AN ASSESSMENT OF THE STATE OF MATERNAL CONTINUUM OF CARE IN MOROGORO, TANZANIA

by

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Dissertation Abstract

Background: Each year, an estimated 289,000 women and 3 million newborns in low and middle-income countries die of largely preventable causes. In response, a 'continuum of care' framework has been adopted to describe the provision of lifesaving interventions to mothers and newborns in an effective and efficient manner. This research aims to explore the dropout of women from the care continuum and the association between the continuum approach and the adoption of family planning in the postnatal period.

Methods: This study used data from a household survey, of 1968 women, who had delivered in the preceding 2-14 months, that was part of a broader evaluation and collected information on health behaviors and care seeking practices during pregnancy, childbirth and postnatal period. The survey was of a multi stage sampling design conducted in 4 districts of Morogoro Region in Tanzania. The study (1) examines the dropout of women from the continuum of care in Morogoro region (Chapter 4) (2) seeks to understand the characteristics of the individuals who use postnatal care (PNC) and the content of PNC (Chapter 5) and (3) assesses receipt of receiving FP counseling at different points of contact in the care continuum (Chapter 6).

Results: Only 10 % (198/1931) of women accessed the recommended set of services offered through the entire continuum (4 ANC visits, facility delivery and 1 postnatal visit) and 1% (18/1931) reported not having a care contact at any stage. The largest dropout occurred at the stage of postnatal care with less than one in four women receiving early or late PNC. The services received during PNC care varied by type of facility – health centers and hospitals performed better than dispensaries in the delivery of key counseling messages. Women receiving counseling at all 3 stages (OR 2.0, 95%

CI 1.11-3.61) were more likely to use Long Acting Permanent methods (LAPM) than those counseled at fewer stages.

Conclusion: There are clear utilization gaps in the maternal health continuum in Tanzania, in general, and postnatal care, in particular.

Keywords – continuum, maternal health, postnatal care, postpartum family planning, Morogoro, Tanzania

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Organization of the document

The thesis is organized into seven main chapters:

1. Introduction - briefly describes the current status of maternal and neonatal health globally and the need for the 'continuum of care' framework to better understand the provision of Maternal Newborn Child Health (MNCH) services.
2. Literature review - details the existing literature on the 'continuum of care' framework, status of postpartum care in low resource settings and approaches to integrating family planning into the MNCH continuum.
3. Research Aims and Methodology: that describes the study aims, study context, data collection and analytical methods applied to the overall research.
4. Three Manuscript Sections - structured in the form of freestanding journal articles one for each research aim. Each manuscript includes a brief introduction and methods section specific to the aim, followed by aim-specific results and discussion.
5. Conclusion- presents an overarching view of the key study findings, strengths & limitations, and implications.

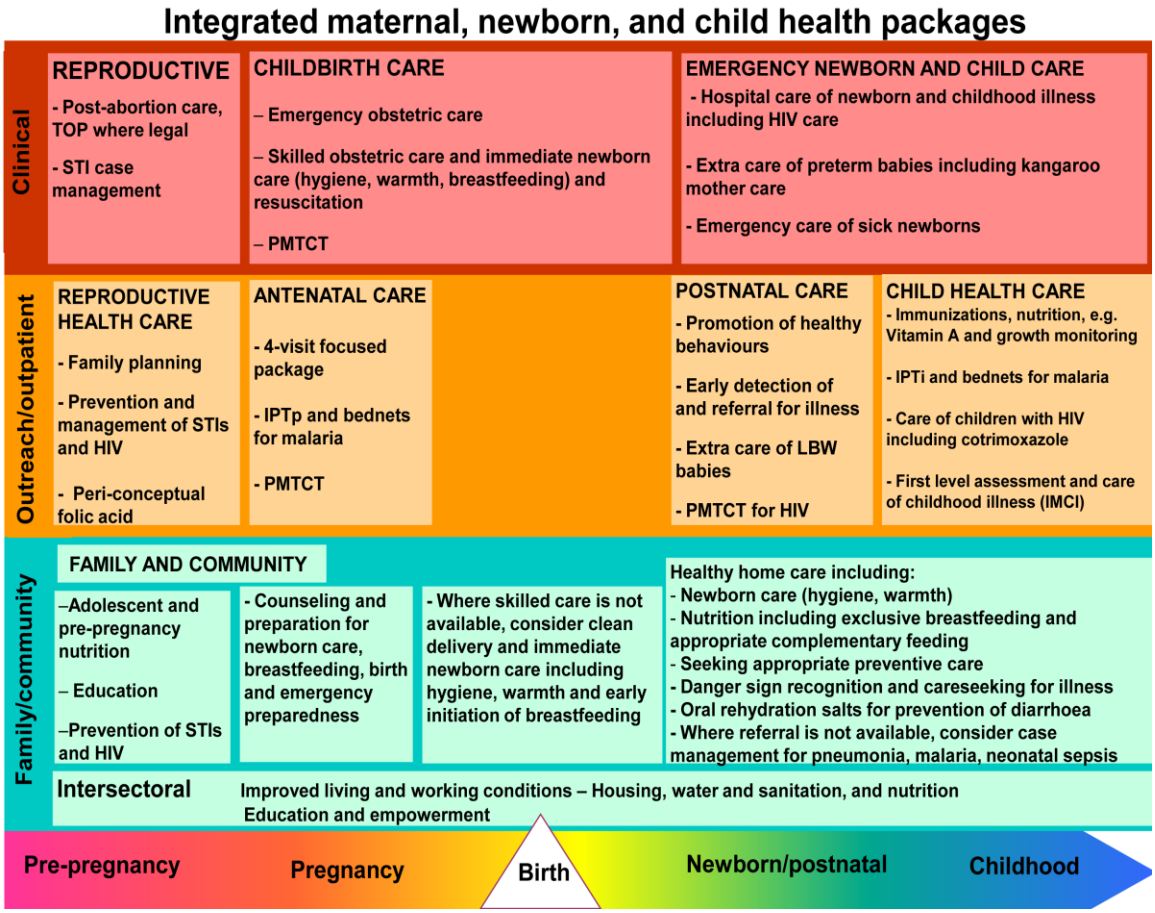
Introduction

Globally an estimated 289,000 women died in 2013 from complications associated with pregnancy or childbirth [1]. Ninety nine percent of these deaths occurred in low resource settings; more than half in Sub-Saharan Africa [2]. Among the 7.6 million deaths in children under the age of 5, 44% occur during the neonatal period and nearly half of these deaths occur during the first 72 hours following delivery [3]. In 2013, almost 1 million newborns died on the day they were born, and 2 million newborns died within the first seven days after birth [4]. The past decade has shown that no single intervention is sufficient in isolation to improve maternal and newborn health and the 'continuum of care' framework has been highlighted as a core programmatic principle to reduce morbidity and mortality [5].

In reproductive health, the 'continuum of care' concept refers to continuity of care throughout the lifecycle—adolescence, pregnancy, childbirth, postpartum period, and childhood (Figure 1) [5-8]). It provides a framework for the provision of essential lifesaving interventions to all women and children throughout the lifecycle by integrating effective interventions and delivery strategies within existing health system packages [6]. A well-functioning continuum of care has been shown to increase client and provider satisfaction [9] and maximize efficiency in limited resource settings [10] and is the basis of care in many wealthy countries [5]. The two dimensions of the continuum include 1) the time dimension—continuity of care over time from pre-pregnancy through antenatal, intra- and postpartum periods for women, and care for children from the newborn period through adolescence; and 2) the place (or level) dimension—integrated service delivery

provided by communities to first level and referral health facilities [11, 12]. Although a lot of the literature in developing countries has focused on 'childhood' part of the continuum [13, 14], an effective continuum is especially important for maternal health, since timely linkages to referral care are necessary to reduce maternal deaths [5].

Figure 1 - The Integrated Continuum of care approach



Kerber KJ, de Graft-Johnson JE, Bhutta ZA, Okong P, Starrs A, Lawn JE: Continuum of care for maternal, newborn, and child health: from slogan to service delivery. *Lancet* 2007:370(9595):1358-1369

An important stage in the care continuum is postnatal care (PNC), which has not received as much attention as antenatal care or delivery care from researchers and policymakers [15]. According to the World Health Organization (WHO), the postnatal period starts one

hour post-delivery of the placenta and includes the following six weeks and an extended postnatal care until one year after delivery [16]. PNC includes the prevention and early detection and treatment of complications and disease and the provision of advice and services on breastfeeding, birth spacing, immunizations, nutrition and HIV services. Postpartum care can help reduce mortality and morbidity for the mother and newborn, which is very high during the first week and up to four weeks after delivery [15]. The postpartum care visit also serves as an entry point for the provision of other health services including family planning and immunization. Unfortunately, in Sub-Saharan Africa, postnatal care for the mother and infant in the crucial first hours and days after childbirth is poor in quality and coverage or missing entirely, even for those who give birth in a health facility [11]. The postpartum period has been traditionally considered as an important time for introducing and promoting contraception [17]. From a public health perspective, it is crucial to take advantage of every contact in the care continuum to offer women appropriate family planning counseling and services. The periods of pregnancy, delivery and postpartum periods are considered opportune for counseling women on the adoption of modern family planning (FP) methods due to frequent encounters with the health system [18-20]. Increasing contraception rates to meet needs for spacing and limiting births can avert more than 150,000 maternal deaths over 5 years [21].

The East African country of Tanzania, experiences high levels of maternal mortality (454 per 100,000 live births) and under-five child mortality (81 per 1,000 live births) with 32% of under five deaths occurring in the first month of life [22]. Significant dropouts occur in the continuum of maternal services from the antenatal period to the postnatal period; 95% of pregnant women in Tanzania receive at least one antenatal checkup and 50% deliver

with a skilled birth attendant, yet only 35% of Tanzanian women receive a postpartum checkup [22]. Despite universal knowledge of contraceptives (90%), only 34% of married women use any method of contraception, with only 27% using a modern method. The most commonly used methods are injectables (11%), pills (7%) and traditional methods (7%) [22]. Unmet need among women (Defined as women who want to stop or delay childbearing but are not using any method of contraception) of reproductive age is 25% respectively, with considerable rural–urban and regional disparities [22]. To address the gaps, the National Road Map Strategic Plan to Accelerate Reduction of Maternal, Newborn and Child Deaths in Tanzania, 2008–2015 (One Plan) adopted the continuum of care framework with a focus on high coverage of effective interventions and integrated MNCH service packages as well as other key programs such as Safe Motherhood (SM), Family Planning (FP), Prevention of Mother to Child Transmission (PMTCT) of HIV, Malaria, Expanded Program on Immunization (EPI), Integrated Management of Childhood Illnesses (IMCI), Adolescent Health and Nutrition.

Currently, there is very little evidence on the factors for the dropout of women occurring from the care continuum in Tanzania. In our research, we focus on the time dimension of the continuum for mothers, looking at women as they move through the period from pregnancy to childbirth and postpartum period. We propose to fill this gap in evidence to help policymakers and program implementers to tailor their response to address the large gaps in the knowledge of interventions that work and their delivery.

Goals and Aims of the present study

The overarching goal of this study is further understand the programmatic implications of the MNCH continuum of care through the assessment of the utilization of care, especially

postpartum care and effectiveness of this approach on adoption of postpartum family planning in the Morogoro Region of Tanzania.

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Literature review

The following review details the existing literature on the 'continuum of care' framework, status of postpartum care in low resource settings and approaches to integrating family planning into the MNCH continuum.

Continuum of Care approach

Although, the term "continuum of care" was initially applied in the 1970s to the integration of research and practice in providing continuity of care for the elderly, the majority of the literature was restricted to health care in developed nations [1, 2]. The term was most often used in the context of individual care and case management, promoting care within a network to ensure a client is not lost to follow up[2]. Over the last decade, the continuum of care framework has been at the forefront as the programmatic principle of Maternal Newborn & Child Health (MNCH) services to reduce mortality and morbidity among women and children, particularly in low income settings [3-6]. The World Health Organization has pushed for the MNCH continuum to form the framework strategies towards integrated care at a population and health systems level [7]. The framework aims to seek synergies in care delivered to mothers and children, by targeting the place (or location) of service delivery, and health issues that can be addressed at the same time [8, 9]. The continuum of care was conceptualized to plan for the delivery of optimum *health* care to patients and has been characterized in literature as *"the unbroken and consistent existence, available and uptake of the intervention to the recommended ending of the intervention over a period of time" [10]*.

Many definitions have been put forth to describe the concept of 'continuum' in the context of women and children's health (Table 1). With a view to providing an all-encompassing definition, Kerber et al [8] propose the following - "*The continuum of care for maternal, neonatal, and child health requires access to care provided by families and communities, by outpatient and outreach services, and by clinical services throughout the lifecycle, including adolescence, pregnancy, childbirth, the postnatal period, and childhood. Saving lives depends on high coverage and quality of integrated service-delivery packages throughout the continuum, with functional linkages between levels of care in the health system and between service-delivery packages, so that the care provided at each time and place contributes to the effectiveness of all the linked packages*."

Table 1 - Definitions of the concept of 'Continuum of Care' by various organizations

Source	**Definition of "Care Continuum"**
World Bank[11]	*Programs succeed best when they provide a package of services, including community-based family planning, health and nutrition services. Substantial - and sustained - reduction of the risk of dying once pregnant, however requires an effective continuum of care from the community to the first referral level supported by a public education program."*
CDC [12]	*The right person at the right time, at the right place, providing the right care*
WHO[7]	*The core principle underlying the strategies to develop MNCH programmes is the 'continuum of care'. This expression has two meanings. First it means care has to be provided as a continuum throughout the lifecycle, including adolescence, pregnancy, childbirth and childhood. Second it indicates that care has to be care has to provided in a seamless continuum that spans the home, the community, the health center and the hospital.*
The Lancet Neonatal Survival Series[13]	*The time has come for these health interventions for newborn babies to be integrated into maternal and child health programmes…The continuum-of-care approach promotes care for mothers and children from pregnancy to delivery, the immediate postnatal period, and childhood, recognizing that safe childbirth is critical to the health of both the woman and the newborn child—and that a healthy start in life is an essential step towards a sound childhood and a productive life.*

	Another related continuum is required to link households to hospitals by improving home based practices, mobilizing families to seek the care they need, and increasing access to and quality of care at health facilities
Save the Children[14]	*The household to hospital continuum of care approach provides pragmatic steps to ensure the availability of and access to quality maternal and newborn services at peripheral health facilities and district hospitals, while strengthening linkages in between*
Mangiaterra et al[15]	*The continuum of care that follows the life-cycle is part of a high impact program delivery, supported by enabling environment, encompassing strong political commitment and strengthened comprehensive health system, from community level to clinical services*
Partnership for Maternal. Newborn and Child Health[16]	*This encompasses a continuum of essential interventions that should be accessible to mothers, newborns and children at household, community, district and national levels, as well as continuum that follows through the lifecycle of maternal, newborn and child health.*

In the past, efforts to improve maternal and newborn health have taken a piecemeal approach – for example, skilled attendance at birth through the identification of barriers to care [17-19] and improvement of delivery venues [20]; and community-based safe-motherhood [21, 22]. In addition, efforts have been made to improve the prevention and treatment of malaria [23-29], sexually transmitted diseases through syphilis screening [30] and PTMCT [31-33], as well as maternal and newborn infections following delivery through the promotion of clean delivery kits [34]. MNCH and general health system strengthening received less media attention and donor investment than vertical program and campaigns [35]. The integration of previously vertical program interventions into the MNCH umbrella has been the start of a paradigm shift in thinking about service provision from a piecemeal approach towards a continuum of care [36]. The formation of the Partnership for Maternal, Newborn and Child Health in 2005[37], and the integrated national plans by Tanzania (One Plan) are derivatives of this change in thinking [38].

The concept of 'continuum' has been described in terms of two dimensions 1) the time dimension—continuity of care over time from pre-pregnancy through antenatal, intra- and postpartum periods for women, and care for children from the newborn period through adolescence; and 2) the place dimension—integrated service delivery provided by communities to first level and referral health facilities [39, 40]. The time dimension involves building on the care provided in the preceding time period and planning for future care, ensuring a seamless experience for each client. For example, family planning services in the pre-pregnant state contributes to a wanted pregnancy at the right time; in the antenatal period, it primes the woman and her family through counselling to the dangers of short birth intervals and benefits of spacing and availability of modern contraceptive choices; during delivery and postpartum care, continue the counseling process and if appropriate, provide the contraceptive of choice. The place dimension involves connecting the home and community, with the first level facility, and a referral linkage to the appropriate higher-level facility, ensuring quality care at the right place and links to the next level of care when needed. As an example, an effective postpartum care package in the Tanzanian setting may involve community based visits for counseling by CHWs, provision of basic services like family planning at the nearest health facility and referral to a hospital for treatment of complications.

In literature, the benefits of a well-functioning continuum have included an increase in client and provider satisfaction [2] and increased efficiency in limited resource settings [41]. Integrated provision of services have been shown to improve coverage and quality [42] if introduced in a phased manner [43]. A review of integrated packages found that interventions for neonatal health were largely bundled out of convenience or funding

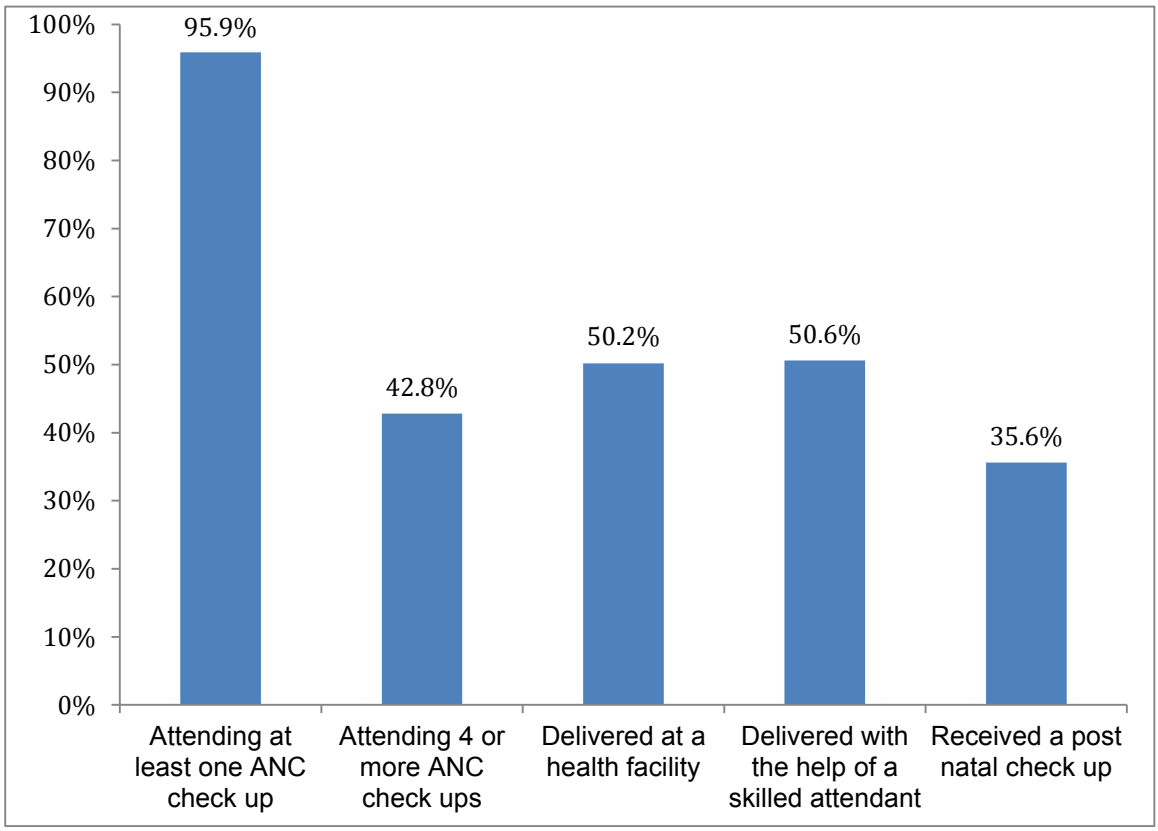
requirements, rather than based on anticipated synergistic effects, like service delivery mode or cost-effectiveness. Packaging of neonatal care interventions have rarely conformed to recommendations set forth in evidence based literature for using common points of service delivery, time periods of intervention and synergistic combinations of interventions [44]. Although a lot of the literature on continuum has focused on child survival [3, 45], an effective continuum is especially important for maternal health, since timely linkage to referral care is necessary to reduce maternal deaths [8].

