESTAD, O. 2009. Measuring inequalities in the distribution of health workers: the case of Tanzania. *Human Resources for Health*, 7, 4.
- MWIDUNDA, P. E. & ELIAKIMU, E. 2015. Creating a national culture of quality: the Tanzania experience. *AIDS*, 29 Suppl 2, S175-7.
- NATIONAL BUREAU OF STATISTICS (NBS) [TANZANIA] & ORC MACRO 2005. Tanzania Demographic and Health Survey 2004-05. Dar es Salaam, Tanzania: National Bureau of Statistics and ORC Macro.
- NATIONAL BUREAU OF STATISTICS (NBS)[TANZANIA] & ICF MACRO 2011. Tanzania Demographic and Health Survey 2010. Dar es Salaam, Tanzania: NBS and ICF Macro.

- NECOCHEA, E., TRIPATHI, V., KIM, Y.-M., AKRAM, N., HYJAZI, Y., DA LUZ VAZ, M., OTOLORIN, E., PLEAH, T., RASHIDI, T. & BISHANGA, D. 2015. Implementation of the Standards-Based Management and Recognition approach to quality improvement in maternal, newborn, and child health programs in low-resource countries. *International Journal of Gynecology & Obstetrics*, 130, Supplement 2, S17-S24.
- NGIDI, W., REDDY, J., LUVUNO, Z., ROLLINS, N., BARKER, P. & MATE, K. S. 2013. Using a Campaign Approach Among Health Workers to Increase Access to Antiretroviral Therapy for Pregnant HIV-Infected Women in South Africa. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, 63, e133-e139 10.1097/QAI.0b013e318291827f.
- NOUR, N. M. 2008. An Introduction to Maternal Mortality. *Reviews in Obstetrics and Gynecology*, 1, 77-81.
- OGRINC, G., MOONEY, S. E., ESTRADA, C., FOSTER, T., GOLDMANN, D., HALL, L. W., HUIZINGA, M. M., LIU, S. K., MILLS, P., NEILY, J., NELSON, W., PRONOVOST, P. J., PROVOST, L., RUBENSTEIN, L. V., SPEROFF, T., SPLAINE, M., THOMSON, R., TOMOLO, A. M. & WATTS, B. 2008. The SQUIRE (Standards for QUality Improvement Reporting Excellence) guidelines for quality improvement reporting: explanation and elaboration. *Quality & Safety in Health Care*, 17, 13-32.
- OLLERHEAD, E. & OSRIN, D. 2014. Barriers to and incentives for achieving partograph use in obstetric practice in low- and middle-income countries: a systematic review. *Bmc Pregnancy and Childbirth*, 14.
- PAUL E. PLSEK 1999. Quality Improvement Methods in Clinical Medicine. *Pediatrics*, 103, 203-14.
- PEMBE, A. B., CARLSTEDT, A., URASSA, D. P., LINDMARK, G., NYSTROM, L. & DARJ, E. 2010. Quality of antenatal care in rural Tanzania: counselling on pregnancy danger signs. *BMC Pregnancy Childbirth*, 10, 35.
- PEMBE, A. B., URASSA, D. P., CARLSTEDT, A., LINDMARK, G., NYSTROM, L. & DARJ, E. 2009. Rural Tanzanian women's awareness of danger signs of obstetric complications. *BMC Pregnancy Childbirth*, 9, 12.
- PENFOLD, R. B. & ZHANG, F. 2013. Use of Interrupted Time Series Analysis in Evaluating Health Care Quality Improvements. *Academic Pediatrics*, 13, S38-S44.
- PENFOLD, S., MANZI, F., MKUMBO, E., TEMU, S., JARIBU, J., SHAMBA, D., MSHINDA, H., COUSENS, S., MARCHANT, T., TANNER, M., SCHELLENBERG, D. & ARMSTRONG SCHELLENBERG, J. 2014. Effect of home-based counselling on newborn care practices in southern Tanzania one year after implementation: a cluster-randomised controlled trial. *BMC Pediatrics*, 14, 187.
- PENFOLD, S., SHAMBA, D., HANSON, C., JARIBU, J., MANZI, F., MARCHANT, T., TANNER, M., RAMSEY, K., SCHELLENBERG, D. & SCHELLENBERG, J. A. 2013. Staff experiences of providing maternity services in rural southern Tanzania - a focus on equipment, drug and supply issues. *BMC Health Services Research*, 13, 61.
- PLANNING COMMISSION 1995. The Tanzania Development Vision 2025.
- PUCHALSKI RITCHIE, L. M., VAN LETTOW, M., BARNSLEY, J., CHAN, A. K., SCHULL, M. J., MARTINIUK, A. L. C., MAKWAKWA, A. & ZWARENSTEIN, M. 2016. Lay Health Workers experience of a tailored knowledge translation intervention to improve job skills and knowledge: a qualitative study in Zomba district Malawi. *BMC Medical Education*, 16, 1-8.
- RAVEN, J., HOFMAN, J., ADEGOKE, A. & VAN DEN BROEK, N. 2011. Methodology and tools for quality improvement in maternal and newborn health care. *International Journal of Gynecology & Obstetrics*, 114, 4-9.
- RAVEN, J. H., TOLHURST, R. J., TANG, S. & VAN DEN BROEK, N. 2012. What is quality in maternal and neonatal health care? *Midwifery*, 28, e676-e683.
- RILEY, W. J., MORAN, J. W., CORSO, L., BEITSCH, L. M., BIALEK, R. & COFSKY, A. 2010. Defining Quality Improvement in Public Health. *Journal of Public Health Management & Practice* January/February, 16, 5-7.