The MNCH continuum of care provides a framework for the bundling of evidence-based interventions into one package that spans the time and place dimensions of health care delivery (Figure 1). These interventions already exist in the health system in many low and middle income countries but are planned and provided in a fragmented manner [46]. Monitoring progress for MNCH services has been primarily through indicators of coverage or utilization of single interventions, until recently and has not explored the integrated provision of interventions in a care continuum. The concept of 'co-coverage' was put forth by Victoria et al to assess "*which individuals benefit from existing services and how interventions or services are clustered within a setting or a given delivery channel*"[47]. It has not been easy to extend the 'co-coverage' to the distribution of services where timing of interventions is key.

Over 95% of pregnant women in Tanzania attend at least one antenatal visit, yet coverage drops for the recommended four visits to deliver the focused ANC (FANC) package, and delivery care (Figure 2) [48]. The biggest drop occurs at the time of PNC with 65% reporting not receiving a checkup [48]. The postnatal period is key in that it is the time

when life-threatening complications in mothers and newborns can be detected and some health promoting behaviors e.g., breast-feeding and contraception can be promoted [49].

Figure 2 - Dropout of women from the Continuum of Care in Tanzania (DHS Tanzania 2010)



Postnatal Care

Care during the postnatal period receives less research attention than antenatal and delivery care in many developing countries [50]. DHS started collecting data on postnatal care in the surveyed countries only from the year 1998[51]. Existing models of PNC originated in developed countries at the beginning of the 20th century in response to the high maternal and neonatal mortality rates of the time and conventionally focused on routine observation and examination of vaginal blood loss, uterine involution, blood

pressure and body temperature. There has been limited guidance for health-care professionals on other postpartum practices, including care for the baby which has conventionally focused on cord care, hygiene and weight monitoring and feeding and/or immunizations, without systematic, comprehensive assessment and care of newborns. According to the World Health Organization (WHO), the postnatal period starts one hour after delivery of the placenta and extends until 42 days post-delivery [52]. Postnatal care aims to reduce mortality and severe morbidities, as well as promote the healthy behaviors for both the mother and newborn. It comprises of a) prevention and early detection and treatment of complications b) provision of advice and services on breastfeeding, birth spacing, immunizations, and maternal nutrition [53]. For the purposes of describing care provision, the postnatal period consists of immediate, early and late periods. The immediate postnatal period refers to the time just after childbirth, during which the risks to the mother of postpartum hemorrhage and other significant morbidity are greatest and covers the first 24 hours from birth. Close supervision by a skilled attendant is required in this period so that any complications can be identified promptly and appropriate intervention or referral is provided. The period from days 2 through 7 are referred to as the early postnatal period and the period from days 8 through 42 as the late postnatal period. Approximately 45% of maternal deaths occur in the immediate postnatal period and another 23% occur on in the early postnatal period [50] and timely postnatal care could reduce some of the mortality and morbidity. Women appear open to some new behaviors, especially for the newborn, and show intentions to follow others, such as birth spacing. Many behaviors, when initiated during the postnatal period, promote the health of both the new mother and baby, and include: early initiation of breastfeeding and

avoidance of prelacteals, feeding of colostrum, exclusive breastfeeding through the first six months of life, extra feeding for small or sick newborns, complementary feeding, normal newborn care (drying, warmth), care for the small baby (nutrition, warmth, kangaroo care), immunizations for the baby (polio, Hepatitis B); birth spacing, LAM, family planning initiation; and hygiene for mother and newborn (cord care, breasts, perineum) (Table 2).

Table 2 - Interventions to be delivered during various phases of the postnatal period

Health promotion means	Day 1 immediate postpartum	Days 2-7	Days 8-42
Timely initiation of breastfeeding	X		
Colostrum	X		
Exclusive breastfeeding	X	X	X
- LAM		X	X
- Sick baby feeding		X	X
Danger signs— Mother & Newborn	X	X	
Hygiene Cord care Eye care	X	X	
Normal newborn care			
-Warmth	X		
- Drying	X		
-Vaccination		X	X
Small babies Kangaroo care	X	X	X
Mother care	X		
-Breast		X	X
-Perineum		X	
-Birth spacing & Family planning		X	X
-Hygiene		X	X
-Violence			X

-Depression		X	X
Nutrition -Vitamin A -Iron folate		 X X	 X X

Barriers to use of postpartum care, include those that are general to health services in low resource settings like costs, transport/distance, lack of decision-making power, lack of availability, perceived poor quality of care, and some that are particular to maternal health like late recognition of the complications/illnesses (Table 3). Traditional seclusion of the mother and newborn is a barrier unique to the postpartum period, vulnerability to evil spirits, perception of being unclean (due to pollution), or need to recuperate. The time period for this seclusion ranges from 7 to 40 days, and is marked by a period of sexual abstinence, although it has been argued that seclusion does not inhibit care seeking [54]. The most important barrier to address is the perception among women and providers that postpartum care is not important. Women, in Cairo, who had recently delivered stated they saw no need for preventive care associated with the postpartum period but would be interested if there were specific objectives like provision of services like iron folate tablets or vaccinations [49]. In other instances, even if they have the need for a service like family planning, they did not make use of postpartum services [55]. Sometimes health providers are themselves not motivated to provide postpartum care and they fail to inform women of postpartum care visits or set up appointments [56]. In a study from Karachi study, about half the women delivered in a facility, but only 17% were counseled to attend postpartum clinics and only 26% of those counseled attended a postpartum care[54].

Table 3 - Barriers and facilitators to postnatal care

Levels	Barrier	Facilitator
Community/ household	Community beliefs and practices about postpartum period, symptom etiology Lack of a perceived need for care Perception of severity of symptoms Decision making power for women Cost of care Access to care	Integrated community health services
Facility	Lack of motivation among providers about postpartum care Limited resources – staffing, facility infrastructure, supplies Poor training of providers	Provision of specific services like iron, vitamin A and contraceptives Provision of preventative and curative newborn care Need for birth certificates and other documentation
Policy	Shortages of nurses/midwives Lack of linkages leading to poor coordination between vertical programs (silos)	Integrated provision of services across the continuum

The perceived need for postpartum care and its subsequent utilization seems to be limited to women suffering from complications perceived as serious like sepsis or vesico-vaginal fistula. In a study from an urban slum in Bangladesh, about three quarters of women sought care for postpartum illnesses despite poverty. The first contact of care was mainly from traditional health care providers with a consultation with a formal medical practitioner sought only if the symptoms persisted. The pattern of care was influenced by the trust in a particular practitioner, cost of care, severity and etiology of the problem [57]. Similar findings were reported from Pakistan, which showed that women's

perception of the seriousness of heavy bleeding and sepsis was the key to adopting appropriate use of skilled care. Women who perceived high fever seriously sought allopathic care earlier than they did for heavy bleeding. The authors reason that the demand for health services does not hinge solely on women's perceptions of the seriousness but also on the type of symptom. Heavy bleeding, though serious, was considered "healthy" and "normal during childbirth" while high fever was "dangerous" [54].

The analysis of DHS data from 39 countries has shown that women belonging to a household with higher wealth status and having received antenatal care, education, urban residence, and media exposure are more likely to receive postpartum care [58, 59]. Many studies have focused on care seeking for complications in the postpartum period [59-61] while others have focused on routine preventive care visits [62]. Maternal education, Birth order occupation, antenatal care usage, presence of pregnancy complications and access to health facilities have been the most common factors shown to determine use of Postnatal Care [60-62]. Recently, studies from other settings have examined the influence of contextual effects on the utilization of maternal health services in general [63-65]. Contextual effects research has typically looked at demographic makeup of residents, the availability of health services, distance. Community characteristics with a positive influence peer usage of services [63], high living standards [66], perception of good quality of health services [67] and the presence of community health worker [64]. Negative effects have been associated with difficult access [64] and high fertility in the community [63]. The effect of contextual factors is seen on various aspects of the care continuum including antenatal care [68], delivery care [63, 65, 67-69], contraceptive

usage [68, 70] and other reproductive outcomes [68, 69]. To the best of our knowledge, there are no studies looking at postnatal care using a multilevel analysis.

Postpartum Family Planning

Family planning (FP) is important throughout an individual's and couple's reproductive life, and postpartum family planning (PPFP) focuses on the prevention of unintended and closely spaced pregnancies through the first 12 months following childbirth. Postpartum family planning refers to initiation and use of family planning methods during the first year after giving birth. Figure 1 identifies the points of contact within the care continuum that can provide opportunities to integrate PPFP with maternal, newborn and child health (MNCH) interventions. A comprehensive PPFP intervention entails continuity of care for the woman and her baby at many points of contact in the health system over a relatively long time horizon (i.e. from the antenatal period to 12 months after birth). The "extended postpartum period" includes a 12-month interval following the birth of a child [55] and is a complex period, during which a woman has to care for her newborn child as well as cope with a series of emotional and physical changes and often extreme tiredness [71]. Contraception may be critical for women in postpartum period to prevent unintended pregnancy and reduce the lifetime risk of maternal mortality by safe birth intervals [72, 73]. Birth to pregnancy intervals of less than six months are associated with 150% increased risk of maternal death, about 70% elevated risk of third trimester bleeding, 70% increase of premature rupture of membranes, and 30% increased risk of postpartum endometritis in the next pregnancy [73]. Pre-eclampsia and high blood pressure are significantly more likely for women with preceding birth to pregnancy intervals of less than six months or more than 75 months compared to those with intervals of 27-50

months, while premature rupture of membranes is significantly more likely following inter-pregnancy intervals of 6-14 months [74]. Similar, beneficial effects are found on newborn mortality [75, 76] and development of new HIV infections [77]. WHO advocates an interval at least 24 months before attempting the next pregnancy in order to reduce the risk of adverse maternal, perinatal, and infant outcomes [78]. Ensuring provision of all elements of care from antenatal services, including PMTCT, delivery, and postpartum care, increases the likelihood of effectively meeting women's health and fertility intentions [79]. According to DHS surveys in 27 countries, two-thirds who are within one year of their last birth have an unmet need for contraception have an unmet need for contraception [80]. Lack of access to family planning products and services increases women's risk of suffering the negative consequences of unwanted and unintended pregnancies, including maternal and neonatal morbidity and mortality. Thus, ensuring equitable access to family planning services across the continuum fulfills the principles espoused at ICPD by extending reproductive rights to the most vulnerable members of society.

PPFP programs and interventions (Table 4) are designed to reach women at one or more specific contacts with the health system for information and services, including: 1) ANC, 2) labor and delivery including pre-discharge, 3) PNC and 4) immunization and child health care visits [81]. Family planning services have been the focus of many attempts at integration into the continuum of MNCH services, with many programs attempting to integrate them into services during the postnatal period (Table 5) [81-86]. A systematic review by USAID on the integrated delivery of family planning with postpartum care was inconclusive on the effects. The study found that 4 studies found no effect of the

intervention on contraceptive use while 5 studies reported positive results. In low resource settings, there is demand from women for family planning services during the provision of key MNCH services and this integration of family planning services results in increased client satisfaction [87-89]. However, integrating reproductive health services within existing MNCH services can be difficult due to a lack of resources, poor management, supervision, and training, and poor supplies, and management guidelines [90, 91]. A Postpartum Systematic Screening program resulted in increased knowledge of contraceptives among clients and increased the exposure of clients to FP services. Providers also showed greater motivation for the provision of FP services along with immunization and other child services [89].

Though literature talks of the need for a continuum of care, few have quantified the dropout from the continuum or identified factors influencing the dropout. To our knowledge, few studies have assessed the effectiveness of providing family planning services at different stages of the care continuum. Our study seeks to fill this gap in evidence and provide directions for further inquiry.

Table 4 - PPFP strategies for points of contact along continuum of care

Stage	Pregnancy	Labor and delivery, Pre-discharge (0–48 hours)	Postnatal care (48 hours–6 weeks)	Infant care (4–6 weeks through 12 months)
Overall program goal	Pregnant women discuss reproductive intentions for spacing or limiting and choose a PPFP method during ANC.	Postpartum women who choose a method during ANC or at time of delivery receive high-quality PPFP services prior to discharge. Postpartum women are counseled about EBF and LAM prior to discharge and begin breastfeeding immediately.	Postpartum women have initiated immediate breastfeeding and are exclusively breastfeeding and practising LAM. Postpartum women who are not exclusively breastfeeding or non-breastfeeding are using a modern contraceptive method by/before 6 weeks postpartum to avoid a closely spaced pregnancy (pregnancy can occur as soon as 45 days after birth if not exclusively breastfeeding).	Postpartum women begin using a modern contraceptive within the first year following birth. Postpartum women are exclusively breastfeeding and practicing LAM until the infant is 6 months old, then transitioning to another modern contraceptive method (if not already using another method by 6 months).
Illustrative program strategies	Strengthen awareness of and demand for PPFP during the ANC period Strengthen continuity of care linkages and referrals between facility and community and ANC and birthing services Improve the enabling environment for PPFP as a routine part of ANC services	Effective linkages and protocols are in place to support FP counseling and referrals of maternity clients for PPFP information and services and continuity of care Infrastructure of maternity SDPs is adequate for providing high-quality PPFP services High-quality PPFP information, counseling and services, including PPIUDs	Home-based maternal and newborn care is provided to postpartum women by midwives and other health-care providers, including CHWs SDPs provide PNC including PPFP information, counseling and services	

		and PPTOs, are provided at maternity SDPs by competent, confident and committed providers EBF and LAM counseling are routine components of pre-discharge counselling		
Program outcomes	Number/percentage of ANC clients who have received information and counselling regarding PPFP and EBF Number/percentage of ANC clients who have chosen a PPFP method and have it marked on their ANC card/client card	Proportion of women who select a method during ANC and who request and receive desired method prior to discharge Proportion of maternity clients who request a method during early labor or pre-discharge counselling and receive their desired method before leaving the facility Proportion of women who intend to exclusively breastfeed who begin to breastfeed prior to discharge and practice LAM after discharge	Number and proportion of postpartum women exclusively breastfeeding and practicing LAM at 6 weeks postpartum Number and proportion of postpartum women who are not exclusively breastfeeding or non-breastfeeding who are using a modern contraceptive method by 6 weeks postpartum Number and proportion of women referred for and using contraception by 6 weeks postpartum.	Number and percentage of postpartum women attending child health/immunization visits that initiate using a modern contraceptive method within the first year following a birth (this includes practicing LAM for up to 6 months and transitioning from LAM to another modern method by/before 6 months)

Table 5 - List of studies promoting PPFP along the MNCH care continuum

Setting	Stages along care continuum	Strategy	Results
Healthy Fertility Study[87] Country: Bangladesh Date: 2007–2012	Antenatal and postpartum periods	System and capacity building of service providers, including the referral system Community-based advocacy and behavior change communication at the household, community and facility levels Basic package of MNCH information and services through CHWs during antenatal and postpartum periods. Intervention group received additional FP information and community based services during counselling visits.	Contraceptive method use approximately 2.5 times higher in the intervention arm than in the control arm at 24 months postpartum. Incidence of a subsequent pregnancy up to 24 months after a live birth was significantly lower No adverse effect on MNH
Measurement, Learning & Evaluation (MLE) project Country: Senegal Date: 2011	Labor and delivery/predischarge Child health/immunizations	Routine health services in urban area	Knowledge of integrated services is high but only a few reported receiving FP services among exit interview clients Women who received FP information at the time of delivery more likely to be using modern FP postpartum than those who did not receive such information. Exposure to FP services at an immunization visit was not significantly related to postpartum FP use
FRONTIERS [92] Country: Egypt Date: 2005–2011	Antenatal and postpartum periods	Clinic and community-based behavior Communication change (BCC) and service delivery models. 'Health services' model communicated birth spacing and PPFP messages to	Both models proved effective in changing knowledge and attitudes towards HTSP and in enhancing use of PPFP at 10– 11 months postpartum and were associated with increased use

		women via health workers during their prenatal and postpartum care visits. Community awareness' model, in addition, also involved an awareness-raising component that targeted men.	of services,
PASMO Women's Health Project [93] Country: El Salvador Date: 2009–present	Antenatal care and labor and delivery/predischarge	Increase in the number of providers and facilities that perform post-obstetric IUD insertions Improve the quality of FP consultations conducted during pregnancy	Increased number of IUD insertions Incorporation of IUD insertion into medical curriculum
PPIUD program[94] Country: India Date: 2007–present	Antenatal care and labor and delivery/predischarge	Introduced alternative training approach that uses competency-based training, anatomical models, service delivery performance standards and technical support for strengthening interval IUD services in India Set up of clinical training sites and training a team of four providers at each facility to provide PPFP/PPIUD services On-site orientation of the entire obstetrics and gynecology department and facility management to provide a supportive environment; Provision of instruments and IEC materials; Deployment of dedicated counselors to provide routine counselling and referral for PPFP at ANC clinics and follow up of PPIUD clients	Successfully expanded the method mix and the service delivery timing of FP options available IUD adoption rate more than 10% 99.6% reported that they were satisfied with IUCD at the time of insertion and 92% reported satisfaction at the six-week follow-up visit

Population council [95] Country: India Date: 2007–2011	Antenatal period	Key intervention components included the reorientation of community workers Provision of counselling aids to community workers Provision of IEC materials to women and their household	Significant increase in knowledge of spacing 4 months postpartum and use of modern contraceptives for spacing at 9 months postpartum Increased spousal communication
Integra Initiative [96-98] Countries: Kenya and Swaziland Dates: 2008–2013	Postpartum care	Strengthening provider skills to offer both HIV counseling and testing and PPFP services through a mentorship approach. Used Balanced Counselling Strategy Plus toolkit as job aid	Statistically significant increase in proportion of observations where providers discussed return to sexual activity, return to fertility, HTSP, and the benefits of spacing
EPI – FP integration[81] Country: Mali Date: 2009–present	Child health/immunizations	Integrated FP counselling and service delivery efforts with routine child immunization events Provided thirty-minute group presentations followed by individual counselling session	Increase in providers trained in counseling Prices of long acting contraceptives reduced
EPI – FP integration [99] Country: Togo Date: 199	Child health/immunizations	FP messages provided during immunization session	Increase in monthly FP clients by 54% and awareness of availability of FP programs by 18%
SFH/PSI LARC program[100] Country: Zambia Date: 2008–present	Labor and delivery/predischarge	Attaching LARC services to existing, high-volume public health center Introduced Contraceptive implants and IUDs to program sites Included training and placing SFH midwives as dedicated LARC providers at high-volume facilities	Increase in providers trained in LARC Increased use of LARCs
Population council program[81] Country: Zambia	Postpartum care	Developed Integrated Postnatal Care Guidelines Development and adaptation of guidelines	More providers in intervention sites used the Balanced Counselling Strategy Plus (BCS+) toolkit

Date: 2011–2012		and protocols; Organizational change and role clarification with all staff in intervention sites; Ensuring availability of equipment, supplies and materials; Strengthening data collection, recording systems and referral system	Increased knowledge of FP commodities, STIs, and danger signs during the early postpartum period and for the newborn

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Methods

The research findings presented as part of this dissertation relate to the baseline household survey of the Morogoro Evaluation Project (MEP) in the land-locked Morogoro Region, located in eastern Tanzania. We present a brief overview of the situation in Tanzania and Morogoro, background of the integrated PMTCT facility/ Community Program, the Morogoro Evaluation Project evaluating the above-mentioned program, the design of the baseline Household survey conducted as part of the MEP, and analysis of the data from survey to address our research aims.

Situation in Tanzania

The United Republic of Tanzania's largely rural population of approximately 43 million people has a life expectancy of 51 years, according to the 2002 census.[1] The East African country is the largest in the region and borders Kenya, Uganda, Rwanda, Burundi, the Democratic Republic of Congo, Zambia, Malawi, and Mozambique. Tanzania, much like its neighboring countries, has a high maternal mortality ratio (454 per 100,000 live births) [1]. While recent cause specific estimates of maternal mortality are not available, estimates from a 2000 study in Morogoro Region, Tanzania found that in contrast to global trends, the leading cause of mortality were puerperal sepsis (35%) and postpartum hemorrhage (17%) [2]. Underpinning high maternal mortality is moderate to low rates of skilled attendance (including physician, clinical officer, assistant clinical officer, nurse/midwife, or MCH aide) at birth (51%; urban 83% and rural 42.3%) and 3.4 % of births had no skilled or unskilled assistance [1]. Skilled attendance may have been either at a health facility or outside of a facility. Health facility births accounted for 50.2% of

live births, with the public sector accounting for 41% of all deliveries. Barriers to accessing health care reported by Tanzanian women in the 2010 DHS were lack of money (24 %), distance to a health facility (19 %), not wanting to go to a health facility alone (11 %), and obtaining permission from partners or other family members (2 %). Tanzania's HIV prevalence is 6 % among adults age 15-49 years. Tanzania has a total fertility rate (TFR) of 5.4 children per woman, with half of women giving birth for the first time by age 20. The % of women receiving antenatal care from a skilled provider at least once in the five years preceding the 2010 Tanzania Demographic and Health Survey (TDHS) is high, at 96 %. However, only 43 % of women receiving ANC obtained it the recommended four times. The proportion of women receiving postnatal care is lower, with 65 % of women having no postnatal checkup (excluded pre-discharge care).

Study setting - Morogoro

Morogoro Regions sits between Dar es Salaam and Dodoma in Eastern Tanzania (Figure 3). With a population of 2.2 million and a population density of 31 inhabitants per square kilometer, the Region is among Tanzania's largest and yet least densely populated regions (Figure 4) [3]. According to a 2002 census Morogoro Region – like most of other regions in Tanzania – has more people living in rural areas (73%) than in urban areas (27%). In terms of household size, Morogoro Region is similar to national averages with 4.4 persons per household, slightly smaller than the national average of 4.9 [3]. A comparison of selected indicators in Morogoro Region and in Tanzania is given below (Table 6). More women in Morogoro Region than in Tanzania overall deliver in a health facility, and the percentage of currently married women in Morogoro using any modern method of contraception is over ten percentage points more than in Tanzania overall,

Morogoro Region has the lowest percentage of women with at least one problem accessing health care out of all the regions in mainland Tanzania, and women in Morogoro are slightly more involved in decision-making about their own health care than women in Tanzania overall. However, the percentage of women age 15-49 ever tested for HIV and those who know where to get an HIV test are lower in Morogoro Region than in Tanzania overall. Additionally, the neonatal, infant, and under-five mortality rates are all higher in Morogoro Region than in Tanzania overall, according to the 2005 TDHS.

Figure 3 - Morogoro region in Tanzania

Figure 4 - Map of Morogoro region

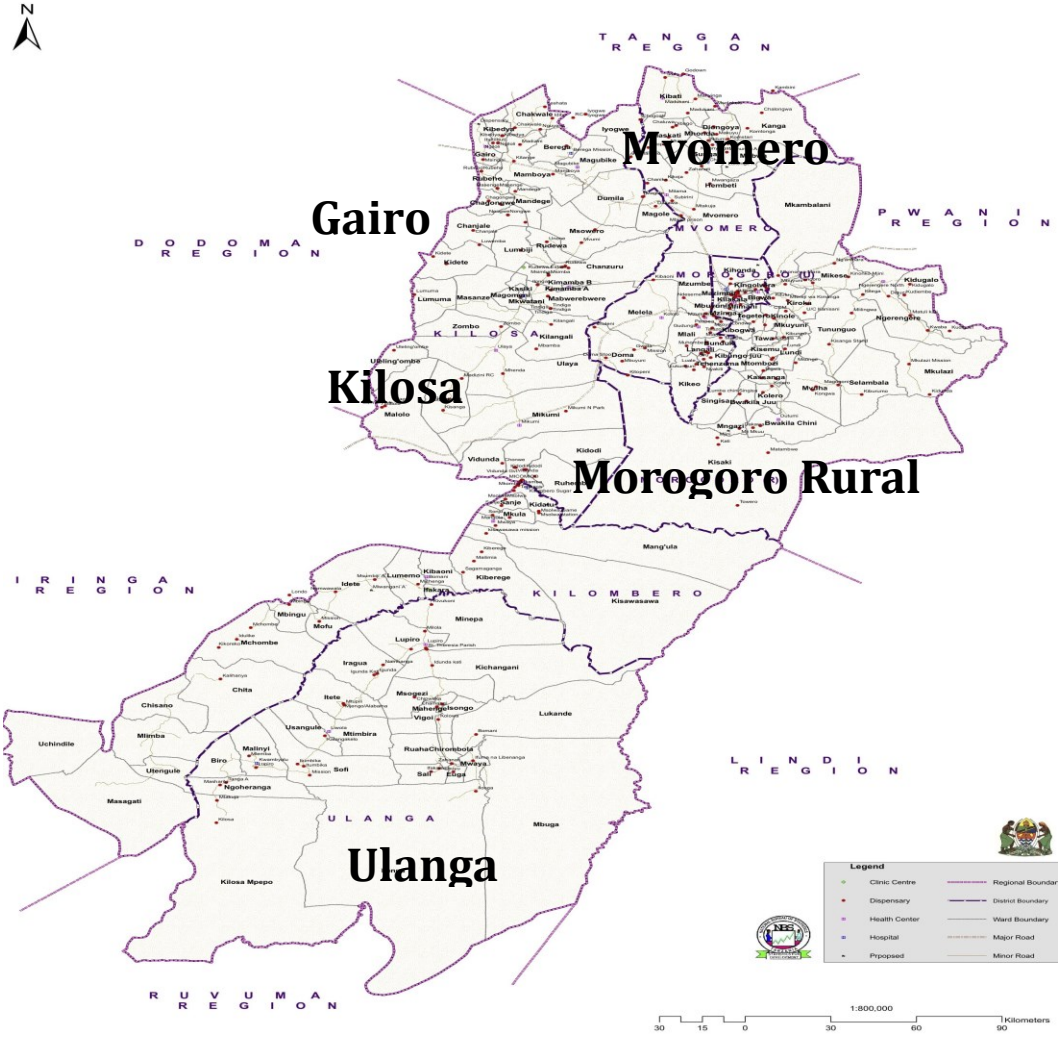


Table 6 - Key MNCH Indicators for Morogoro Region and Tanzania

Indicator	Morogoro Region	Tanzania (national average)
Current use of any modern method of contraception by currently married women age 15-49 (%) (2010)	39.9	27.4
Percentage delivered in a health facility (2010)	58	50.2
Percentage of women age 15-49 giving birth in the five years preceding the survey having no postnatal checkup (2010)	64.6	64.6
Percentage of women age 15-49 who reported at least one problem accessing health care (2010)	23	35.5

Percentage of women age 15-49 ever tested for HIV (2010)	52.6	59.1
Percentage of women age 15-49 who know where to get an HIV test (2010)	91.3	92.4
Percentage of currently married women age 15-49 who make decisions about their own health care (2010)	63.6	60.3
Neonatal mortality rate (2005*)	55.4	33.8
Infant mortality rate (2005*)	95.5	82.5
Under-five mortality rate (2005*)	138.2	132.2
*Rates not available for 2010 in Morogoro Region, so 2005 numbers are used for Morogoro Region and Tanzania for neonatal mortality, infant mortality, and under-five mortality rates. Sources: Macro International I. MEASURE DHS STAT compiler. www.measuredhs.com. Accessed 04/01/2015		

Integrated Facility/Community PMTCT program

In accordance with the National Road Map Strategic Plan to Accelerate Reduction of Maternal, Newborn and Child Deaths in Tanzania (2008-2015), the Integrated Facility/Community PMTCT program was implemented in Morogoro by the MoHSW with support from Jhpiego. Since October 2008, the program has completed a number of activities including program planning and establishment, baseline assessments (facility and community) and dissemination of results, and participation in a number of stakeholder meetings related to program implementation. The MoHSW and Jhpiego identified postpartum care as a critical gap in MNCH service provision, specifically in the areas of follow-up with HIV-positive mothers and exposed infants, pre-discharge counseling, family planning (FP) counseling, knowledge about modern FP methods among community members, and community knowledge on postnatal care (PNC). Building on an established Prevention of Maternal-to-Child Transmission (PMTCT) platform,5 the MoHSW and Jhpiego developed an Integrated Facility and Community

PMTCT program that is in line with the national strategy to reduce maternal, newborn, and child mortality between 2008 and 2015 (One Plan).

Program Strategy and Key Activities

The proposed model for integrated care included the services, along with strengthened linkages between the community and the facility level services (Table 7). The strategy is to ensure that HIV-positive pregnant women are linked into comprehensive MNCH services through an integrated community/facility approach, implemented through community health workers (CHWs) and facility-based providers with the following key activities:

- Capacity building at selected health facilities, including district hospitals and health centers
- Development of a community-based program focused on MNCH and led by CHWs
- Utilization of mobile technology to support service delivery (pending MoHSW approval)

This program is being implemented initially in selected health centers and catchment areas of those health centers in the Morogoro Region of Tanzania (table 3).

Table 7 - Key activities for the Integrated PMTCT Facility/Community Program

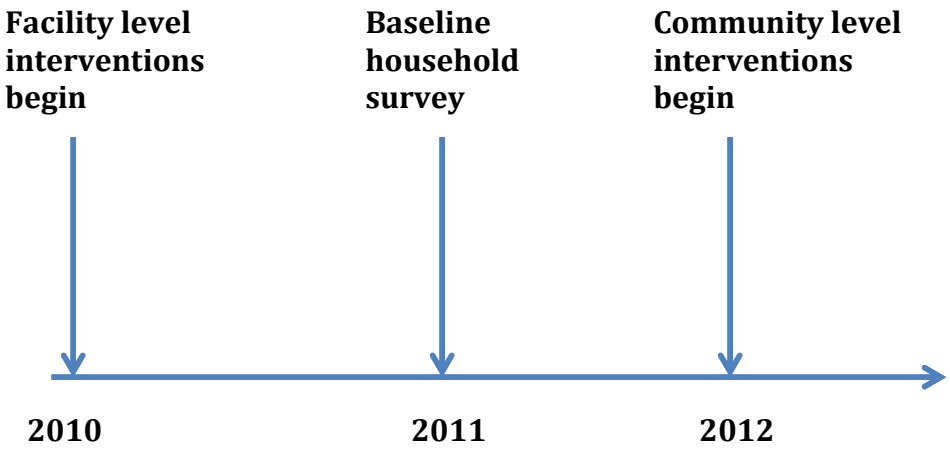
MCH continuum	4 Prongs of PMTCT	Community Level Integration		Facility Level Integration	
		MCH aspects	**HIV/AIDS aspects**	**MCH aspects**	**HIV/AIDS aspects**
Prior to Pregnancy	**Primary Prevention** **Family Planning**	Integrate MCH and HIV/AIDS Community activities focused on the individual		Integrate MCH and HIV/AIDS activities for men and women of reproductive age	
		• Behavior change focused on preventing unwanted pregnancy • Delay of first pregnancy • Community-based FP services, referrals • Antenatal care information (to promote early ANC attendance if pregnant)	• Integrated behavior change focused on preventing HIV infection, prevention of other STIs • Delay sexual debut • Dual protection, distribution of condoms • Provision of CT services / referrals • Stigma reduction	• Behavior change focused on preventing unwanted pregnancy • Delay of first pregnancy • Clinical FP services • Antenatal care information (to promote early ANC attendance if pregnant)	• Integrated behavior change focused on preventing HIV infection • Integration / strengthening of MCH messages into other CT entry points: FP and dual protection, importance of early ANC, etc.
During Pregnancy and Delivery	**PMTCT** **Primary Prevention (for HIV-women)** **Family Planning**	Integrate MCH and HIV/AIDS Community Activities		Integrate CTC into ANC and L&D	
		• Encouragement of early ANC • Follow-up of mothers in ANC, support to complete FANC schedule • Birth preparedness and complication readiness planning	• Follow-up ANC attendants Untested: encourage to accept testing Uninfected: support primary prevention Infected: psycho-social support; support entry into CTC; support ART or prophylaxis ARV	• Quality, integrated FANC Antenatal nutrition Malaria in pregnancy PMTCT HIV prevention (including	• Routine HIV testing • ANC labs to include CD4 for HIV+ women • TB screening for HIV+ women • Initiation and management of ART where indicated, by

	(decisions about PP FP) **Care and Treatment**	• Encouragement to deliver with a skilled attendant • Facilitate early decision-making for postpartum (infant feeding, postpartum FP, etc.)	regimen; support ART or ARV regimen post-partum; support good infant feeding practices	prevention for positives) Planning for infant feeding Planning for postpartum family planning • High quality delivery care to minimize pregnancy related deaths	ANC staff • Administration of ARV prophylaxis if HAART not indicated, by ANC staff • High quality delivery care to minimize likelihood of transmission of HIV during delivery
Postnatal period	**PMTCT** **Primary Prevention (for HIV-women)** **Postpartum Family Planning** **Care and Treatment**	Integrate MCH and HIV/AIDS Community Activities		Integrate Postnatal and Early Child Services; Integrate CTC into Postnatal/Early Child Visits	
		• Support adherence to postpartum care and early infant care • Support immediate neonatal care, recognize danger signs, facilitate referrals for any emergencies • Support infant feeding	• Support primary prevention for HIV-mothers • Community psychosocial support for HIV+ mothers • Monitoring of HIV exposed infants • Adherence support for those on ART or continuing ARV prophylaxis • Support for OI monitoring and prophylaxis, including cervical cancer screening for HIV+ women	• Integrated postnatal and early child visits ("one-stop-shop")	• Strengthened growth monitoring for HIV-exposed infants • Adherence support (ART or postpartum ARV prophylaxis) • Routine management of ART • OI monitoring and prophylaxis, including TB screening and cervical cancer screening and treatment

Morogoro Evaluation Project

The Morogoro Evaluation Project was set up to evaluate the above package of maternal, newborn and child health interventions being implemented by the Tanzania Ministry of Health and Social Welfare in Morogoro Region. The project was funded by the United States Agency for International Development through the Health Research Challenge for Impact (HRCI) cooperative agreement with Johns Hopkins University. The evaluation is being implemented by Muhimbili University for Health & Allied Sciences (MUHAS) and the Johns Hopkins Bloomberg School of Public Health in collaboration with the Ministry of Health and Social Welfare of the United Republic of Tanzania and Jhpiego/Tanzania.

Figure 5 - Timeline of project activities



Baseline Household survey

The data for the present study comes from the baseline household survey conducted as part of an evaluation project in Morogoro region of Tanzania. The survey was carried out after the facility level activities of the IFC program had been implemented but before the community level package was implemented (Figure 5). The principal objective of the

household survey was to collect baseline data on household characteristics, fertility levels and preferences, awareness and use of family planning methods including LAM, maternal and neonatal health, breastfeeding practices, antenatal care, malaria prevention and treatment, women's status, knowledge and behavior regarding HIV/AIDS, and PMTCT, and satisfaction with health care facilities, care seeking pattern and barriers to care seeking. The survey was carried out by MUHAS with support from JHSPH, Jhpiego and MoHSW.

Sampling

The survey sample was designed to provide estimates for rural areas of the districts of Kilosa, Morogoro District Council, Mvomero and Ulanga in the Morogoro Region of Tanzania.

Power analysis

We performed post-hoc power analysis for our sample size of 1968 women with varying ratio of group sizes (categories of the independent variable). The unadjusted power analysis were derived using the *power* commands in Stata 13. The sample size would have been powered to detect a 10% difference between two groups for some indicators like the proportion of women having a facility delivery or using postnatal care but would not have enough power for indicators with low prevalence like the use of LAPM contraceptives (Table 8).

Table 8 - Power analysis to detect differences in indicators between two groups

Indicator	Values of Indicator		Ratio of number of subjects in groups being compared (n in group 1 / n in group 2)	Power
	Group 1	Group 2		
Facility delivery	60%	70%	1	99.6%

	60%	70%	2	99.0%
	60%	70%	3	97.9%
	60%	70%	4	95.9%
Postnatal care	20%	30%	1	99.9%
	20%	30%	2	99.8%
	20%	30%	3	99.3%
	20%	30%	4	98.3%
LAPM	5%	7%	1	45.6%
	5%	7%	2	39.2%
	5%	7%	3	32.6%
	5%	7%	4	27.5%

A two-stage sampling strategy was employed to select 30 clusters in each of the intervention and comparison arms (Table 9) with about 30 – 35 recently delivered women (RDWs) interviewed per cluster. A RDW was defined as a woman who had a pregnancy outcome within 14 months of the date of interview but not within the last 2 months.

Table 9 - List of Health Center catchment areas used in the sample

Districts	Implementing IFC program	Not implementing IFC program
Kilosa	Gairo Ulaya	Magubike Kimamba Msange Kidodi Kidete
Mvomero	Kibati Mgeta	Melela Mzumbe Mvomero
Morogoro DC	Duthumi Ngerengere Tawa	-
Ulanga	Mtimbira Mwaya	Lupiro
*Gairo has become a separate district from Kilosa in 2012		

First stage

Thirty villages in the intervention area and 30 villages in the comparison areas were chosen in the first stage, through probability proportional to size (PPS) sampling. The population estimates for the villages were based on the 2002 Tanzania census. All villages in the catchment areas of the health centers were listed along with population and distance to the HC. The list of villages was prepared based on the health center catchment data obtained from the health facilities. The discrepancy in the population figures was cross-checked based on the population figures from the 2002 census data. In each Health center catchment areas, the villages were grouped according to the wards that they belonged to with the wards arranged based on closeness to the health centers.

Second stage

For each village selected, a list of the population and households was made based on data from the local government authorities. Villages are usually divided into a number of geographically defined sub-villages (kitongojis). Based on the population estimates of sub-villages, the sub-villages were combined into population units with an approximate size of 1000-1500 individuals. One sub-village unit was chosen in a random manner by lottery for the survey. In each unit, the survey team visited every household to administer a short instrument to identify women who had a pregnancy outcome in the last 2-14 months. An eligible woman was considered as one who gave birth within the past 14 months but not within the previous two months irrespective of outcome. This ensured that the probability of being sampled was equal for all the households in the village. In each household, only one woman was interviewed. If the household had more than 1 eligible woman, only one was selected for interview by random picking of names. After selection,

the selected RDW was interviewed after obtaining written informed consent. If a multiple birth was encountered then details about all of the babies was collected.

Questionnaires

The respondents identified in each household were interviewed using the RDW Questionnaire. The content of the questionnaire was based on the model questionnaires developed by the MEASURE DHS program. The questionnaires were adapted to reflect relevant issues related to the implementation of the Integrated MNCH and PMTCT program. Contributions were solicited from various stakeholders representing the Ministry of Health & Social Welfare, Jhpiego, and USAID. The adapted questionnaires were translated from English into Kiswahili and pretested.

The Household Listing and Eligibility Screening Forms were used to list all the female members who are usual resident? in the selected households. Basic information was collected on the characteristics of each female listed, including age, sex, and the possibility of a pregnancy related outcome in the last two years. The main purpose of the Household Listing Form and the Eligibility Screening Form was to identify women who were eligible for the individual interview.

Once an eligible woman was identified, the RDW Questionnaire (Appendix – A) was used to collect information on the following topics:

1. Background characteristics
2. Birth history
3. Pregnancy, delivery, and postnatal care
4. Newborn care practices
5. Knowledge, attitudes, and behavior related to HIV/AIDS and PMTCT

6. Knowledge and use of Post-partum family planning methods

If the eligible respondent was not present at the time of the interviewer's visit, an appointment was made for the interviewer to return at a later time. The interviewers made two repeat visits (total of 3 visits) to ensure that all identified eligible women were interviewed. If the woman was unavailable to be interviewed for the duration of the interviewer's stay in the village, then she was marked as 'unavailable. All elements of the survey were pretested prior to the survey.

Training of Field Staff

Field staff training took place between 17 July and 30 July 2011. A total of 13 interviewers were trained. The supervisors were selected based on the field performance during initial work. The Supervisors and a field editor were given specialized training to enable them to perform their duties. MUHAS investigators, supported by JHSPH facilitated the training. The training was conducted following the DHS training procedures, including classroom presentations, mock interviews, field practice, and tests. The interviewers were also trained on the ethical aspects of conducting surveys, and other operational aspects. Towards the end of the training, the teams conducted practice fieldwork in Kimara and Mbezi wards in Kibaha district, Pwani region.