- ROBERT G. HAMLIN, ANDREA D. ELLINGER & BEATTIE, R. S. 2009. Toward a Profession of Coaching? A Definitional Examination of 'Coaching,' 'Organization Development,' and 'Human Resource Development'. *International Journal of Evidence Based Coaching and Mentoring*, 7, 13.
- ROCKERS, P., WILSON, M., MBARUKU, G. & KRUK, M. 2009. Source of Antenatal Care Influences Facility Delivery in Rural Tanzania: A Population-Based Study. *Matern Child Health J*, 13, 879-885.
- RONSMANS, C. & GRAHAM, W. J. 2006. Maternal mortality: who, when, where, and why. *Lancet*, 368, 1189-200.
- ROWE, A. K., DE SAVIGNY, D., LANATA, C. F. & VICTORA, C. G. 2005. How can we achieve and maintain high-quality performance of health workers in low-resource settings. *Lancet*, 366, 1026-1035.
- RUANGWA DISTRICT COUNCIL 2012. Council Comprehensive Health Plan: July 2012-June 2013.
- SALAM, R., LASSI, Z., DAS, J. & BHUTTA, Z. 2014. Evidence from district level inputs to improve quality of care for maternal and newborn health: interventions and findings. *Reproductive Health*, 11, S3.
- SARONGA, H., DUYSBURGH, E., MASSAWE, S., DALABA, M., SAVADOGO, G., TONCHEV, P., DONG, H., SAUERBORN, R. & LOUKANOVA, S. 2014. Efficiency of antenatal care and childbirth services in selected primary health care facilities in rural Tanzania: a cross-sectional study. *BMC Health Services Research*, 14, 96.
- SAVIGNY, D. D. & ADAM, T. 2009. Systems thinking for health systems strengthening. Alliance for Health Policy and Systems Research: WHO.
- SAY, L., CHOU, D., GEMMILL, A., TUNCALP, O., MOLLER, A. B., DANIELS, J., GULMEZOGLU, A. M., TEMMERMAN, M. & ALKEMA, L. 2014. Global causes of maternal death: a WHO systematic analysis. *Lancet Glob Health*, 2, e323-33.
- SCHELLENBERG, J. R. A., MRISHO, M., MANZI, F., SHIRIMA, K., MBUYA, C., MUSHI, A. K., KETENDE, S. C., ALONSO, P. L., MSHINDA, H., TANNER, M. & SCHELLENBERG, D. 2008. Health and survival of young children in southern Tanzania. *Bmc Public Health*, 8.
- SHEINGOLD, B. H. & HAHN, J. A. 2014. The history of healthcare quality: The first 100 years 1860–1960. *International Journal of Africa Nursing Sciences*, 1, 18-22.
- SIBLEY, L. M., TESFAYE, S., FEKADU DESTA, B., HAILEMICHAEL FREW, A., KEBEDE, A., MOHAMMED, H., ETHIER-STOVER, K., DYNES, M., BARRY, D., HEPBURN, K. & GOBEZAYEHU, A. G. 2014. Improving Maternal and Newborn Health Care Delivery in Rural Amhara and Oromiya Regions of Ethiopia Through the Maternal and Newborn Health in Ethiopia Partnership. *Journal of Midwifery & Women's Health*, 59, S6-S20.
- SINGH, K., BRODISH, P., SPEIZER, I., BARKER, P., AMENGA-ETEGO, I., DASOBERI, I., KANYOKE, E., BOADU, E. A., YABANG, E. & SODZI-TETTEY, S. 2016. Can a quality improvement project impact maternal and child health outcomes at scale in northern Ghana? *Health Res Policy Syst*, 14, 45.
- SINGH, K., MORAN, A., STORY, W., BAILEY, P. & CHAVANE, L. 2014. Acknowledging HIV and malaria as major causes of maternal mortality in Mozambique. *International Journal of Gynecology & Obstetrics*, 127, 35-40.
- SINGH, K., SPEIZER, I., HANDA, S., BOADU, R. O., ATINBIRE, S., BARKER, P. M. & TWUM-DANSO, N. A. Y. 2013. Impact evaluation of a quality improvement intervention on maternal and child health outcomes in Northern Ghana: early assessment of a national scale-up project. *International Journal For Quality In Health Care: Journal Of The International Society For Quality In Health Care / Isqua*, 25, 477-487.
- SOKOVIC, M., PAVLETIC, D. & FAKIN, S. 2005. Application of Six Sigma methodology for process design. *Journal of Materials Processing Technology*, 162–163, 777-783.
- SORENSEN, B. L., ELSASS, P., NIELSEN, B. B., MASSAWE, S., NYAKINA, J. & RASCH, V. 2010. Substandard emergency obstetric care – a confidential enquiry into maternal deaths at a regional hospital in Tanzania. *Tropical Medicine & International Health*, 15, 894-900.

- SOUZA, J. P., GÜLMEZOĞLU, A. M., VOGEL, J., CARROLI, G., LUMBIGANON, P., QURESHI, Z., COSTA, M. J., FAWOLE, B., MUGERWA, Y., NAFIOU, I., NEVES, I., WOLOMBY-MOLONDO, J.-J., BANG, H. T., CHEANG, K., CHUYUN, K., JAYARATNE, K., JAYATHILAKA, C. A., MAZHAR, S. B., MORI, R., MUSTAFA, M. L., PATHAK, L. R., PERERA, D., RATHAVY, T., RECIDORO, Z., ROY, M., RUYAN, P., SHRESTHA, N., TANEEPANICHSKU, S., TIEN, N. V., GANCHIMEG, T., WEHBE, M., YADAMSUREN, B., YAN, W., YUNIS, K., BATAGLIA, V., CECATTI, J. G., HERNANDEZ-PRADO, B., NARDIN, J. M., NARVÁEZ, A., ORTIZ-PANOZO, E., PÉREZ-CUEVAS, R., VALLADARES, E., ZAVALETA, N., ARMSON, A., CROWTHER, C., HOGUE, C., LINDMARK, G., MITTAL, S., PATTINSON, R., STANTON, M. E., CAMPODONICO, L., CUESTA, C., GIORDANO, D., INTARUT, N., LAOPAIBOON, M., BAHL, R., MARTINES, J., MATHAI, M., MERIALDI, M. & SAY, L. 2013. Moving beyond essential interventions for reduction of maternal mortality (the WHO Multicountry Survey on Maternal and Newborn Health): a cross-sectional study. *The Lancet*, 381, 1747-1755.
- SPANGLER, S. & BLOOM, S. 2010. Use of biomedical obstetric care in rural Tanzania: the role of social and material inequalities. *Soc Sci Med*, 71, 760 - 768.
- SPANGLER, S. A. 2012. Assessing skilled birth attendants and emergency obstetric care in rural Tanzania: the inadequacy of using global standards and indicators to measure local realities. *Reproductive Health Matters*, 20, 133-141.
- SPEROFF, T. & O'CONNOR, G. T. 2004. Study designs for PDSA quality improvement research. *Quality Management in Health Care*, 13, 17-32.
- STARK, C., GENT, A. & KIRKLAND, L. 2015. Improving patient flow in pre-operative assessment. *BMJ Quality Improvement Reports*, 4.
- STATISTA. 2015. *The Statistics Portal* [Online]. Available: <http://www.statista.com/statistics/237584/distribution-of-the-world-population-by-continent/> [Accessed 20.08 2015].
- STATISTICS, N. B. O. & MINISTRY OF PLANNING, E. A. E. 2006. Tanzania census 2002 : Analytical Report. Dar es Salaam: Ministry of Planning, Economy and Empowerment.
- SYED MUHAMMAD ISRAR 2005. Project Mentality: a threat to effective implementation and sustainability of donor funded projects in Pakistan. *Journal of Pakistan Medical Association*.
- TANCRED, T., SCHELLENBERG, J. & MARCHANT, T. 2016. Using mixed methods to evaluate perceived quality of care in southern Tanzania. *International Journal for Quality in Health Care*, 28, 233-239.
- TAYLOR, M. J., MCNICHOLAS, C., NICOLAY, C., DARZI, A., BELL, D. & REED, J. E. 2014. Systematic review of the application of the plan--do--study--act method to improve quality in healthcare. *BMJ Quality & Safety*, 23, 290-298.
- TEASDALE, G. M. 2008. Quality in healthcare and the quest for improvement. *Scott Med J*, 53, 3-6.
- TESFAYE, S., BARRY, D., GOBEZAYEHU, A. G., FREW, A. H., STOVER, K. E., TESSEMA, H., ALAMINEH, L. & SIBLEY, L. M. 2014. Improving coverage of postnatal care in rural Ethiopia using a community-based, collaborative quality improvement approach. *Journal of Midwifery & Women's Health*, 59 Suppl 1, S55-64.
- THADDEUS, S. & MAINE, D. 1994. Too far to walk: maternal mortality in context. *Soc Sci Med*, 38, 1091-110.
- THE PARTNERSHIP FOR MATERNAL, N. A. C. H. 2011. A Global Review of the key Interventions related to Reproductive, Maternal, Newborn and Child Health (RMNCH). Geneva, Switzerland: PMNCH.
- THE UNITED REPUBLIC OF TANZANIA 2014. Basic Demographic and Socio Economic Profile : Key Findings 2012 Population and Housing Census.
- TIMMERMAN, T., VERRALL, T., CLATNEY, L., KLOMP, H. & TEARE, G. 2010. Taking a closer look: using statistical process control to identify patterns of improvement in a quality-improvement collaborative. *Quality and Safety in Health Care*, 19, e19.
- TUNÇALP, Ö., WERE, W. M., MACLENNAN, C., OLADAPO, O. T., GÜLMEZOĞLU, A. M., BAHL, R., DAELMANS, B., MATHAI, M., SAY, L., KRISTENSEN, F., TEMMERMAN, M. & BUSTREO, F. 2015.