Fieldwork

The data collection plan was drafted for the selected clusters in consultation between MUHAS and JHSPH collaborators. Data collection began on 4 august 2011 and was completed on 31 October 2011. Data was collected by 3 teams - each team consisting of four interviewers, a supervisor, and a driver. A field editor reviewed questionnaires from

all the teams using a checklist for completeness, quality, and consistency at the end of each day before the team's departure from the cluster. The field editor and team supervisor held daily briefings with team members to discuss and correct the common errors in data collection. Any errors that could be fixed by visiting the respondent was fixed by means of a return visit. Fieldwork supervision was also coordinated at MUHAS and at the project office in Morogoro. The investigators from MUHAS and JHSPH periodically visited teams to review their work and monitor data quality.

Data Processing and Quality Assurance

The questionnaires completed for each cluster were transported to the Morogoro field office in a secure package along with the Field Coordinator. Each completed questionnaire had a unique ID, consisting of cluster code, interviewer code, household code and RDW line number. These were then individually logged into a tally sheet. A copy of this tally sheet was transported to Dar along with the completed questionnaire. The office managers in the Morogoro and Dar office signed and verified the dispatch and receipt of questionnaires, respectively. Data entry screens were created in FoxPro and eight (8) entry operators were trained for double entry of each completed questionnaire. The data entry team, based at MUHAS created and maintained an editing error log sheet, and a master code list. The completed questionnaires for each cluster, once entered, were stored in secure place.

Research aims

Aim 1

The first aim examines the dropout of women from the continuum of care in Morogoro region.

a) To assess the extent of dropout of women from the maternal care continuum

b) To determine the factors associated with the dropout when moving from one stage of the continuum to the next.

Aim 2

The second aim seeks to understand the differences in the characteristics of the individuals and their communities who use postnatal care and its content.

a) To determine factors associated with the use of postnatal care in rural Morogoro, Tanzania by assessing the community and individual level factors

b) To examine the variation in the delivery of services as part of postnatal care

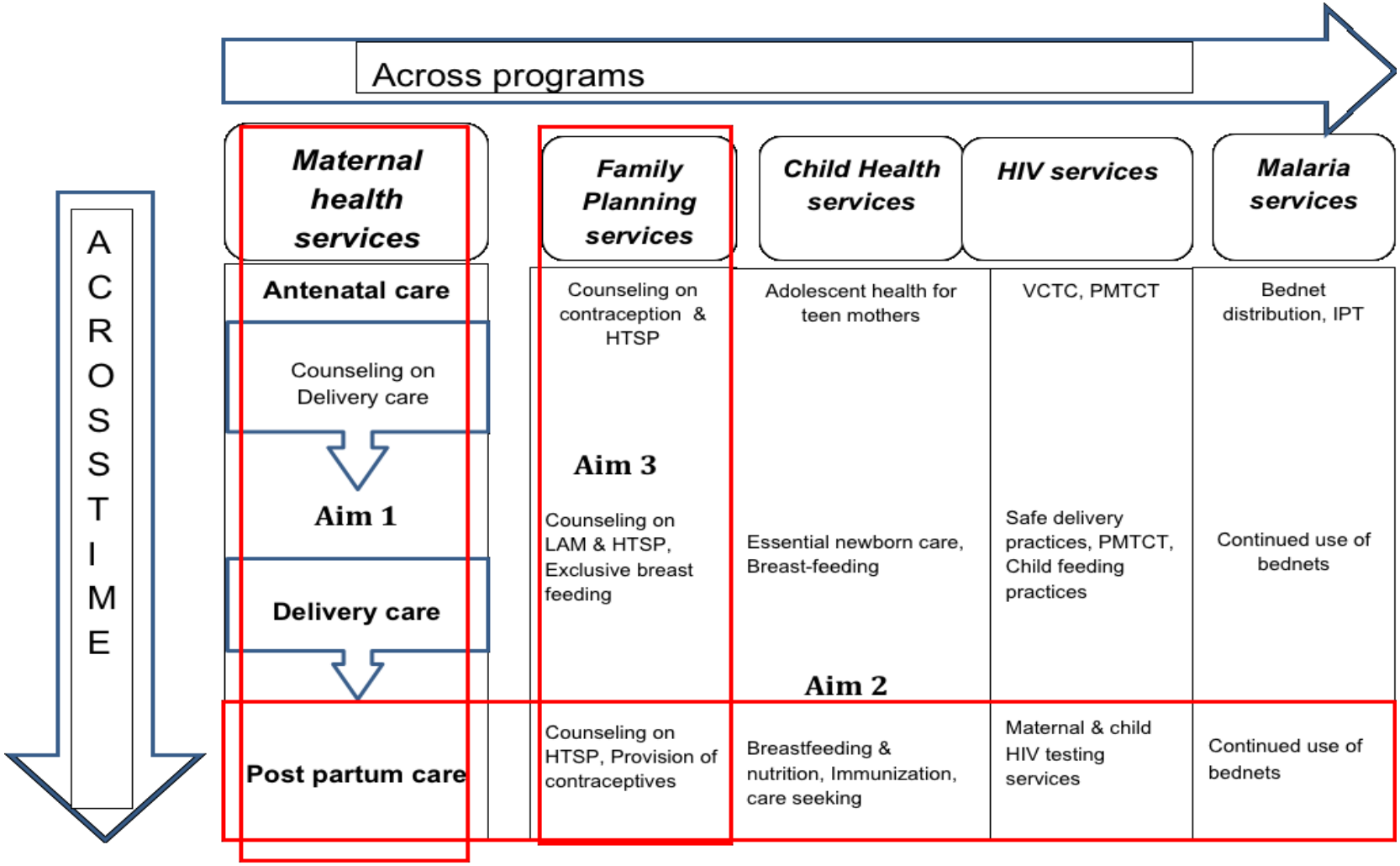
Aim 3

The third aim is to assess the effectiveness of receiving FP counseling at different points of contact (antenatal, delivery and postnatal care) in the care continuum on the knowledge of birth spacing and usage of modern methods of PPFP.

a) To assess the receipt of family planning counseling along the different stages of the care continuum antenatal, delivery and postnatal care

b) To assess the association of receipt of FP counseling on the adoption of modern methods of family planning in particular, long acting permanent methods of contraception (LAPM).

Figure 6 - Research Aims framework



Analysis

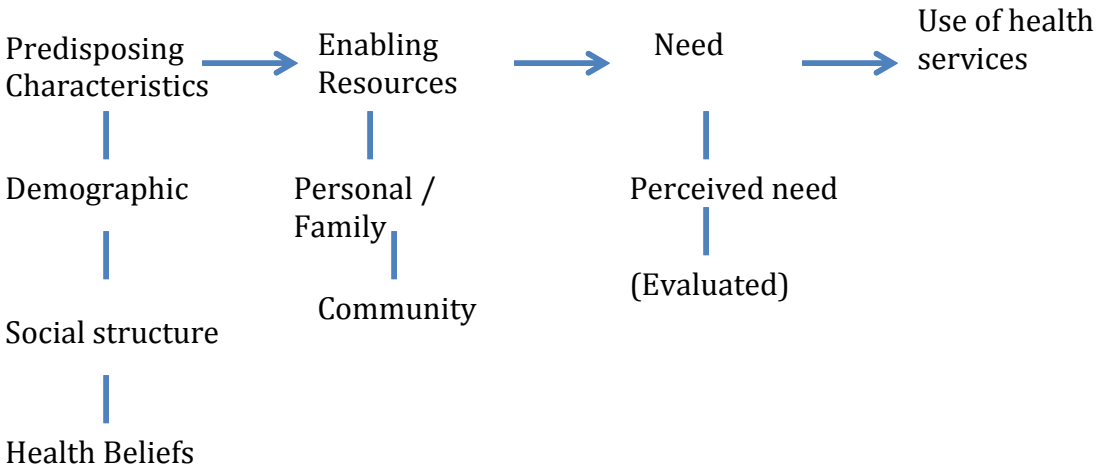
The analysis for the individual aims will be informed by the conceptual framework put for by Andersen for healthcare use (Aim 1 & 2) and the behavioral change evaluation model from MEASURE (Aim 3).

Conceptual frameworks

Andersen healthcare seeking model

The health care-seeking behavior model (Figure 8) was developed by Anderson to explain an individual's use of health care services [4]. This model proposed that the use of health care services is a function of three sets of characteristics - predisposing characteristics, enabling characteristics, and need characteristics. The predisposing characteristics considered in this analysis included demographic factors (age, parity, marital status), and socio-economic factors (education, wealth class, community poverty). The enabling factors included barriers to access (distance to facilities, cost of services) and interaction with health system (prior interactions, community outreach activities). The need characteristics included perceived susceptibility & seriousness (complications during antenatal, delivery & postnatal period, and mode of delivery) and need for services (e.g., contraception). Independent variables included demographic variables such as woman's age, birth order, education, marital status, and religion. The original framework is shown in Figure 8 and the framework has been adapted to model the effect of the independent variables on the outcome variables for manuscripts 1 & 2.

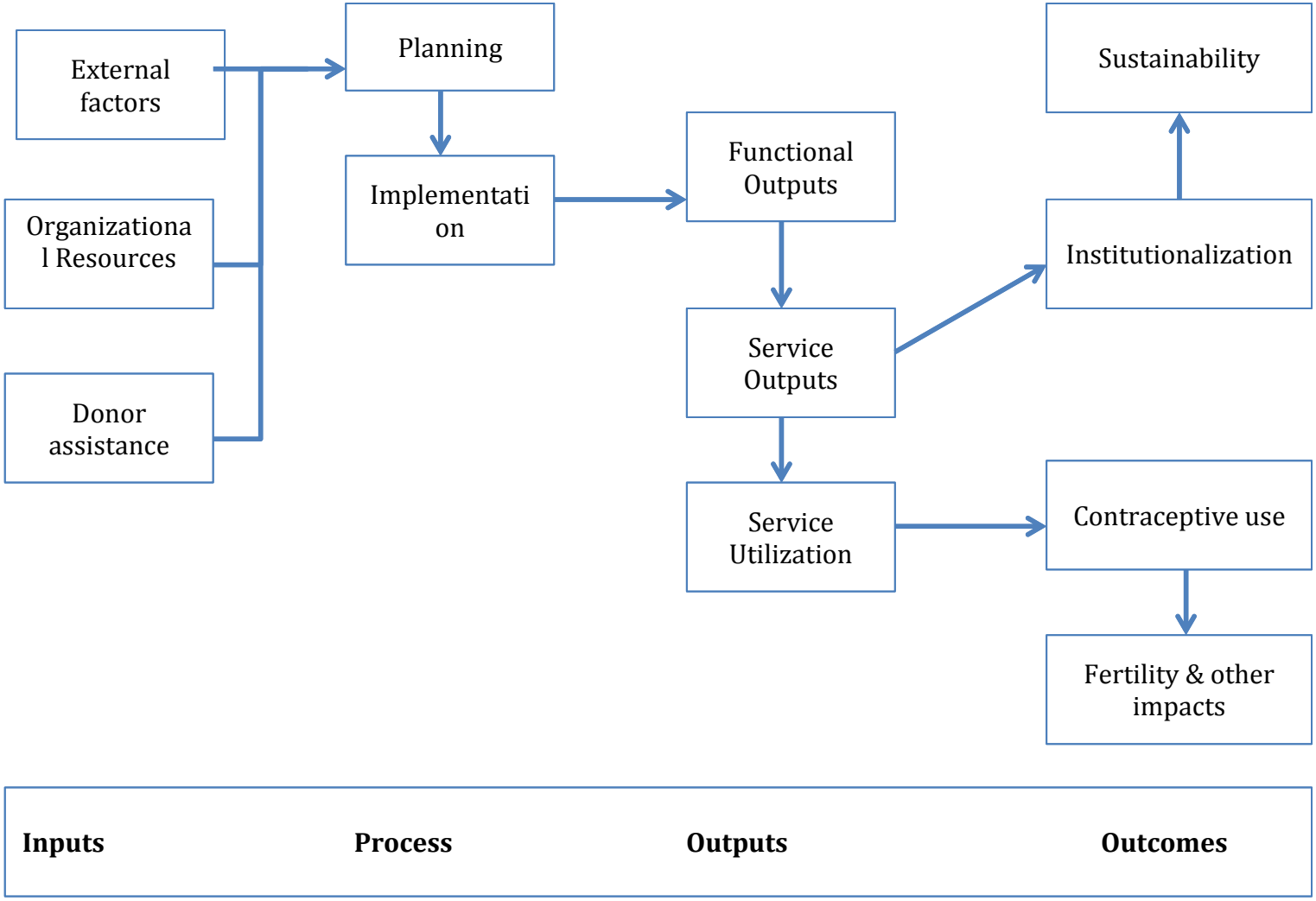
Figure 8 - Andersen model of health care seeking



Family planning evaluation framework

The MEASURE Evaluation Population and Reproductive Health (PRH) funded by the U.S. Agency for International Development (USAID) proposed a framework for evaluating the effects of family planning interventions [5]. The original framework is shown in Figure 9 and the framework has been adapted to model the effects of the integration of FP counseling along the care continuum on the knowledge and adoption of modern methods of contraception in Morogoro region of Tanzania (Manuscript 3).

Figure 9 - Measure framework for evaluating family planning interventions



Variables

The outcome variables used in the analysis of the research aims are detailed in Table 10 and the independent variables are listed in Table 11.

Table 10 – Outcome variables used in the analysis

Variable	Description of variable	Categories
Manuscript 1		
Received 4 or more antenatal visits	Women receiving 4 or more ANC visits	Respondents who received at least one ANC visit
Received antenatal and delivery care	Women receiving delivery care at a health facility	Respondents who received at least one ANC visit
Received antenatal, delivery and postnatal care	Women receiving postnatal care at a health facility	Respondents who received at least one ANC visit and delivery care at a health facility
Manuscript 2		
Received postnatal care at a health facility	Respondents who received postnatal care at health facility from health professional within 6 weeks of delivery	All respondents in the survey
Manuscript 3		
Knowledge of pregnancy spacing	Respondents who report correctly the optimal duration in between pregnancies as 24-60 months	All respondents in the survey
Knowledge of modern method of family planning	Respondents who report correctly at least one modern method* of family planning	All respondents in the survey
Usage of modern method of family	Respondents who report using at least one modern method of	All respondents in the survey

planning	family planning at the time of survey	
Usage of LAPM of family planning	Respondents who report using a Long and Permanent Method** (LAPM) of family planning at the time of survey	All respondents in the survey
*Modern method of family planning includes male and female sterilization, intra-uterine devices (IUD), injectables, intra-dermal implants, pills, male and female condoms, diaphragm, jelly and Lactational Amenorrhea method **LAPM includes male and female sterilization, intra-uterine devices (IUD) and intra-dermal implants		

Table 11 - Independent variables used in the analyses

Name of variable	Description of variable
District	District in which the respondent lives
Distance to any nearest health facility	Distance to nearest Health facility
Peer usage of maternal health services	Proportion in the community using ANC, delivery care minus the index case Divided into tertiles of low, middle and high
Asset index	Household score based on index of assets and dwelling characteristics (type of fuel and toilet; source of lighting; source and time-distance to water; land ownership; possession of sewing machine, clock/watch, kerosene lamp, gold jewelry, pressure cooker, radio, television, bicycle, motorbike, electricity generator, car, tractor, chickens, sheep, cows, goats, horses, donkeys, ducks)
Wealth quintile	Wealth quintile that household falls into based on asset index
Community Poverty	Asset scores averaged at the cluster level Divided into tertiles of low, middle and high
Age	Respondent's age in completed years

Education	No of years of education completed
Relationship	Respondent's relationship to head of household: self, spouse, daughter, spouse of son, grandchild, mother, sister, mother-in-law, sister-in-law, cousin, niece, servant/employee, other
Birth order	Birth order of the index pregnancy
Marital status	Respondent's marital status: single, currently married, widowed, divorced/separated
Antenatal Care utilization	No of ante natal care visits made during the index pregnancy
Delivery care utilization	Place of delivery: Home, health facility
Trust in health system	Person whose advice on the matters of pregnancy and maternal issues is most trusted by respondent: health professional, village / community health worker, others
Cost of accessing services (using ANC as proxy)	Whether respondent had to spend any money to access ANC during index pregnancy
Knowledge of danger signs	No of danger signs as reported by respondent: None, at least one, 2 or more
Complications during pregnancy /delivery	Whether respondent experienced any complications during or after pregnancy & delivery
Counseling on Postnatal Care	Whether respondent was counseled / advised to attend Postnatal Care during index pregnancy
Counseled on Family planning as part of ANC	Respondents who report being counseled on family planning as part of Antenatal Care
Counseled on Family planning after delivery	Respondents who report being counseled on family planning after delivery (pre-discharge)
Counseled on Family planning as part of PNC	Respondents who report being counseled on family planning as part of Postnatal Care

Creating asset index

Asset indices have become a standard method for comparative equity analyses in low-income countries due to the ease of collection of data. In our study, the asset index was based on the household asset ownership collected as part of the household survey. We used the principal component procedure outlined in literature [6, 7] to calculate the asset index. The survey collected data on some household assets and dwelling characteristics including type of fuel and toilet; source of lighting; source and time-distance to water; land ownership; possession of sewing machine, clock/watch, kerosene lamp, gold jewelry, pressure cooker, radio, television, bicycle, motorbike, electricity generator, car, tractor, chickens, sheep, cows, goats, horses, donkeys, ducks. Weights for each of these assets were based on the first principal component (with the highest Eigen value) obtained by applying the principal component analysis procedure to the household's asset ownership information. Asset scores were calculated for each household by summing up the score for each asset based on the weightage from the Principal Components Analysis (PCA). The households were divided into quintiles based on the household asset scores.

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Aim 1- Analysis of dropout from the maternal continuum of care in Tanzania through a household survey

Abstract

Background: The 'continuum of care' is a key framework for planning and evaluating maternal and neonatal health services. Currently, there is very little research applying the 'continuum' framework to the assessment of receipt of maternal health services in Tanzania.

Methods-This study examined the extent of dropout of women from the care continuum and its predictors when moving from one stage of the continuum to the next. We analyzed data of 1931 women, who had delivered in the preceding 2-14 months, from a two-stage cluster sampling household survey of 4 districts in Morogoro region of rural Tanzania. We modeled our explanatory variables using the Anderson model of health care seeking with 3 types of characteristics - predisposing, enabling and need characteristics. We fitted conditional models for the three transitions stages in the continuum for women with i) at least one ANC who made 4 or more ANC visits ii) at least one ANC visit who accessed delivery care at a facility, and iii) at least one ANC visit and facility delivery who had postnatal care at a health facility.

Results - Only10 % (198/1931) of women access the services offered through the entire continuum (4 ANC visits, facility delivery and 1 postnatal visit) and 1% (18/1931) interviewed reported not having care at any stage. After multivariate analysis, among women receiving antenatal care, positive predictors of 4 or more ANC visits include age groups 20-34 years [Odds Ratio (OR) 1.77, 95% Confidence Interval (CI) 1.22-2.56] and 35-49 years (2.03,1.29-3.2), and knowledge of at least 2 pregnancy danger signs (1.75,

1.39 -2.1). Negative predictors include higher birth orders like 2nd or 3rd pregnancies (0.68, 0.47 -0.98) and 4th or higher (0.66, 0.46- 0.96), primary or higher education (0.77, 0.61-0.97), severe swelling of the legs/ face during pregnancy (0.73, 0.58 -0.93) and resident of Kilosa (0.59,0.4-.98). Among women receiving antenatal care, positive predictors of facility deliveries include women from the fourth (1.66, 1.12-2.47) and richest households (3.4, 2.04-5.66), and richest communities (2.9, 1.14-7.4), those reporting complications except swelling of legs/face (1.37, 1.05-1.79), and 4 or more ANC visits (1.55, 1.14-2.09). Negative associations were observed with higher birth orders like 2nd or 3rd pregnancies (0.6, 0.4 -0.88) and 4th or higher (0.4, 0.27- 0.61), and resident of Kilosa (0.28,0.12-0.66), receiving antenatal care at a dispensary (0.66,0.45-0.97), and spending money for ANC (0.64, 0.47-0.86).). Among women receiving antenatal care and facility delivery, positive predictors of postnatal care included richest communities (2.25, 1.21-4.44), living in the Integrated Facility/Community program (IFC) catchment areas (1.89, 1.03-3.45), knowledge of at least 2 pregnancy danger signs (1.78, 1.13 -2.83), CHW counseling for postnatal care (4.22, 1.97-9.05), caesarean section or forceps delivery (3.25, 1.84-5.73), and health provider counseling on FP (2.39, 1.71-3.35). Negative predictors include antenatal complications, and resident of Kilosa (0.36, 0.15-0.83) or Ulanga (0.2, 0.06-0.69)

Conclusions –Dropout from the maternal care continuum is high in rural Morogoro, Tanzania with the movement from delivery care to PNC being most affected. The associated factors are varied and programs should redirect efforts to addressing them to reduce dropout from the care continuum.