- Quality of care for pregnant women and newborns—the WHO vision. *BJOG: An International Journal of Obstetrics & Gynaecology*, 122, 1045-1049.
- TWUM-DANSO, N. A., DASOBERI, I. N., AMENGA-ETEGO, I. A., ADONDIWO, A., KANYOKE, E., BOADU, R. O., ATINBIRE, S., BALAGUMYETIME, P., BAGNI, F., KUBIO, C., SAGOE-MOSES, I. & BARKER, P. M. 2013. Using quality improvement methods to test and scale up a new national policy on early post-natal care in Ghana. *Health Policy Plan*.
- TWUM-DANSO, N. A. Y., AKANLU, G. B., OSAFO, E., SODZI-TETTEY, S., BOADU, R. O., ATINBIRE, S., ADONDIWO, A., AMENGA-ETEGO, I., ASHAGBLEY, F., BOADU, E. A., DASOBERI, I., KANYOKE, E., YABANG, E., ESSEGBEY, I. T., ADJEI, G. A., BUCKLE, G. B., AWOONOR-WILLIAMS, J. K., NANG-BEIFUBAH, A., TWUMASI, A., MCCANNON, C. J. & BARKER, P. M. 2012. A nationwide quality improvement project to accelerate Ghana's progress toward Millennium Development Goal Four: design and implementation progress. *International Journal for Quality in Health Care*.
- U. S. DEPARTMENT OF HEALTH AND HUMAN SERVICES & HEALTH RESOURCES AND SERVICES ADMINISTRATION 2011. QUALITY IMPROVEMENT.
- UNFPA. 2016. *Maternal health: Overview* [Online]. Available: <http://www.unfpa.org/maternal-health> [Accessed 09.02 2016].
- UNICEF 2015. Levels & Trends in Child Mortality: Estimates Developed by the UN Inter-agency Group for Child Mortality Estimation.
- UNITED NATIONS 2015. The Millennium Development Goals Report.
- USAID HEALTH CARE IMPROVEMENT PROJECT 2008. The Improvement Collaborative: An Approach to Rapidly Improve Health Care and Scale Up Quality Services. Bethesda, Maryland: USAID Health Care Improvement Project.
- VAN DEN BROEK, N. R. & GRAHAM, W. J. 2009. Quality of care for maternal and newborn health: the neglected agenda. *BJOG: An International Journal of Obstetrics & Gynaecology*, 116, 18-21.
- VICTORA, C. G., SCHELLENBERG, J. A., HUICHO, L., AMARAL, J., EL ARIFEEN, S., PARIYO, G., MANZI, F., SCHERPBIER, R. W., BRYCE, J. & HABICHT, J. P. 2005. Context matters: interpreting impact findings in child survival evaluations. *Health Policy Plan*, 20 Suppl 1, i18-i31.
- WALL, S. N., LEE, A. C., CARLO, W., GOLDENBERG, R., NIERMEYER, S., DARMSTADT, G. L., KEENAN, W., BHUTTA, Z. A., PERLMAN, J. & LAWN, J. E. 2010. Reducing intrapartum-related neonatal deaths in low- and middle-income countries-what works? *Semin Perinatol*, 34, 395-407.
- WANG, H., LIDDELL, C. A., COATES, M. M., MOONEY, M. D., LEVITZ, C. E., SCHUMACHER, A. E., APFEL, H., IANNARONE, M., PHILLIPS, B., LOFGREN, K. T., SANDAR, L., DORRINGTON, R. E., RAKOVAC, I., JACOBS, T. A., LIANG, X., ZHOU, M., ZHU, J., YANG, G., WANG, Y., LIU, S., LI, Y., OZGOREN, A. A., ABERA, S. F., ABUBAKAR, I., ACHOKI, T., ADELEKAN, A., ADEMI, Z., ALEMU, Z. A., ALLEN, P. J., ALMAZROA, M. A., ALVAREZ, E., AMANKWAA, A. A., AMARE, A. T., AMMAR, W., ANWARI, P., CUNNINGHAM, S. A., ASAD, M. M., ASSADI, R., BANERJEE, A., BASU, S., BEDI, N., BEKELE, T., BELL, M. L., BHUTTA, Z., BLORE, J. D., BASARA, B. B., BOUFOUS, S., BREITBORDE, N., BRUCE, N. G., BUI, L. N., CARAPETIS, J. R., CARDENAS, R., CARPENTER, D. O., CASO, V., CASTRO, R. E., CATALA-LOPEZ, F., CAVLIN, A., CHE, X., CHIANG, P. P., CHOWDHURY, R., CHRISTOPHI, C. A., CHUANG, T. W., CIRILLO, M., DA COSTA LEITE, I., COURVILLE, K. J., DANDONA, L., DANDONA, R., DAVIS, A., DAYAMA, A., DERIBE, K., DHARMARATNE, S. D., DHERANI, M. K., DILMEN, U., DING, E. L., EDMOND, K. M., ERMAKOV, S. P., FARZADFAR, F., FERESHTEHNEJAD, S. M., FIJABI, D. O., FOIGT, N., FOROUZANFAR, M. H., GARCIA, A. C., GELEIJNSE, J. M., GESSNER, B. D., GOGINASHVILI, K., GONA, P., GOTO, A., GOUDA, H. N., GREEN, M. A., GREENWELL, K. F., GUGNANI, H. C., GUPTA, R., HAMADEH, R. R., HAMMAMI, M., HARB, H. L., HAY, S., HEDAYATI, M. T., HOSGOOD, H. D., HOY, D. G., IDRISOV, B. T., et al. 2014. Global, regional, and national levels of neonatal, infant, and under-5 mortality during 1990-2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet*, 384, 957-79.