Background

Globally an estimated 289,000 women died in 2013 from complications associated with pregnancy or childbirth [1]. Ninety nine percent of these deaths occurred in low resource settings; more than half in Sub-Saharan Africa [2]. Among the 7.6 million deaths in children under the age of 5, 44% occur during the neonatal period and nearly half of these deaths occur during the first 72 hours following delivery [3]. The East African country of Tanzania, experiences high levels of maternal mortality (454 per 100,000 live births) and under-five child mortality (81 per 1,000 live births) with 32% of under five deaths occurring in the first month of life [4]. The 'continuum of care' framework, which examines continuity of care and receipt of services throughout the lifecycle—adolescence, pregnancy, childbirth, postnatal period, and childhood has become one of the key program frameworks for planning and evaluating strategies to reduce maternal and newborn deaths and improve maternal and neonatal health and wellbeing [5-8]). The framework examines provision of essential live saving interventions for women and their children during pregnancy, childbirth and the postnatal period and the extent of integration of effective interventions and delivery strategies within existing health system packages[6]. The two dimensions of the continuum include 1) the time dimension—continuity of care over time from pre-pregnancy through antenatal, intra- and postnatal periods for women, and care for children from the newborn period through adolescence; and 2) the place dimension—integrated service delivery provided by communities to first level and referral health facilities [9, 10].

A well-functioning continuum of care can increase client and provider satisfaction [11]

and maximize efficiency in limited resource settings [12] . Although much of the literature on continuum has focused on child survival [13, 14], an effective continuum is especially important for maternal health, since timely linkages to referral care are necessary to reduce maternal deaths [5]. In line with this approach, the National Road Map Strategic Plan to Accelerate Reduction of Maternal, Newborn and Child Deaths in Tanzania, 2008–2015 (One Plan) adopted the continuum of care framework with a focus on high coverage of effective interventions and integrated maternal newborn child health (MNCH) service packages as well as other key program such as Safe Motherhood, Family Planning (FP), Prevention of Mother to Child Transmission (PMTCT) of HIV, malaria, immunization, Adolescent Health and Nutrition.

In the present study, we restrict the analysis to the time dimension, focusing on women during the period from pregnancy to childbirth and postnatal period. In Tanzania, significant disruptions occur in the continuity of services from the antenatal period to the postnatal period. According to Tanzania DHS, 95% of pregnant women in Tanzania receive at least one antenatal checkup and 50% deliver with a skilled birth attendant, yet only 35% of Tanzanian women receive a postnatal checkup[4]. All women are expected to receive focused antenatal care of high quality during pregnancy, which involves 4 antenatal check ups, skilled birth attendance at delivery and postnatal care up to a year after delivery. There is a need to understand where the gaps in the continuum of care lie and what factors lead to these gaps in care seeking before programmatic interventions are planned and implemented. This study examines the dropout of women from the continuum of care in Morogoro region. We have the following objectives – a) To assess the extent of dropout from the care continuum and b) To determine the factors associated

with the dropout when moving from one stage of the continuum to the next.

Methods

Study design and context

A household survey of women (N=1968) who had a child birth 2 to 14 months preceding the survey, hereafter referred to as "recently delivered women" (RDW) was carried out from August 2011 to November 2011 in the Morogoro region of Tanzania. The baseline household survey was conducted to establish baseline for an evaluation of an Integrated Facility and Community Maternal Newborn and Child Health (MNCH) program being implemented by the Tanzanian Ministry of Health and Social Welfare (MoHSW) with support from Jhpiego. The principal objective of the survey was to establish baseline household characteristics and MNCH care utilization among recently delivered women.

Study area and sampling

The target population for the survey was RDWs living in rural and sub-urban areas of four districts (at the time of the survey) in the Morogoro Region of Tanzania. The districts of Morogoro District Council, Mvomero, Kilosa (Gairo was subsequently carved out of Kilosa) and Ulanga were selected on the basis that they had a predominantly rural population. A two-stage sampling strategy was employed to select households from 60 villages, through probability proportional to size (PPS) sampling using population estimates from 2002 Tanzania national population census. For each selected village, a list of the population and households was made based on data from the local government authorities, and sub-village units (Kitongoji) were grouped into clusters that were roughly composed of a 1000 population and one cluster was chosen in a random manner by lottery for the survey. In each cluster, the survey team visited every household to

interview women who had any pregnancy outcome (live born/stillbirth/abortion) in the previous year. If the household had more than one eligible woman, only one was randomly selected for interview by lottery.

Instrument and Data collection

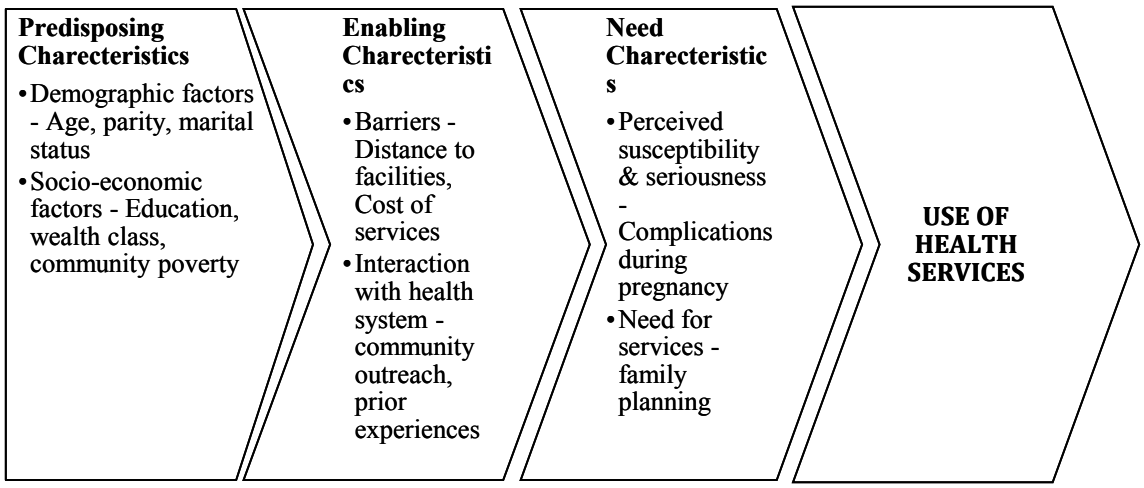
The respondent identified in each household was interviewed using a questionnaire adapted from the model questionnaires developed by the MEASURE Demographic & Health Surveys (DHS) program [15]. The questionnaire was adapted to reflect relevant issues related to the larger ongoing evaluation in the region and collect information on background characteristics, pregnancy history, utilization of health care during pregnancy, delivery, and postnatal care and barriers to care seeking. The adapted questionnaire was translated from English into Kiswahili, and back translated for checking the correctness in translation, and pretested. The respondents were interviewed after obtaining written informed consent. Two teams of trained interviewers fluent in Swahili and English administered the survey. A field editor reviewed questionnaires from all the teams using a checklist for completeness, quality, and consistency at the end of each day. The field editor and team supervisor held daily briefings with team members to discuss and correct any visible errors in data collection. The study investigators made periodic checks to ensure quality of data collection and entry.

Variables

We utilized the health-seeking behavior model (Figure 10) developed by Anderson and Newman for identifying the key variables of interests and confounding covariates [16]. This model proposed that the use of health care services is a function of three sets of characteristics - predisposing characteristics, enabling characteristics, and need

characteristics. The predisposing characteristics considered in this analysis included demographic factors (age, parity, marital status), and socio-economic factors (education, wealth class, community poverty). The enabling factors included barriers to access (distance to facilities, cost of services) and interaction with health system (prior interactions, community outreach activities). The need characteristics included perceived susceptibility & seriousness (complications during antenatal, delivery & postnatal period, and mode of delivery) and need for services (e.g., contraception). Explanatory variables included demographic variables such as woman's age, birth order, education, marital status, and religion.

Figure 10 - Explanatory framework for use of health services (adapted from Andersen model)



It is difficult to collect income data in low-income countries and asset indices have become a standard method for comparative equity analyses in these countries. An index of household wealth, based on household assets was created using principal components

analysis (PCA) methods and used to group households into wealth quintiles[17]. The asset score of the households in the cluster was averaged to generate a community poverty score that served as proxy for wealth of the community. We collected information on the presence of the nearest functioning health facility and the distance recorded. The distance variable was categorized as 0 km (facility in the village), less than 5 km and more than 5 km.

At the time of the survey, some facility based postnatal care training activities had already been implemented in 9 facilities as part of the Integrated Facility Community (IFC) Program. This was a program implemented by the ministry with assistance from Jhpiego to strengthen postnatal care in the region. To account for the effect of the program, we created a variable that coded 1 for women living in the catchment area of the facilities that were known to be part of the rollout of the program and 0 for those living in catchment areas of health facilities not part of the program. Since cost of care is an important predictor, we asked women if they had spent any money in accessing antenatal or delivery care and used as a dichotomous variable for the analysis. History of complications during the antenatal, intrapartum and postnatal periods, was used as a proxy for perceived needs, as women who consider themselves at risk may seek care. We created dummy variables for women, who reported swelling of legs and / or face in their antenatal period, and complication other than swelling of the face or legs. Other dummy variables were created for women reporting complications during delivery, and complications in the postnatal period. We asked women to list the danger signs in pregnancy and a dummy variable created for women if they knew 2 or more danger signs. To model cost as a barrier to care seeking, we created dummy variables as that were

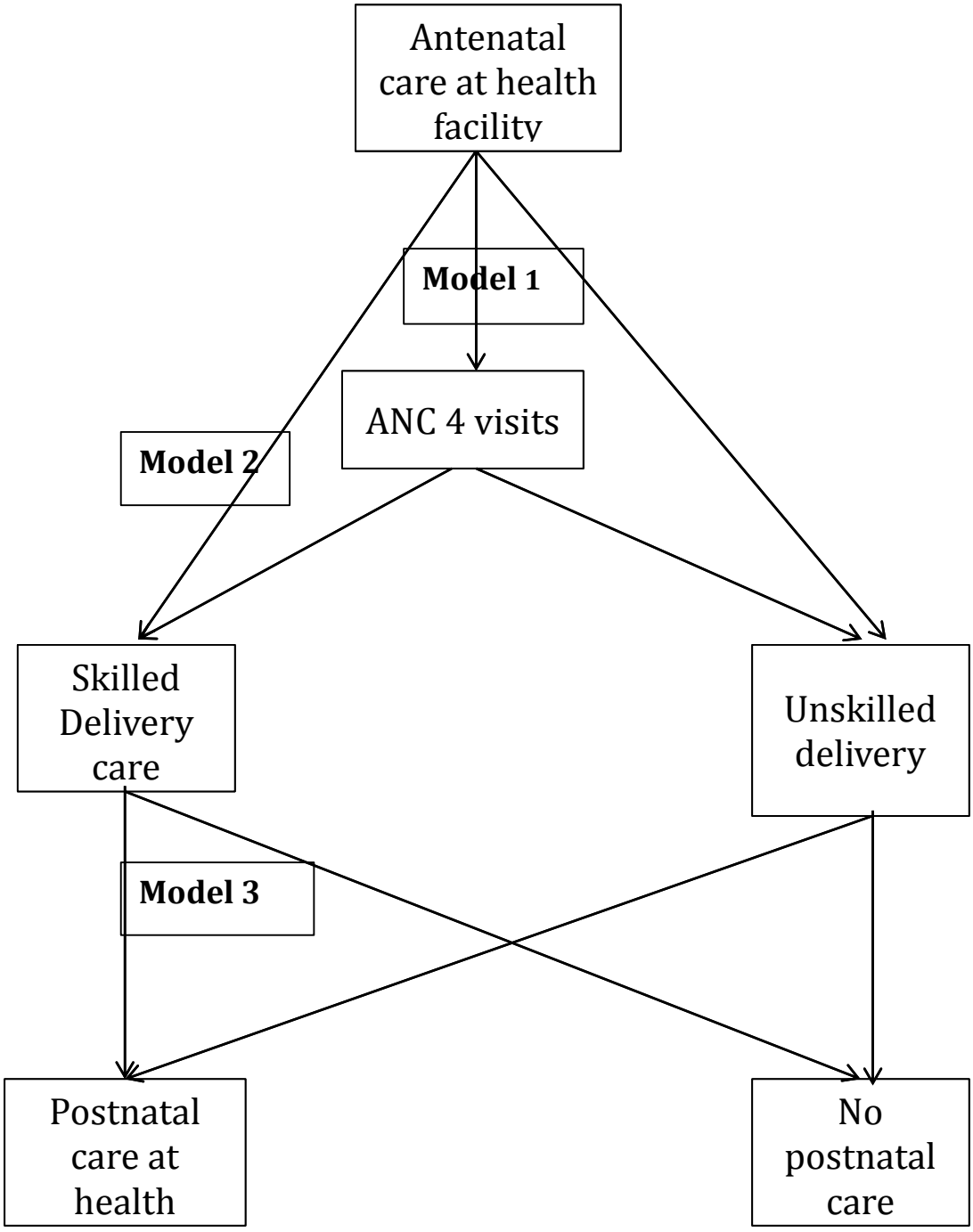
proxies for expenses incurred during antenatal and delivery care. Dummy variables were created for women who reported being advised by a CHW to seek delivery care and postnatal care at a health facility. To model a need of family planning , we created a dummy variable for those women who were counseled on family planning by a health provider at the time of their receiving delivery care at a health facility.

Conditional models for assessing dropout from continuum

We used a probability model to conceptualize the patterns of use in the care to highlight the extent of dropout along different points on the pathway. Based on the pathway for the continuum of care, a woman can follow different possible paths for three types of services during antenatal care, delivery care and postnatal care (Figure 11). Since we are looking specifically at women who had entered the care continuum and then subsequently dropped out, we have included only women who accessed antenatal care at least once in our conditional models. As outlined in the figure, we developed three conditional logit models to identify factors influencing the retention along the pathway. Since antenatal care was almost universal in our sample, we addressed the issue of having four antenatal visits as prescribed in the FANC guidelines. To identify factors associated with use of 4 visits, we fit Model 1 comparing women receiving 4 or more ANC visits versus those receiving fewer than 4 visits. It is coded 1 if a woman received 4 or more visits and 0 if received less than 4 visits. Among women who received antenatal care, some went on to receive skilled birth attendance and some did not. In our sample from Morogoro, health facilities were the only source of skilled care at birth and hence we fit Model 2 among women who received antenatal care to determine the factors associated with the continuity from having antenatal care to having facility delivery. The outcome for Model

2 is 1 for receiving antenatal care and delivering at a health facility, and 0 for receiving any antenatal care but not delivering at a facility. After delivery, some women received postnatal care at a health facility and some did not. In the present setting, health facilities are the only means of obtaining postnatal care with no existing community based postnatal care. Thus we fit Model 3 among women who received antenatal care and skilled birth attendance to identify factors associated with completion of the continuum of care. The two categories of the outcome for Model 3 are 1 for receiving antenatal care, skilled birth attendance, and postnatal care, and 0 for receiving antenatal care and skilled birth attendance but not postnatal care.

Figure 11 - Conditional Models for explaining dropout from different points of contact in care continuum



Statistical analysis

We described the level of coverage for individual points of contact in the care continuum - Antenatal care, delivery care and postnatal care Using frequencies and proportions.. Bivariate and multivariate analyses were performed for independent variables of interest with adjustment for clustering due to survey design. We present confidence intervals at the 95% level wherever applicable. All statistical analyses was carried out with STATA 13. The extent of missing data was assessed, and patterns of missingness were explored in order to determine whether data were missing at random. Missing data were handled through multivariate regression imputation which replaces missing values with multiple sets of simulated values from a Bayesian posterior predictive distribution of missing data to complete the dataset [18]. The survey data are in a hierarchical structure with individuals nested within clusters (sub-village). Since women within a cluster are likely to be similar, variance is underestimated and measures of association may be overestimated. Another consequence of clustering is that each observation contains less unique information resulting in a diminished effective sample size. Multivariate logit regressions with adjustment for survey design were fitted to account for the clustering effect of the data. In this case, clustering is accounted by the use of robust variance estimators based on a first-order Taylor series linear approximation [19].

Results

Population characteristics and study population

The study used data from 1931 recently delivered women from 4 districts of Morogoro region in Tanzania since 37 (2%) were excluded from the analysis because they had

experienced pregnancies that resulted in a miscarriage. Seventy percent of the respondents were between 20-34 years of age, while the age groups 15-19 and 35-49 comprised 15% each. Almost two thirds was Christian and 81% reported living within a marriage or a union. Thirty one percent report experiencing a complication during the antenatal period and 14% and 11% reported having complications during delivery and in the postnatal period respectively, with 6% reporting a complicated mode of delivery (caesarian section or use of forceps).

Pathways of care

Almost all women (96.5%, n = 1864) used antenatal care at least once in their pregnancy and of them 66.5% (n = 1240) made at least 4 visits or more. Two thirds (n = 1255) delivered at a health care facility and less than one in four (n = 437) attended postnatal care at a health facility (Table 12). The care pathway (Figure 12)chosen most frequently by one third (654/1931) was when women had 4 or more ANC visits, facility based delivery care and no postnatal care. Only 10 % (198/1931) of women make use of the services offered through the entire continuum (4 ANC visits, facility delivery and 1 postnatal visit). The proportion of women using skilled care for delivery was higher when women had 4 or more ANC visits than those who had fewer visits (69.4% vs 59.1%). Having made 4 or more ANC visits increased the probability of women using postnatal care after delivery at a facility (23% vs 19.8%). Fewer women, in our sample, used PNC if they had a facility delivery compared to a home delivery and this pattern was observed in women who had 4 or more ANC visits (23% vs 26.5%) or fewer than 4 visits (19.8% vs 21.9%). Less than 1% (18/1931) of women interviewed reported not having any contact at any point during their pregnancy.

Table 12 – Variations in Maternal Health care utilization by User Characteristics in Morogoro Region, Tanzania

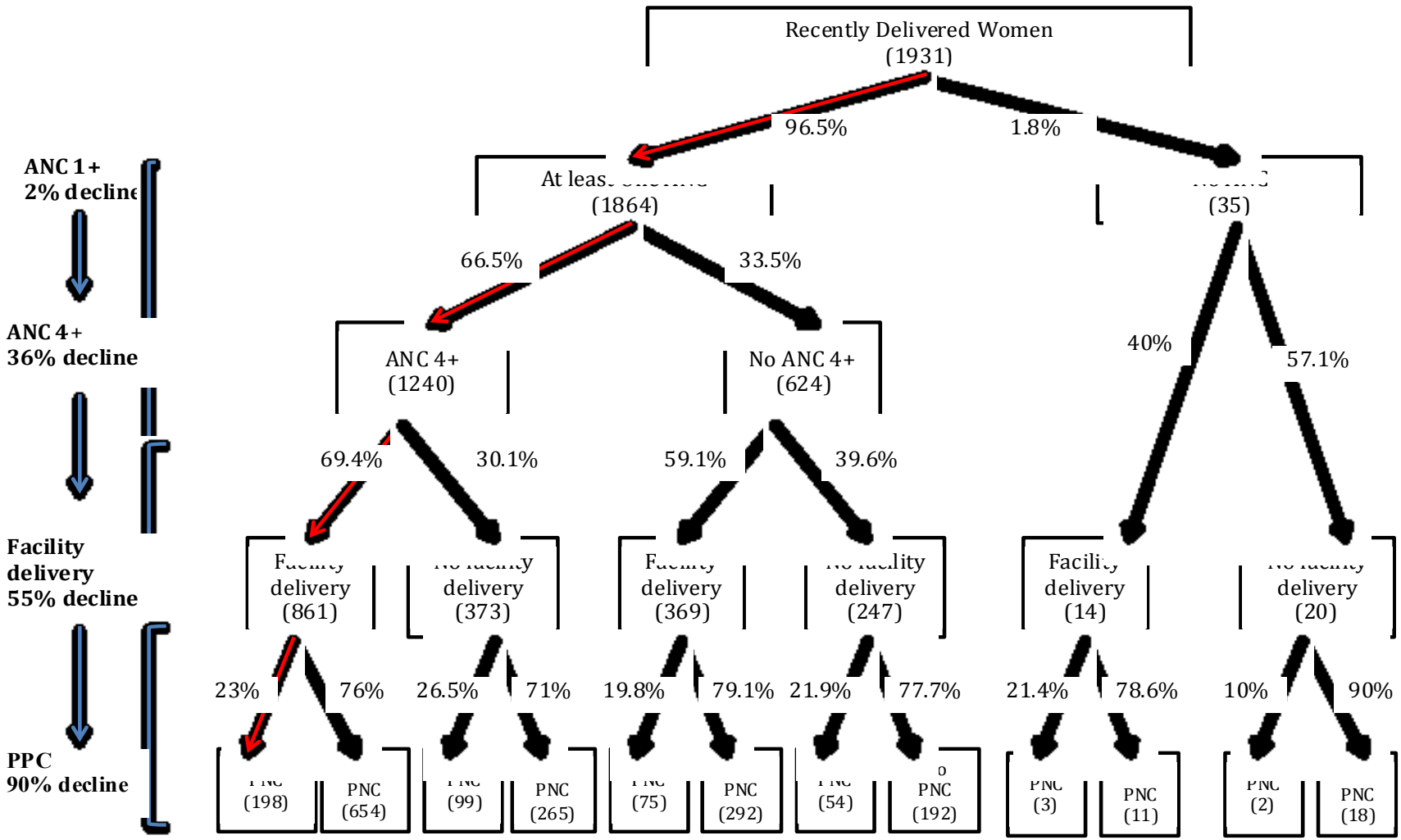
Variables	Categories	N	4 or more ANC visits (95% CI)?	Skilled attendance at delivery (95% CI)	Facility Based Postnatal care (95% CI)
Overall		1931	65.3% (61.8, 68.6)	66.8% (59.7, 73.2)	23.1% (18.7, 28.2)
Age	15 - 19	291	56.6% (49.8, 63.1)	70.4% (61.1, 78.2)	22% (16.3, 29.1)
	20 - 34	1334	66.6% (62.6, 70.4)	66% (58.1, 73.1)	23.2% (18.6, 28.5)
	35 - 49	299	67.2% (61.4, 72.6)	61.5% (52.9, 69.4)	23.9% (17.7, 31.4)
Wealth quintiles	Lowest	424	66.4% (61, 71.4)	55% (46.9, 62.9)	22.5% (16.8, 29.5)
	Second	356	64.3% (58.1, 70)	50.1% (41.6, 59.5)	21.6% (14.9, 30.3)
	Middle	3389	64.6% (58.6, 70.1)	61.2% (51.5, 70.1)	22.4% (16.1, 30.3)
	Fourth	380	63.2% (57.4, 68.7)	75.2% (67.8, 81.4)	23.9% (17.4, 32)
	Highest	382	67.8% (62.1, 73.1)	87.3% (81.3, 91.6)	25.2% (18.2, 33.8)
Birth order	1	408	64.2% (59.1, 69)	77% (69.7, 82.9)	22.1% (17.3, 27.9)
	2-3	724	65% (59.9, 69.8)	68.1% (59.3, 75.7)	23.2% (17.7, 29.8)
	4+	786	66.2% (61.8, 70.2)	58% (50.1, 65.4)	23.5% (18.7, 29.2)
Education	No schooling	531	66.9% (61.8, 71.6)	53.2% (44.4, 61.7)	19.9% (16.1, 24.4)
	Less than primary	203	70.7% (63.6, 76.8)	66.7% (57.2, 75)	18.6% (13, 25.9)
	Primary or more	1191	63.7% (59.6, 67.6)	71.3% (63.5, 77.9)	25.3% (19.8, 31.8)
Married	Not in union	378	60.1% (53.1, 66.7)	66.9% (58.7, 74.3)	24.7% (18.2, 32.5)
	Married/ in union	1544	66.6% (62.6, 70.4)	65.6% (58, 72.5)	22.8% (18.4, 27.9)
Community Assets	Low	647	68.2% (61.6, 74.1)	50.2% (38.7, 61.8)	23.6% (15.5, 34.2)
	Middle	665	60.9% (55.9, 65.8)	64.3% (53.3, 74)	17.9% (14.1, 22.6)
	High	619	66.9% (60.9, 72.4)	83.8% (72.3, 91.1)	28.4% (19.8, 28.3)
Distance to facility	In the village	1181	66.4% (62.6, 70)	67.1% (58.1, 75)	21.2% (16.1, 27.3)
	1-5Km	352	66.7% (55.4, 76.3)	78.9% (65.9, 87.8)	30.8% (20.3, 43.6)
	More than 5 km	398	60.7% (53.1, 67.8)	50.6% (33.5, 67.6)	22.2% (13, 35.4)
Districts	Morogoro DC	250	68.2% (57.4, 77.2)	69.9% (51.1, 83.8)	38.5% (26, 52.8)

	Mvomero	520	70.7% (64.2, 76.5)	64.6% (50.7, 76.4)	26.6% (17.2, 38.8)
	Kilosa	808	60% (54.8, 64.9)	60% (47.7, 71.2)	18.6% (13.7, 24.6)
	Ulanga	353	67.4% (61.8, 726)	78.2% (66, 86.9)	17.7% (10.8, 27.7)
Postnatal Program implemented	No	970	64.7% (60.3, 68.9)	72.8% (63.1, 80.6)	19.4% (15, 24.8)
	Yes	961	65.9% (60.5, 70.9)	59% (48.5, 68.8)	26.8% (19.7, 35.4)
Severe swelling of face/legs during antenatal period	No	1663	66.3% (62.8, 69.6)	65.4% (58, 72.2)	23.9% (19.1, 29.5)
	Yes	240	58.8% (52.5, 64.9)	67.9% (58.3, 76.2)	17.4% (13.3, 22.3)
Other complications during antenatal period	No	1430	66.5% (62.6, 70.1)	64.7% (57.3, 71.4)	23.5% (18.8, 28.9)
	Yes	478	61.6% (56.5, 66.5)	68.9% (59.9, 76.6)	22.1% (17.2, 27.8)
Complications during delivery	No	1616		65% (57.6, 71.8)	22.6% (17.9, 28.1)
	Yes	277		70.4% (61, 78.3)	27.5% (22.2, 33.5)
ANC 4 visits	No	659		58.9% (50.2, 67.2)	20.8% (16.8, 25.5)
	Yes	1240		69.8% (62.6, 76.1)	24.4% (19.2, 30.4)
Facility accessed for ANC	Hospital	142		76.6% (67.6, 83.7)	
	Health Center	534		73.1% (64.5, 80.2)	
	Dispensary	1176		62.8% (54.4, 70.5)	
Facility accessed for delivery care	Hospital	393	59.9% (50, 69)		21.4% (17.3, 26.1)
	Health Center	403	67.2% (62.2, 71.9)		27.3% (18.1, 38.8)
	Dispensary	458	67.2% (63, 71.1)		19.2% (13.3, 32.7)
Money spent on ANC	No	1451		68.7% (61.5, 75.1)	
	Yes	388		58.7% (48.1, 68.6)	
Money spent on delivery care	No	911			25.2% (19.8, 31.4)
	Yes	913			20.6% (16.3, 25.7)

CHW advised facility delivery	No	1649		66.7% (59.4, 73.3)	
	Yes	223		60.1% (49.3, 70)	
Mode of delivery	Normal delivery	1778			22.2% (17.5, 27.6)
	Caesarean / Forceps delivery	115			37.8% (29.4, 47)
CHW advised postnatal care at facility	No	1739			22.1% (18, 26.9)
	Yes	148			42.2% (27.7, 58.2)
Postnatal complications	No	1682			22.4% (17.9, 27.7)
	Yes	223			29.4% (22.5, 37.4)
Counseled by health provider on family planning during delivery care	No	800			20.1% (15.8, 25.2)
	Yes	1036			33.3% (26.4, 41.1)

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

Figure 12 - Care pathways used by women in Morogoro



Multivariate models

As described in the methods section, three separate logit regression models are fitted to identify predictors for women to receive maternal health services along the continuum of care. Table 2 shows the estimated odds ratios and 95% confidence intervals for the variables included in each model.

ANC 4+ visits

Model I analyzes the association between use of 4 or more antenatal care visits by women who entered the care continuum and independent variables from our framework (Table 13). The results showed that making 4 or more ANC visits were significantly positively associated with age groups 25-34 and 35-49, and women's knowledge of danger signs. Negative associations were observed with higher birth orders, educational attainment of primary schooling or more, living in communities with higher wealth status and reporting severe swelling of face and legs during pregnancy.

Age showed the strongest association to use of ANC4 with women aged 20-34 and 35-49 having 77% (OR 1.72, 95% CI 1.22 to 2.56) and 103% (OR 2.03, 95% CI 1.29 to 3.2) higher odds in comparison to women in the 15-19 age group. Women for whom this was their first pregnancy were almost 30% more likely to make 4 or more ANC visits than those in their 2nd or 3rd pregnancies (OR 0.68, 95% CI 0.47 to 0.98) and fourth pregnancy or more (OR 0.66, 95% CI 0.46 to 0.96). The odds of ANC4 care were 23% lower for women with primary or higher education (OR 0.77, 95% CI 0.61 to 0.97) than for women with no schooling. Women who reported symptoms of severe swelling of the legs during their pregnancy were 27% (OR 0.73, 95% CI 0.58 to 0.93) less likely to go for 4 or more ANC visits. Women with knowledge of at least 2 pregnancy danger signs were 75% more

likely to complete 4 ANC visits (OR 1.75, 95% CI 1.39 to 2.1). Individual household wealth, distance to nearest facility or type of facility for receipt of ANC were not observed to be associated with increased likelihood of receiving 4 or more ANC visits,

Facility delivery

Model 2 analyzes the association between use of facility based delivery care by women who entered the care continuum (had at least one antenatal visit) and variables from our framework (Table 13). The results showed that facility care was significantly positively associated with women from richer households, and richer communities, those reporting complications, and with 4 or more ANC visits. Negative associations were observed with higher birth orders, women receiving antenatal care at a dispensary, those reporting spending money for ANC, residents of Kilosa district and those residing within catchments of facilities that are part of the IFC program.

Wealth had the most significant effect on the use of delivery care – women in the fourth (OR 1.66, 95% CI 1.12 to 2.47) and richest (OR 3.40, 95% CI 2.04 to 5.66) household quintiles were significantly more likely to use delivery care than the poorest. Also, when community wealth was taken into account the richest third of communities were more likely to report use of delivery care (OR 2.9, 95% CI 1.14 to 7.4). Women reporting complications other than severe swelling of face and legs were 37% (OR 1.37, 95% CI 1.05 to 1.79) more likely to report use of delivery care while those with severe swelling of face or legs were unlikely to show any significant association with delivery care. Making 4 or more ANC visits was 55% (OR 1.55, 95% CI 1.14 to 2.09) more likely to be associated with delivery care than those with fewer visits.

Women with higher birth orders of 2-3 and 4 or more were 40% (OR 0.6, 95% CI 0.4 to

0.88) and 60% (OR 0.4, 95% CI 0.27 to 0.61) less likely, respectively, to report seeking delivery care than those in their first pregnancy. Those reporting using dispensaries as their primary source of antenatal care reported 34% lower use of delivery care at facilities (OR 0.66, 95% CI 0.47 to 0.86) when compared to hospitals but no such associations were seen among those receiving ANC in health centers (OR 0.83, 95% CI 0.53 to 1.31). Spending money on ANC decreased odds of delivery care by 36% (OR 0.64, 95% CI 0.47 to 0.86). Women living in the IFC program catchment areas were 50% less likely to report seeing delivery care (OR 0.51, 95% CI 0.27 to 0.97).

Postnatal care

Model 3 analyzes the association between use of facility based postnatal care by women who entered the care continuum (had at least one antenatal visit) and remained in the continuum for delivery care (Table 13). The variables with the strongest association for PNC after a facility delivery were women with a caesarean section / forceps delivery, women reporting advice from a Community Health worker (CHW) and those counseled on family planning during delivery. Positive associations were also seen with women from richer communities, and those living in the IFC catchment areas. Negative associations were observed with women reporting complications during pregnancy and living in Kilosa and Ulanga districts.

A complicated mode of delivery like caesarean section was associated with a more than 3 fold (OR 3.25, 95% CI 1.84 to 5.73) increase in odds of return for postnatal care and advice from a CHW about postnatal care increased the odds by more than 4 times (OR 4.22, 95% CI 1.97 to 9.05). Counseling women on family planning before discharge after delivery care was associated significantly with women returning for postnatal care (OR

2.39, 95% CI 1.71 to 3.35). Christians (OR 1.46, 95% CI 1.03 to 2.07) and women from the richest third of communities (OR 2.25, 95% CI 1.21 to 4.44) were more likely to return for postnatal care. Living in the program catchment areas increased odds of receiving postnatal care by 89% (OR 1.89, 95% CI 1.03 to 3.45) compared to those living in non-program areas.

Women who reported symptoms of severe swelling of the legs during their pregnancy were 42% (OR 0.0.58, 95% CI 0.35 to 0.96) and those with other complications during their pregnancy were 32% (OR 0.68, 95% CI 0.48 to 0.96) less likely to return for postnatal visits.

Table 13 - Conditional Models with adjusted odds ratios for characteristics influencing dropout from care continuum

		Model 1 (n=1864)			Model 2 (n=1864)			Model 3 (n=1230)		
		(ANC -> ANC4)			(ANC -> Delivery)			(Delivery -> PPC)		
Variables	Categories	Odds	95% CI		Odds	95% CI		Odds	95% CI	
Age	15 - 19	Ref			Ref			Ref		
	20 - 34	1.77*	1.22	2.56	1.02	0.64	1.61	0.76	0.41	1.4
	35 - 49	2.03*	1.29	3.20	1.50	0.80	2.83	0.76	0.37	1.55
Education	No schooling	Ref			Ref			Ref		
	Less than primary	1.25	0.85	1.79	1.02	0.70	1.49	1.31	0.64	2.71
	Primary or more	0.77	0.61	0.97	1.37	0.99	1.89	1.56	0.98	2.5
Marital status	Not married/in union	Ref			Ref			Ref		
	Married/in union	1.28	0.90	1.81	1.11	0.81	1.54	0.80	0.56	1.15
Birth order	1	Ref			Ref			Ref		
	2-3	0.68*	0.47	0.98	0.60*	0.40	0.88	1.24	0.77	1.98
	4+	0.66*	0.46	0.96	0.40*	0.27	0.61	1.15	0.67	2.00
Wealth quintiles	Lowest	Ref			Ref			Ref		
	Second	1.05	0.76	1.43	0.79	0.57	1.09	1.09	0.58	2.03
	Middle	1.06	0.76	1.49	1.12	0.77	1.62	0.91	0.56	1.48
	Fourth	1.08	0.75	1.56	1.66	1.12	2.47	1.05	0.56	1.95
	Highest	1.19	0.81	1.74	3.40	2.04	5.66	1.01	0.58	1.76
Community Assets	Low	Ref			Ref			Ref		
	Middle	0.72	0.53	1.00	1.58	0.82	3.06	1.45	0.71	2.95
	High	0.96	0.68	1.35	2.90*	1.14	7.40	2.25*	1.21	4.44
Distance to	In village	Ref			Ref			Ref		

facility	1-5Km	1.01	0.62	1.64	1.18	0.64	2.18	1.13	0.51	2.57
	> 5 km	0.90	0.64	1.26	0.77	0.39	1.52	1.65	0.67	4.06
IFC program in catchment facility	No	Ref			Ref			Ref		
	Yes	1.14	0.83	1.57	0.51*	0.27	0.97	1.89*	1.03	3.45
Severe Swelling of legs /face	No	Ref			Ref			Ref		
	Yes	0.73*	0.58	0.93	0.81	0.57	1.17	0.58*	0.35	0.96
Other ANC complications	No	Ref			Ref			Ref		
	Yes	0.86	0.68	1.10	1.37*	1.05	1.79	0.68*	0.48	0.96
Knowledge of at least 2 danger signs		Ref			Ref			Ref		
		1.75*	1.39	2.10	1.23	0.92	1.65	1.78*	1.13	2.83
ANC 4 visits	No				Ref			Ref		
	Yes				1.55*	1.14	2.09	1.04	0.74	1.45
Complications during delivery	No				Ref			Ref		
	Yes				1.27	0.87	1.84	1.40	0.90	22
Facility type for ANC visits	Hospital	Ref			Ref					
	Health Center	1.24	0.78	1.97	0.83	0.53	1.31			
	Dispensary	1.32	0.82	2.12	0.66*	0.45	0.97			
Facility type for delivery care	Hospital							Ref		
	Health Center							1.32	0.86	2.03
	Dispensary							134	0.82	2.17
Money spent on ANC	No				Ref					
	Yes				0.64*	0.47	0.86			
Money spent on delivery care	No							Ref		
	Yes							0.72	0.48	1.07
CHW advised facility delivery	No				Ref					
	Yes				0.95	0.66	1.38			
Mode of delivery	Normal delivery							Ref		

	Caesarean / Forceps delivery							3.25^	1.84	5.73
CHW advised postnatal care at facility	No							Ref		
	Yes							4.22^	1.97	9.05
Postnatal complications	No							Ref		
	Yes							1.08	0.66	1.76
Counseled by health provider on family planning during delivery care	No							Ref		
	Yes							2.39^	1.71	3.35
All estimates are adjusted for religion of the respondents and geographic place of residence										

*p < 0.05 ^p<0.01

Discussion

Morogoro region showed almost universal coverage for antenatal care among pregnant women, two-thirds accessing delivery care and a quarter accessing postnatal care. Our present study highlights that less than 10% of women follow the recommended (ANC4+, facility delivery and at least one postnatal visit) pathway in the care continuum with the largest dropouts occurring from delivery to postnatal care and that the factors associated with dropout from the continuum varied widely for different points of care. The poor were most likely to drop out from the care continuum and make fewer points of contact for care. About one third of women in the 4 districts of Morogoro region of Tanzania did not complete 4 visits for ANC and these estimates are in line with other studies in similar settings [20-25]. Our finding that women younger than 20 years of age made more ANC visits than older women contradicts the Tanzania DHS finding but is consistent with other studies [23, 26, 27]. The TDHS study also reported that the odds ratio of ANC 4 for women in the 20–34 year age group was higher in 2010, although not statistically significant [28]. In contrast to other studies from similar settings, education and wealth seemed to have negative associations with ANC4, with the most educated of women and those from the richest communities being the least likely to make 4 or more visits[24, 25, 27].

We present an explanation for the above finding using some DHS data. Only 15 percent of Tanzanian women made their first ANC visit before the fourth month of pregnancy and one-third of women did not seek ANC until their sixth month of pregnancy with median first visit occurring after 5.4 months. An analysis of the decline in ANC 4 visits using DHS data from 2004-05 and 2010 suggests that promotion of 4 visits as part of the

focused antenatal care (FANC) rollout by the Ministry of Health and Social Welfare, United Republic of Tanzania, may have led to the decline in proportion of women with 4 visits[29]. Since the first visit is expected to be made before 16 weeks, health providers trained in FANC may have offered only the later 3 visits in pregnancy to women. In our sample, women with primary or more education presented later in pregnancy than women with no schooling and may have led to the more educated having fewer ANC visits. First pregnancies and women knowing 2 or more danger signs were more likely to complete 4 or more visits supports the hypothesis that increased perception of risk promotes use of care. Severe swelling of legs and face seemed to be an impediment in care seeking, possibly because women were unable to make the trip to the facility for care. Distance did not appear to influence ANC4+ in contrast to the findings from DHS data but has been observed seen in other similar settings [28, 30]. The lack of agreement in the findings between our study and the DHS analysis could be a result of the localized nature of our survey in contrast to countrywide data of the DHS. This is supported by the ANC4 prevalence in our study (65.3%) being almost twice versus the TDHS 2010 estimate (37.6%).

Facility based delivery was higher in our sample than the TDHS 2010 prevalence of 50.2% for Tanzania and 58% for Morogoro region. Our sample also showed a stronger association with both individual and community wealth than many other studies from similar settings, with facility delivery being the most inequitable compared to ANC and PNC. Women were also less likely to access care if they had to pay for it, supporting the view that cost of care is a barrier to accessing delivery care and to the overall retention of women in the care continuum [31].