- WEBSTER, P. D., SIBANYONI, M., MALEKUTU, D., MATE, K. S., VENTER, W. D., BARKER, P. M. & MOLEKO, W. 2012. Using quality improvement to accelerate highly active antiretroviral treatment coverage in South Africa. *BMJ Qual Saf*, 21, 315-24.
- WHO 2006. WHO recommendations for clinical mentoring to support scale-up of HIV care, antiretroviral therapy and prevention in resource-constrained settings.
- WHO 2009. Monitoring and evaluation of health systems strengthening: An operational framework.
- WHO 2011. The Abuja Declaration: Ten Years On.
- WHO 2015a. Strategies toward ending preventable maternal mortality (EPMM).
- WHO 2015b. Trends in Maternal Mortality: 1990 to 2015: estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division. *In: WHO (ed.)*.
- WIEDENMAYER, K. A., KAPOLOGWE, N., CHARLES, J., CHILUNDA, F. & MAPUNJO, S. 2015. The reality of task shifting in medicines management- a case study from Tanzania. *Journal of Pharmaceutical Policy and Practice*, 8, 13.
- WILMS, M. C., MBEMBELA, O., PRYTHERCH, H., HELLMOLD, P. & KUELKER, R. 2014. An in-depth, exploratory assessment of the implementation of the National Health Information System at a district level hospital in Tanzania. *BMC Health Services Research*, 14, 91.
- WILTSEY STIRMAN, S., KIMBERLY, J., COOK, N., CALLOWAY, A., CASTRO, F. & CHARNS, M. 2012. The sustainability of new programs and innovations: a review of the empirical literature and recommendations for future research. *Implementation Science*, 7, 17.
- WORKU, A., YALEW, A. & AFEWORK, M. 2013. Availability and components of maternity services according to providers and users perspectives in North Gondar, northwest Ethiopia. *Reproductive Health*, 10, 43.
- WORLD HEALTH ORGANIZATION 2004a. Beyond the Numbers.
- WORLD HEALTH ORGANIZATION 2004b. Making pregnancy safer: the critical role of the skilled attendant: a joint statement by WHO, ICM and FIGO.
- WORLD HEALTH ORGANIZATION 2005. The World health report : 2005 : make every mother and child count.
- WORLD HEALTH ORGANIZATION 2006. Quality of Care : a process for making strategic choices in health systems.
- WORLD HEALTH ORGANIZATION 2007. Everybody business : strengthening health systems to improve health outcomes : WHO's framework for action.
- WORLD HEALTH ORGANIZATION 2010. Monitoring the building blocks of health systems: a handbook of indicators and their measurement strategies.
- WORLD HEALTH ORGANIZATION 2015. World health statistics 2015.
- WORLD HEALTH ORGANIZATION 2016. Standards For Improving Quality Of Maternal And Newborn Care In Health Facilities.
- YISMA, E., DESSALEGN, B., ASTATKIE, A. & FESSEHA, N. 2013. Completion of the modified World Health Organization (WHO) partograph during labour in public health institutions of Addis Ababa, Ethiopia. *Reprod Health*, 10, 23.
- YOUNGLESON, M. S., NKURUNZIZA, P., JENNINGS, K., ARENDSE, J., MATE, K. S. & BARKER, P. 2010. Improving a mother to child HIV transmission programme through health system redesign: quality improvement, protocol adjustment and resource addition. *PLoS One*, 5, e13891.
- ZAKANE, S. A., GUSTAFSSON, L. L., TOMSON, G., LOUKANOVA, S., SIÉ, A., NASIELL, J. & BASTHOLM-RAHMNER, P. 2014. Guidelines for maternal and neonatal "point of care": Needs of and attitudes towards a computerized clinical decision support system in rural Burkina Faso. *International Journal of Medical Informatics*, 83, 459-469.