Making 4 or more ANC visits, was also associated with facility delivery but those receiving their ANC at dispensaries were much less likely to come back for delivery care. Dispensaries in Tanzania appear to have lower quality of care than hospitals and health centers (personal communication). Many studies show that the quality of the antenatal interaction with the health system encourages women to come back for delivery care [27, 32, 33]. In our study, women in their first pregnancy were more likely to access care, possibly due to higher risk perception [27]. A study of DHS data from 44 countries showed that in settings with high infant mortality rates, low parity was associated with facility delivery, possibly explaining the above finding[34]. The negative association with the IFC program areas could be attributed to the selective implementation of the program in areas perceived to be poorly performing in use of health services (personal communication).

The transition from delivery to postnatal care showed the most significant dropout in the care continuum with less than 1 in 4 returning after delivery care at a facility. Women counseled by a CHW to return to a facility for postnatal care were associated with greater use PNC. Women who reported being counseled for family planning before discharge from the facility at the time of delivery care were associated with greater use, possibly as result of the need for obtaining contraceptive supplies.

The IFC program was implemented in 2010 to improve the postnatal care at selected health facilities and may be showing its impact in the increased proportion of women living their catchment area returning for PNC. Women were almost two times more likely to return for postnatal care in the program areas and should be considered in light of the finding that the women living in program areas were half as likely to opt for a facility

delivery after ANC. A facility assessment of postnatal counseling in the same area showed that health workers help with fixing dates for when the women should return for a postnatal care visit which may result in higher rates of use (Personal communication). In spite of this reduction in dropouts from the care continuum in program catchment areas, the overall proportion of women accessing postnatal care continues to be low. As in antenatal care, women with swelling of legs and face were less likely to return for postnatal care, possibly due to women being unable to make the trip to the facility.

The significance of our research is the use of a continuum of care framework, to assess the status of MNCH services in a non-project health settings. There is a need to distinguish the difference in merely looking at the points of contact vis a vis the actual content and quality of services provided. Our research shows that factors determining dropout from the care continuum vary widely – in direction and magnitude - between the various stages of the continuum. They also show many deviations from similar studies carried out in Tanzania and elsewhere. Findings seem to be greatly context specific and show the necessity to understand where the population stands in the continuum of care, where dropouts occur from the pathway from one service to the next, and what should be the focus of efforts to prevent droputs. This analysis specific to the Morogoro region brings out the importance of addressing the issue of dropouts by improving use of postnatal care, specifically in early and late postnatal periods, and reducing the inequity in delivery care.

Limitations

Our findings are drawn from a geographically small area in Morogoro region and may not be generalizable to the rest of Tanzania or sub-Saharan Africa. We would have

preferred to investigate further the quality and content of counseling services provided in the continuum of pregnancy to delivery, but the design of the present survey did not permit such an analysis. We did not collect data on characteristics of the health system for the present sample. Moreover, the present study is a cross-sectional survey limiting our findings to associations between variables and unable to determine direction of association or causality. Women living within the catchment area of a facility implementing a program may not have actually received the elements of the program due to their visiting other health facilities outside their designated areas.

Policy implications

The findings are most important to the MoHSW, in terms of supporting policies aimed at expanding coverage of services by targeting factors associated with dropout. District level variations should be critically analyzed with a focus on what works in the better performing areas. The findings will not change existing guidelines but will generate interest in research on the implementation of FANC and other MNCH programs. Other key messages include the need to encourage women to contact the health system early in pregnancy and strengthen the counseling of women by CHWs.

Conclusion

Our research highlights the importance of assessing MNCH services across the dimension of time in the care continuum as well as the need for further research in order to effectively guide and monitor progress towards increasing coverage. Addressing the issue of establishing effective links between the different stages is crucial to improving overall coverage. The findings can be used to improve MNCH integration and service delivery along the continuum of care in order to reach the maximum number of women,

newborns and children with effective care.

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Aim 2 - Determinants of use of postnatal care at health facilities in rural Tanzania: Multilevel analysis of a household survey

Abstract

Background: Significant disruptions occur in the continuity of services from pregnancy to delivery care into the postnatal period. Currently, there is very little evidence on the factors associated with use of postnatal care from health facilities in Tanzania.

Methods- This study examined the factors associated with the use of postnatal care by assessing the community and individual level factors and the variation in the content of services delivered as part of PNC. Using random intercept logistic regression analysis, we analyzed data of 1968 women, who had delivered in the preceding 2-14 months, from a two-stage cluster sampling household survey of 4 districts in Morogoro region of rural Tanzania . Individual level explanatory variables included i) Socio-demographic factors : age, birth order, education, and wealth, ii) Factors related to pregnancy : number of antenatal visits, history of complications and mode of delivery; and iii) Health system factors : place of delivery care, and counseling received. Community level variables included community levels of family planning, health service utilization, trust in health system, poverty and education, and distance to health facility. .

Results- Less than one in four women in Morogoro reported having visited a health facility for postnatal care. Individual-level attributes positively associated with postnatal care use were women's education of primary level or higher [Odds Ratio (OR) 1.37, 95% Confidence Interval (CI) 1.04-1.81], having had a caesarean section or forceps delivery (2.95, 1.8-4.81), and being counseled by a community health worker to go for postnatal care at a health facility (2.3, 1.36-3.89). Other positive associations included those

recommended HIV testing for baby (1.94, 1.19-3.15), and whose partners tested for HIV (1.41, 1.07-1.86). Higher community levels of family planning usage (2.48, 1.15-5.37) and high level of trust in health system (1.77, 1.12-2.79) were two significant community-level predictors. Lower postnatal care use was associated with having delivered at a hospital (0.5, 0.33-0.76), health center (0.57, 0.38-0.85), or dispensary (0.48, 0.33-0.69), and having had severe swelling of face and legs during pregnancy (0.65, 0.43-0.97). Hospitals and health centers appear to be better than dispensaries in delivering the services as part of postnatal care. HIV +ve women were also more likely to report receiving better services than HIV –ve women.

Conclusions –In the context of low postnatal care use in a rural setting, programs should redirect efforts towards reaching women identified in our study as those who do not avail themselves of postnatal care.

Keywords - Postnatal care, multilevel model, Tanzania, contextual factors

Background

Globally an estimated 289,000 women died in 2013 from complications associated with pregnancy or childbirth [1]. Almost all (99%) of these deaths occurred in low resource settings; more than half of these occurring in Sub-Saharan Africa [2]. Among the 7.6 million deaths in children under the age of 5, 44% occur during the neonatal period and nearly half of these deaths occur during the first 72 hours following delivery [3]. Tanzania experiences high levels of maternal mortality (410 per 100,000 live births) and under-five child mortality (81 per 1,000 live births) with 32% of the latter mortality occurring in the first month of life [4]. The 'continuum of care' framework (Figure 1) has now been highlighted as a core programmatic principle of improving Maternal Newborn & Child Health (MNCH) [5-7]). It provides a framework for the provision of essential lifesaving interventions to all women and children throughout the lifecycle by integrating effective interventions and delivery strategies within existing health system packages[6]. Across the continuum of care, significant disruptions occur in the continuity of services from the antenatal period to the postnatal period. For example, 95% of pregnant women in Tanzania make at least one antenatal visit while 50% deliver with a skilled birth attendant, yet only 35% of Tanzanian women receive a postnatal checkup[4]. Postnatal care (PNC) for the mother and infant in the crucial first hours and days after childbirth is poor in quality and coverage or missing entirely, even for women who give birth in a health facility [8]. According to the World Health Organization (WHO), the postnatal period starts one hour post-delivery of the placenta and continues for six weeks thereafter[9]. Postnatal care includes the prevention of complications, their early detection and treatment and provision of services on breastfeeding, birth spacing,

immunizations, nutrition and HIV. Postnatal care can he lp reduce mortality and morbidity for the mother and newborn, which are very high during the first week and up to four weeks after delivery[10]. The postnatal care visit also serves as an key point of contact for the provision of other health services including family planning and immunization..

Although globally PNC includes services provided to women and newborns both in the community and health facility, the focus of the present study is to explore the issue of postnatal visits at health facilities for mothers in Tanzania. The overall focus of our research is on the continuum of care, and hence we have focused on the points of contact for care. Since pre-discharge care after childbirth is delivered as part of the 'delivery care' contact, we have excluded care received before discharge from our analysis. The Tanzanian Ministry of Health and Social Welfare (MoHSW) guidelines call for at least 3 visits during the postnatal period (within one week, at 28 days and at 42 days) apart from the immediate postnatal care around the time of delivery [11]. CHWs are expected to encourage the mother to attend postnatal appointments at the health facility according to the following schedule – i) Within 48 hours in case of home deliveries, ii) Within seven days, iii) At 28 days, iv) At 42 days, v) At six months. These visits (with the exception of the 48 hours visit for home deliveries) are expected to be made by women, irrespective of whether they deliver at a facility or at home. There is a need to understand the differences in the characteristics of the individuals and their communities who do not use these services. The objective of this study is a) To determine factors associated with the use of postnatal care by assessing the relative contributions of community and individual level

factors, b) To examine the variation in the content of services delivered as part of postnatal care

Methods

Study design and context

The target population for our research was rural women in the Morogoro region of Tanzania who had a childbirth in the preceding 2-14 months and referred to as "recently delivered women" (RDW). The household survey of women (N=1968) was carried out from August 2011 to November 2011. The household survey was conducted as part of an evaluation of the Integrated Facility and Community Maternal Newborn and Child Health (MNCH) program being implemented by the MoHSW with support from Jhpiego since 2008. The principal objective of the survey was to establish baseline household characteristics and MNCH care utilization among RDWs.

Study area and sampling

The study sample for the survey was RDWs living in rural areas of four districts in the Morogoro Region of Tanzania- Morogoro District Council, Mvomero, Kilosa and Ulanga. A two-stage sampling strategy was employed to select households from 60 villages,. The first stage was the selection of villages through probability proportional to size (PPS) sampling using population estimates from the 2002 Tanzania National Population Census. In each selected village, a list of the population and households was made for each sub-village units (Vitongoji) based on data from the local government authorities. Sub-village units were grouped to create clusters composed roughly of a population of 1000. The second stage of the sampling process was to choose one cluster

in a random manner by lottery. In each cluster, the survey team visited every household to list and interview women who had any pregnancy outcome (live born/ stillbirth/ abortion) in the preceding 2-14 months. If the household had more than one eligible woman, only one was randomly selected for interview. Among the respondents, 37 (2%) were excluded from the analysis because they had experienced pregnancies that resulted in a miscarriage and did not have reason to access postnatal care.

Instrument and Data collection

The respondent identified in each household was interviewed using a questionnaire adapted from the model questionnaires developed by the MEASURE Demographic & Health Surveys (DHS) program. The questionnaire was adapted to reflect relevant issues related to the larger ongoing evaluation in the region and collect information on background characteristics, pregnancy history, utilization of health care during pregnancy, delivery, and postnatal period as well as barriers to care seeking. If multiple births were encountered then it was considered as a single pregnancy event. The adapted questionnaire was translated from English into Kiswahili and pretested. The respondents were interviewed after obtaining written informed consent. Two teams of trained interviewers fluent in Swahili and English administered the survey questionnaire. A field editor reviewed questionnaires from all the teams using a checklist for completeness, quality, and consistency at the end of each day while the study investigators made periodic checks to ensure quality of data collection and entry.

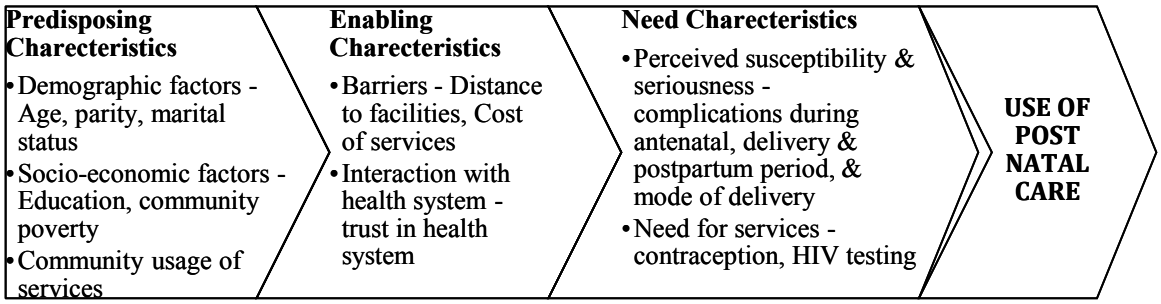
Variables

We framed the use of postnatal care at facilities using the health-seeking behavior model developed by Anderson and Newman[12]. This model proposes that the use of health

care services is a function of three sets of characteristics - predisposing characteristics, enabling characteristics, and need characteristics (Figure 13). To predict use of postnatal care, we included (i) predisposing characteristics such as age, parity, marital status, education, wealth index, community poverty and peer usage of services, (ii) enabling characteristics such as distance to facilities, cost of services, trust in health system and community outreach activities, and (iii) need characteristics such as perceived susceptibility, seriousness of complications during antenatal, delivery and postnatal period, mode of delivery and need for contraception, and HIV testing.

The outcome variable was 'use of postnatal care at a health facility', which was defined as attending postnatal care at a dispensary, health center, or hospital (government or private) within 6 weeks of delivery. Individual-level explanatory variables included demographic variables such as woman's age, birth order, education, marital status, and

Figure 13 - Factors influencing utilization of postpartum care



religion. An index of household wealth, based on household assets was created using principal components analysis (PCA) methods proposed by Filmer and Pritchett and used to group households into wealth quintiles[13]. Frequency of antenatal care visits and location of delivery care were included as measures of health system utilization. The variable 'HIV testing of baby' refers to the requirement for HIV testing of the baby after birth (not part of routine postnatal care) and functions as a 'need characteristic' variable. The 'partner test for HIV' variable is proxy for the involvement of men in the process. If expenses were incurred for a delivery, it was coded as a dichotomous variable 'money spent on delivery' which is a proxy barrier to care seeking.

To create community-level variables, the individual level responses were averaged at the level of the clusters. The asset score of the households in the cluster was averaged to generate a community poverty score that served as proxy for wealth of the community. The proportion of women in the cluster with primary or higher education was used as proxy for literacy of a community. The proportion of women using contraception and the proportion attending 4 or more antenatal visits were used as proxies for community postnatal family planning practices and maternal health service utilization. The community level variables for education, contraceptive prevalence and ANC4+ coverage were generated by assigning each cluster with the value of the prevalence of women for the indicators and dividing them into tertiles of low, middle and high categories. Communities with more than 80% of respondents who reported trusting a health provider or CHW for advice on pregnancy related issues were classified as communities with high trust. Survey teams, also, collected information on the presence of the nearest functioning

health facility and the distance recorded. The distance variable was categorized as 0 km (facility in the village), less than 5 km and more than 5 km.

Statistical analysis

Frequency distributions of the sample women were performed to describe the characteristics of women included in this study. Bivariate and multivariate analyses were performed for individual-level and community-level variables of interest. Multilevel models take into account the hierarchical structure of the data and clustering of responses at the different levels. . The following equation illustrates the multilevel model for utilization of Postnatal Care

$$\text{logit}(P_{ij}) = b_0 + b_1 I_{ij} + b_2 C_{ij} + b_3 Z_j X_{ij} + \mu_j + \varepsilon_{ij}$$

where i and j are the level 1 (individual) and level 2 (community) units respectively; p_{ij} is the probability of the outcome of interest for the birth *i*in the area*j*; the b's are the fixed coefficients; I and C refer to individual- and community-level explanatory variables, respectively; and $Z_j X_{ij}$ is a cross-level interaction term; μ shows the random effects for the jth area. The error term, ε, represents unmeasured factors that may influence use of postnatal are at a health facility. A multilevel random intercept logistic regression model without covariates (null model) was used to assess the influence of unobserved community-level characteristics on the overall variation in facility use. Three multilevel random intercept logistic regression models were fitted to estimate associations between the individual and community variables and the likelihood of seeking postnatal care at a health facility. The first model included individual-level characteristics only, the second model included community-level characteristics only and the last model (full) includes individual and community-level variables.

All statistical analyses were carried out with STATA 13. The extent of missing data was assessed, and patterns of missingness were explored in order to determine whether data were missing at random or missing completely at random (MCAR). Missing data were imputed through multiple imputation method which replaces missing values with multiple sets of simulated values from a Bayesian posterior predictive distribution of missing data[14].

Ethical considerations

Ethical and administrative approvals were obtained from the Ethics Review Committee of the Johns Hopkins University and the Muhimbili University of Allied Health Sciences, Dar es Salaam, Tanzania. Written informed consent was obtained from each participant.

Results

Population characteristics and study population

Our study included 1931 women who gave birth at any location residing in 60 clusters in 4 districts of Morogoro region in Tanzania. In our sample 73% of women lived within 5 km of a health facility and 61% lived in a village with a facility. Almost two thirds of the population was Christian while 81% reported living within a marriage or a union. About 98% had made 1or more antenatal care visits and 34% reported having delivered at home. Thirty one percent reported having experienced a complication during the antenatal period and 14% and 11% reported having complications during delivery and in the postnatal period respectively, with 6% reporting a complicated mode of delivery (caesarean section or use of forceps). Less than a quarter of women (23.2 % 95% CI : 18.7 -28.3) of the respondents reported visiting a health facility to receive postnatal care

with 2.4% (95% CI: 1.6-3.4) receiving care from a hospital, 9.3% (95% CI: 5.5 – 15.2) from a health center and 10.8% (95% CI: 8.2-14.2) from a dispensary. About 7.8% (95% CI 5.6-7.1) of women report being visited by a CHW postnatally. The socio-demographic (Table 14), health care seeking (Table 15) and community level (

Table **16**) characteristics of the women using postnatal care in the different types of facilities are given below.