APPENDICES

Appendix 1. Qualitative study interview guide

Improving institutional childbirth services in rural Southern Tanzania: a qualitative study of healthcare workers' perspective

ID:

Interview date:

Interview start:

Interview end:

Socio-demographic information of participant

1. Place of residence:
 2. Ethnicity:
 3. Religion:
 4. Education:
 5. Main occupation:
 6. Age:
 7. Number of QI sessions attended:
-

1. What do you understand by the term “quality improvement in maternal and neonatal health”?
2. Do you remember key issues we discussed during our meetings (the learning sessions) in order to improve the quality of care for pregnant women and newborns? If yes, could you please explain them (Probe: use of PDSA cycle, use data, generate change ideas, follow up visits, maternal or newborn topics).
3. What do you think about the learning sessions? What did you like about it? What could be improved?

4. Do you remember key activities we did together during follow up visits in order to improve the quality of care for pregnant women and newborns? (Probe: look at data, process data and outcome, revise PDSA, revise what we learnt during LS, plot graphs, discuss change ideas)
5. Which activity worked best during the QI implementation? Can you explain why?
6. Which activity did not work during the QI implementation? Can you explain why?
7. Can you remember the change ideas (activities) you agreed on to implement in order to improve maternal and neonatal health services? (Probe: giving individual birth plan and complication preparedness counselling to all pregnant women attending ANC clinic, use of information brochure, keeping a register, attending village meetings, male involvement in counselling).
8. Did you manage to implement some of these change ideas? If yes, which ones?
Do you continue them? If yes, why? If no, why not?
Did the activities improve the quality of care for pregnant women and newborns in your facility? If yes, how? If no, why not? Please give examples.
9. During the implementation of your change ideas or QI activities were there any challenges you faced? What kind of challenges? Did you overcome them? How?
10. During the implementation of your QI activities or change ideas did you need any extra support from the district, project or your colleagues? If yes, from whom? What kind of support did you need? Did you get it?
11. Were you able to apply the PDSA cycle to improve other types of services? If yes, can you give an example? If no, why not?
12. Were you able to transfer the knowledge about it to anyone else?
13. Has the service provision at your health facility/ies changed after participating in this project?
14. How could the QI intervention be improved? Can you give examples?

15. Do you have anything you would like to add?

16. Would you like to ask me any questions?

Additional question for the RCH coordinator

What was your contribution during the implementation of the QI activities?

CURRICULUM VITAE

Personal Details

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Education

2012 – 2016 PhD in Epidemiology and Public Health on “Implementation and evaluation of a health facility quality improvement intervention for maternal and newborn health in southern Tanzania”, supervised by Prof Joanna Schellenberg and Dr Constanze Pfeiffer
Swiss Tropical and Public Health Institute, University of Basel, Switzerland.

2009 – 2014 Master of Science in Epidemiology (Distance learning)
University of London, London School of Hygiene and Tropical Medicine, London, United Kingdom.

1999 – 2004 Doctor of Medicine
Muhimbili University College of Health Sciences,
University of Dar es Salaam, Dar-es Salaam, Tanzania.

Work Experience

Since April 2016 Research Scientist at Ifakara Health Institute working with Vital Strategies and Tanzania Ministry of Health,

Community Development, Gender, Elderly and Children,
Monitoring and Evaluation Section.

2008 -2013	Research Officer at Ifakara Health Institute working with INSIST and EQUIP projects
2006 -2008	Medical Officer under Zanzibar Ministry of Health and Social Welfare

Publications

1. **Jaribu, J.**, Penfold, S., Manzi, F., Schellenberg, J. & Pfeiffer, C. Improving institutional childbirth services in rural Southern Tanzania: a qualitative study of healthcare workers' perspective. *BMJ Open*. 2016.
2. Hanson C, Manzi F, Mkumbo E, Shirima K, Penfold S, Hill Z, Shamba D, **Jaribu J**, Hamisi Y, Soremekun S, Cousens S, Marchant T, Mshinda H, Schellenberg D, Tanner M. & Schellenberg J. Effectiveness of a home-based counselling strategy on neonatal care and survival: A cluster-randomised trial in six districts of rural southern Tanzania. *Plos Med*. 2015.
3. Marchant T, **Jaribu J**, Penfold S, Tanner M, Schellenberg J. Measuring newborn foot length to identify small babies in need of extra care: a cross sectional hospital based study with community follow-up in Tanzania. *BMC Public Health*. 2010.
4. **Jaribu J**, Penfold S, Green C, Manzi F, Schellenberg J. Improving quality of institutional childbirth services in rural Southern Tanzania (Submitted at *International Journal of Health Care Quality Assurance*)
5. **Jaribu J**, Eze I, Schellenberg J. A systematic review of effect of quality improvement approaches in maternal and neonatal health care in sub-Saharan Africa (about to submit)