Table 14 - Distribution of selected socio-demographic characteristics and postnatal care utilization across different types of facilities

Socio-demographic characteristics		Total	Hospital		Health Center		Dispensary		No care		P value
		N	n	%	n	%	n	%	n	%	
Total		1931	44	2.4%	174	9.3%	23	1.8%	1451	77.5%	
Age	15 - 19	291	9	3.2%	25	8.8%	26	9.2%	223	78.8%	0.81
	20 - 34	1334	27	2.1%	121	9.3%	146	11.2%	14	77.3%	
	35 - 49	299	8	2.8%	27	9.5%	3	1.5%	22	77.2%	
Christian	No	688	15	2.2%	64	9.6%	73	1.9%	515	77.2%	0.99
	Yes	1241	29	2.4%	11	9.1%	13	1.8%	935	77.7%	
Education	Less than primary	734	13	1.8%	49	6.9%	72	1.1%	576	81.1%	0.04
	Primary completed or higher	1191	31	2.7%	124	1.7%	131	11.3%	873	75.3%	
Birth order	First pregnancy	408	12	3.0%	36	9.0%	39	9.8%	313	78.3%	0.67
	Second or higher	1510	32	2.2%	136	9.3%	164	11.2%	1135	77.4%	
Wealth	Lowest	424	9	2.2%	24	5.8%	56	13.6%	323	78.4%	0.55
	Second	356	8	2.3%	33	9.6%	32	9.3%	272	78.8%	
	Middle	389	8	2.1%	36	9.6%	4	1.7%	291	77.6%	
	Fourth	3800	6	1.6%	38	1.2%	41	11.1%	286	77.1%	
	Highest	382	13	3.5%	43	11.7%	34	9.2%	279	75.6%	

Table 15 - Distribution of health care seeking characteristics and postnatal care across different types of facilities

Health care seeking characteristics		Total	Hospital		Health Center		Dispensary		No care		P value
		N	n	%	n	%	N	n	%	n	
Overall		1931	44	2.4%	174	9.3%	23	1.8%	1451	77.5%	
ANC visits	No visits	35	0	0.0%	3	9.1%	1	3.%	29	87.9%	0.27
	1-3 visits	634	18	2.9%	45	7.3%	62	1.1%	491	79.7%	

	4 or more visits	1262	26	2.1%	126	1.3%	14	11.4%	931	76.1%	
Eclampsia during antenatal period	No	1876	42	2.3%	167	9.1%	198	1.8%	1423	77.8%	0.12
	Yes	30	1	3.3%	6	2.0%	4	13.3%	19	63.3%	
Severe swelling of face/ legs during antenatal period	No	1663	36	2.2%	163	1.1%	176	1.9%	1246	76.9%	0.04
	Yes	240	7	3.0%	1	4.2%	24	1.2%	195	82.6%	
Mode of delivery	Normal delivery	1778	3	1.7%	165	9.5%	18	1.3%	137	78.5%	<0.001
	Cesarean section	115	14	12.7%	7	6.4%	2	18.2%	69	62.7%	
Complications during delivery	No	1616	32	2.%	152	9.6%	165	1.4%	1237	78.0%	0.04
	Yes	277	12	4.5%	22	8.2%	37	13.8%	198	73.6%	
Complications during postnatal period	No	1682	37	2.2%	149	9.%	172	1.4%	1293	78.3%	0.19
	Yes	223	7	3.2%	25	11.5%	31	14.3%	154	71.0%	
Money spent on delivery	No	911	22	2.5%	11	11.3%	97	1.9%	674	75.4%	0.03
	Yes	913	21	2.4%	6	6.7%	96	1.8%	716	8.2%	
Advised by CHW for PPC	No	1797	41	2.3%	148	8.4%	19	1.8%	1384	78.5%	<0.001
	Yes	90	3	3.4%	21	23.9%	12	13.6%	52	59.1%	
Partner tested for HIV	No	989	2	2.1%	79	8.1%	1	1.3%	775	79.6%	0.06
	Yes	778	23	3.1%	89	11.8%	88	11.7%	552	73.4%	
Received HIV testing for baby	No	1724	34	2.0%	155	9.2%	186	11.%	1311	77.8%	<0.001
	Yes	107	8	7.8%	15	14.6%	11	1.7%	69	67.0%	

Table 16 - Community level factors and utilization of postnatal care at health facilities

Community level variables			**Hospital**		**Health Center**		**Dispensary**		**No care**		**Total**
			n	**%**	**n**	**%**	**N**	**n**	**%**	**n**	**%**

Community usage of family planning	Low	653	14	2.2%	2	3.2%	72	11.4%	528	83.3%	0.03
	Middle	639	14	2.3%	51	8.3%	78	12.7%	473	76.8%	
	High	639	16	2.6%	13	16.6%	53	8.5%	45	72.3%	
Community coverage of 4 ANC visits	Low	687	16	2.4%	4	6.%	81	12.1%	533	79.6%	0.14
	Middle	621	16	2.7%	38	6.3%	49	8.2%	497	82.8%	
	High	623	12	2.%	96	15.9%	73	12.1%	421	69.9%	
Community level of poverty	Low	647	14	2.2%	44	7.1%	86	13.8%	479	76.9%	0.07
	Middle	665	13	2.%	31	4.7%	7	1.7%	54	82.6%	
	High	619	17	2.9%	99	16.6%	47	7.9%	432	72.6%	
Community level of women's education	Low	694	8	18.2%	48	27.6%	78	38.4%	542	37.4%	0.54
	Middle	627	16	36.4%	48	27.6%	59	29.1%	480	33.1%	
	High	610	20	45.5%	78	44.8%	66	32.5%	429	29.6%	
Community trust in health system	Low	1072	22	2.1%	87	8.3%	16	10.1%	835	79.5%	0.71
	High	859	22	2.7%	87	10.6%	97	11.8%	616	74.9%	
Distance to nearest health facility	Facility in village	1181	31	2.7%	6	5.2%	144	12.6%	99	79.5%	0.01
	1 to 5 KM	352	5	1.5%	81	23.5%	17	4.9%	241	70.1%	
	5 or more KM	398	8	2.1%	33	8.6%	42	10.9%	31	78.4%	
District	Morogoro DC	250	3	1.2%	6	24.7%	3	12.3%	15	61.7%	0.05
	Mvomero	520	13	2.6%	51	10.1%	67	13.3%	372	74.0%	
	Kilosa	808	18	2.3%	52	6.6%	69	8.8%	645	82.3%	
	Ulanga	353	1	2.9%	11	3.2%	37	10.8%	284	83.0%	

Bivariate analysis

Bivariate analysis (Table 17) showed women were significantly more likely of using a health facility for postnatal care if the mode of delivery was caesarean section or forceps delivery (OR 2.6, 95% CI 1.65 to 4.07), there were complications during the intra partum period (OR 1.51, 95% CI 1.09 to 2.09) or in the postnatal period (OR 1.56, 95%CI 1.09 to 2.22), or the woman received counseling from a CHW about postnatal care (OR 2.58, 95%CI 1.55 to 4.29). Significantly higher odds were also observed if the baby received testing for HIV (OR 1.9, 95%CI 1.2 to 3.02) or if partner was tested for HIV (OR 1.35, 95%CI 1.05 to 1.74). Lower odds were associated with delivery at a dispensary (OR 0.54, 95%CI 0.38 to 0.77). The only community level variable associated with significant odds of receiving postnatal care was the geographic location of the respondent. Women living in Mvomero (OR 0.5, 95%CI 0.22 to 1.16) Kilosa (OR 0.33, 95%CI 0.15 to 0.71) and Ulanga (OR 0.3, 95%CI 0.12 to 0.72) were less likely to receive postnatal care at a facility than those living in Morogoro DC.

Multilevel analysis

When a multi-level analysis was performed (Table 17), the null model (the multi-level random intercept logistic regression model without covariates), resulted in unexplained variance of 20% at the level of the clusters. The full model with individual and community level covariates reduced the unexplained variance to12% at the cluster level showing that the variation in the use of postnatal care was explained best by the inclusion of both individual and community-level characteristics. The likelihood ratio test was applied to test the significance of the random intercept model versus simpler logistic regression models and was significant (p value < 0.001) showing that the multilevel

model is the better model to explain the use of postnatal care. Models with random slope and interaction variables did not prove significantly different from the random intercept model and are not shown here. The significance of the random intercept in the model with no independent variables ($p < 0.004$) implies that a significant component of the variance in the use of postnatal care was not captured by the observed covariates and these unmeasured variables may constitute a source of bias.

Individual level effects

Women who had completed primary level of education or higher were more likely to be positively associated with postnatal care at a health facility (OR 1.37, 95% CI 1.04 to 1.81). Delivering at a health facility, including at a hospital (OR 0.50, 95%CI 0.33 to 0.76), health center (OR 0.57, 95%CI 0.38 to 0.85), or dispensary (OR 0.48, 95%CI 0.33 to 0.69), was negatively associated with use of postnatal care as compared to those delivering at home. Women reporting swelling of face and legs during pregnancy (n=240) had 35% lower odds of using postnatal care. Women who had a complicated mode of delivery (Cesarean section/ forceps delivery) had 2.9 times greater odds of receiving PNC services from facilities. Women counseled by a CHW on postnatal care had 2.3 times greater odds of using a facility for PNC (OR 2.3, 95%CI 1.36 to 3.89). HIV testing of infants was associated with almost two-fold higher odds of receiving postnatal care at a facility by women (OR 1.94, 95%CI 1.19 to 3.15) while women whose partners were tested for HIV also had increased odds (OR 1.41, 95%CI 1.07 to 1.86).

Community level effects

Women living in Mvomero, Kilosa and Ulanga had 59% (OR 0.37,95% CI 0.17 to 0.79), 69% (OR 0.27,95% CI 0.13 to 0.56) and 84% (OR 0.15,95% CI 0.06 to 0.38) lower

odds, respectively, to use postnatal care than those living in Morogoro DC. Women from communities that had high postnatal family planning contraceptive prevalence were positively associated with postnatal care (OR 2.48, 95%CI 1.15 to 5.37). Communities reporting high level of trust in the advice of health providers on matters of pregnancy and childbirth were more likely to be associated with use postnatal care than communities with lower levels of trust in the health system on issues related to maternal health (OR 1.77, 95%CI 1.12 to 2.79). Community education, poverty levels and distance to nearest facility (which has been widely used as an indicator of geographic access) did not have any association with utilization of postnatal care.

Sensitivity to missing values

The full multilevel model was subjected to sensitivity tests to estimate the impact of missing data using multivariate imputations for the independent variables. The percentage change in the standard error for all independent variables was less than 0.5% and the estimates derived from the imputed model are used.

Table 17 - Determinants of the use of postnatal care in rural Tanzania; results for logistic models

Variables		Unadjusted odds ratios (N = 1931			Model 1 (N =1889) (Individual variables)			Model 2 (N = 1889) (Community variables)			Model 3 (N = 1871) (Individual + Community)		
		OR	**95% CI**		**OR**	**95% CI**					**OR**	**95% CI**	
Individual level													
Age (in years)	15-19 (Ref)	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
	20-34	1.13	0.80	1.60	1.04	0.67	1.62				1.00	0.64	1.57
	35-49	1.31	0.85	2.01	1.18	0.68	2.03				1.14	0.66	1.96
Birth order	First pregnancy	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
	Second or higher	1.17	0.87	1.59	1.13	0.76	1.68				1.13	0.76	1.68
Education	Less than primary	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
	Primary completed or higher	1.28	0.99	1.65	1.38*	1.05	1.82				1.37*	1.04	1.81
Wealth quintile	Lowest (Ref)	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
	Lower	0.86	0.58	1.26	0.89	0.59	1.33				0.86	0.57	1.29
	Middle	0.91	0.62	1.32	0.89	0.60	1.32				0.86	0.58	1.28
	Higher	0.96	0.65	1.4	1.02	0.68	1.53				0.96	0.64	1.45
	Highest	0.92	0.61	1.37	0.86	0.56	1.33				0.79	0.51	1.23
Place of Delivery	Home (Ref)	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
	Hospital	0.7	0.51	1.06	0.52**	0.35	0.79				0.50**	0.33	0.76
	Health Center	0.75	0.52	1.09	0.64*	0.43	0.95				0.57**	0.38	0.85
	Dispensary	0.54**	0.38	0.77	0.49***	0.34	0.72				0.48***	0.33	0.69
Antenatal Care utilization	No ANC visits	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
	1-3 visits	2.15	0.73	6.32	2.15	0.72	6.45				2.37	0.79	7.08
	4+ visits	2.27	0.78	6.61	2.50	0.84	7.43				2.71	0.91	8.06
Mode of delivery	Normal delivery(Ref)	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
	Cesarean / forceps delivery	2.6*	1.65	4.07	2.89***	1.76	4.73				2.95***	1.80	4.81
Eclampsia during Antenatal Period	No(Ref)	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
	Yes	2.18	0.93	5.1	2.29	0.94	5.57				2.33	0.95	5.66
Severe swelling of face / legs during Antenatal Period	No(Ref)	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
	Yes	0.71	0.49	1.05	0.66*	0.44	0.99				0.65*	0.43	0.97
Complications during delivery	No (Ref)	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
	Yes	1.51*	1.09	2.09	1.31	0.89	1.94				1.29	0.87	1.91
Complications	No(Ref)	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00

during Postnatal Period	Yes	1.56*	1.09	2.22	1.39	0.91	2.11				1.33	0.88	2.02
Report spending money on delivery care	No(Ref)	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
	Yes	0.82	0.64	1.05	0.77*	0.59	1.00				0.78	0.60	1.01
Received counseling on PPC from CHW	No (Ref)	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
	Yes	2.58**	1.55	4.29	2.32**	1.37	3.93				2.3**	1.36	3.89
Received HIV testing for infant	No (Ref)	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
	Yes	1.9**	1.2	3.02	1.93**	1.19	3.15				1.94**	1.19	3.15
Partner tested for HIV	No (Ref)	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
	Yes	1.35*	1.05	1.74	1.42*	1.08	1.87				1.41**	1.07	1.86
Community level													
Community usage of family planning	Low	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
	Middle	1.54	0.8	2.96				1.53	0.82	2.86	1.57	0.83	2.98
	High	1.82	0.95	3.5				2.21*	1.04	4.69	2.48*	1.15	5.37
Community coverage of 4 ANC visits	Low	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
	Middle	0.77	0.4	1.46				0.73	0.41	1.31	0.70	0.38	1.27
	High	1.6	0.85	3.02				1.22	0.66	2.24	1.14	0.61	2.14
Community level of poverty	Low	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
	Middle	0.81	0.42	1.55				0.89	0.51	1.56	1.05	0.59	1.88
	High	1.39	0.72	2.69				1.16	0.57	2.38	1.45	0.68	3.09
Community trust in health system	Low	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
	High	1.44	0.83	2.48				1.76*	1.12	2.75	1.77*	1.12	2.79
Community level of women's education	Low	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
	Middle	1.0	0.52	1.93				0.72	0.39	1.33	0.68	0.36	1.26
	High	1.49	0.77	2.89				1.27	0.66	2.46	1.20	0.61	2.36
Distance to nearest health facility	Facility in village	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
	0 to 5 KM	1.77	0.87	3.59				1.08	0.59	1.99	1.07	0.57	1.99
	5 or more KM	1.09	0.55	2.15				1.39	0.76	2.55	1.38	0.74	2.57
Districts	Morogoro DC	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
	Mvomero	0.50	0.22	1.16				0.41*	0.20	0.85	0.37*	0.17	0.79
	Kilosa	0.33**	0.15	0.71				0.31**	0.15	0.61	0.27***	0.13	0.56
	Ulanga	0.3**	0.12	0.72				0.16***	0.06	0.39	0.15***	0.06	0.38
Variance due to					0.47			0.96			0.47		

cluster													
SE (variance)					0.1			0.12			0.1		
* p< 0.05 ** p < 0.01 ***p<0.001													

Content of postnatal care

We examined the content of care received by women during their postnatal care visit. The services varied significantly by type of facility (Table 18) with health centers and hospitals performing better than dispensaries for counseling on HIV ($p<0.001$) & PMTCT ($p<0.001$), family planning ($p =0.01$) and nutrition ($p =0.01$). The content of care also varied significantly by the status of HIV testing of the newborn, which acted as a proxy for the HIV status of the mother (Table 19). Women whose reported testing their newborn for HIV were more likely to report receiving counseling on exclusive breastfeeding ($p<0.001$), nutrition ($p<0.001$), newborn care ($p=0.02$) and family planning ($p=0.03$).

Table 18 - Content of postnatal care by type of facility used for postnatal care

	Total (N=437)		Type of facility used for postnatal care						
Content of care			Hospital (n=44)		Health Center (n=174)		Dispensary (n=203)		p
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	
Problem enquiry	87.1%	82-90.1	84.1%	67.4-93.1	89.5%	83-93.8	85.6%	77.8-91	0.51
Pulse	62.8%	57.9-67.5	77.3%	65.2-86.1	64.0%	55.3-71.8	58.7%	52-65.1	0.06
Temperature	59.1%	53.4-64.6	72.7%	61.1-81.9	60.5%	52-68.3	55.0%	46.8-64.6	0.08
Perineal examination	53.4%	46.7-59.9	65.9%	49.9-79	59.9%	49.4-69.5	45.0%	37.2-53	0.02
Abdominal examination	66.4%	59.8-72.3	77.3%	60.6-88.3	72.7%	62.3-81.1	58.5%	51-65.6	0.02
Breast examination	56.3%	48.7-63.5	59.1%	42.8-73.6	65.1%	54.4-74.5	48.0%	39.7-56.4	0.02
Examination for Deep Vein Thrombosis (DVT)	56.3%	50.4-62	68.2%	53.3-80.1	58.7%	49.5-67.3	51.5%	43.7-59.3	0.12
Counseling on exclusive Breastfeeding	66.5%	60-72.4	68.2%	53.3-80.1	70.9%	61.1-79.1	62.3%	53.5-70.4	0.27
Counseling on newborn care	67.0%	60.6-72.8	75.0%	59.8-85.8	72.3%	64-79.9	60.3%	50.8-69.1	0.05
Counseling on family planning	65.6%	59.1-71.6	74.4%	58.5-85.7	73.1%	64.1-80.5	57.3%	49.1-65.1	0.01
Counseling on nutrition	65.9%	60-71.3	77.3%	63.8-86.8	72.1%	63.1-79.6	58.0%	50-65.6	0.01
Counseling on personal hygiene	67.5%	60.9-73.4	75.0%	61.9-84.7	73.8%	63.6-82	60.3%	51.4-68.6	0.04
Counseling on HIV	62.0%	55.2-68.4	70.5%	55.7-81.9	71.5%	61.4-79.9	52.0%	44.3-59.6	<0.001
Counseling on malaria prevention	68.9%	62.4-74.8	74.4%	60.9-84.5	75.6%	66.6-82.8	61.9%	52.6-70.4	0.03
Counseling on care seeking	66.5%	59.5-72.8	76.7%	59.6-88.1	73.3%	64-80.9	58.5%	49.2-67.3	0.02
Counseling on well baby visits	67.2%	60.6-73.1	72.1%	57.8-83	72.7%	63-80.6	61.3%	52-69.8	0.11
Iron supplementation	53.5%	48-58.9	65.1%	49.3-78.2	53.2%	45.2-61	51.3%	42.7-59.7	0.31
Vitamin A for newborn	37.9%	31.6-44.6	46.5%	32-61.6	34.5%	24.6-45.9	38.9%	30.3-48.2	0.48

Table 19 - Content of care by need for HIV testing of newborn

	Total		Baby tested for HIV				
Content of care			Not tested (n=388)		HIV tested (n=36)		p value
	%	95% CI	%	95% CI	%	95% CI	
Problem enquiry	87.1%	82-90.1	86.5%	80.7-90.7	87.5%	70.1-95.4	0.88
Pulse	62.8%	57.9-67.5	61.5%	56.3-66.4	81.3%	64.2-91.3	0.03
Temperature	59.1%	53.4-64.6	58.8%	53-64.2	75.0%	58.8-86.3	0.05
Perineal examination	53.4%	46.7-59.9	51.4%	44.4-58.4	78.1%	57.7-90.3	0.01
Abdominal examination	66.4%	59.8-72.3	65.0%	58.1-71.4	87.5%	65.6-96.3	0.03
Breast examination	56.3%	48.7-63.5	54.2%	46.4-61	81.3%	60.8-92.4	0.01
Examination for Deep Vein Thrombosis (DVT)	56.3%	50.4-62	53.8%	47.7-59.8	84.4%	68-93.2	<0.001
Counseling on exclusive Breastfeeding	66.5%	60-72.4	65.0%	58.2-71.3	93.8%	76.9-98.6	<0.001
Counseling on newborn care	67.0%	60.6-72.8	66.1%	59.3-72.3	87.5%	70.1-95.4	0.02
Counseling on family planning	65.6%	59.1-71.6	64.8%	58-71	83.9%	67.9-92.7	0.03
Counseling on nutrition	65.9%	60-71.3	64.5%	58.1-70.4	93.8%	76.9-98.6	<0.001
Counseling on personal hygiene	67.5%	60.9-73.4	66.8%	59.5-73.3	90.6%	73.1-97.2	0.02
Counseling on HIV	62.0%	55.2-68.4	61.4%	53.9-68.3	75.0%	57-87.2	0.17
Counseling on malaria prevention	68.9%	62.4-74.8	68.3%	61.1-74.8	87.5%	69.3-95.6	0.05
Counseling on care seeking for maternal complications	66.5%	59.5-72.8	66.2%	58.7-73	81.3%	63.4-91.6	0.12
Counseling on well baby visits	67.2%	60.6-73.1	67.3%	60.4-73.5	75.0%	55.4-87.8	0.43
Iron supplementation	53.5%	48-58.9	51.8%	46-57.7	71.9%	52.2-85.7	0.05
Vitamin A for newborn	37.9%	31.6-44.6	36.8%	30.3-44	53.1%	35.4-70.1	0.09

Discussion

Use of postnatal care is low in rural Morogoro in Tanzania with less than one in four women reporting having visited a health facility for care. In the multi-level, multivariate analyses, individual-level factors that were positively associated with a postnatal care visit included: level of maternal education, cesarean section or forceps delivery, counseling from a CHW, and testing for HIV status both for partner and baby. Community-level factors positively associated with use of postnatal care included trust in health system and high postnatal contraceptive prevalence. Usage of facility-based delivery care and experience of severe swelling of face or legs in the antenatal period were negatively associated with care seeking during postnatal period.

Contextualizing findings

Our study is specific to the Tanzanian context in that the outcome variable was 'any visit made in the postnatal period to a health facility' in contrast to other studies that have included community based visits by health care workers [15-17]. CHWs are expected to deliver health messages and counsel women to go to health facilities for PNC and these visits do not constitute a postnatal visit per the definition of the Ministry of Health & Social Welfare, Tanzania. A strength of our study is the inclusion of community level factors that affected the use of postnatal care at health facilities, and indeed, reduced the unexplained variance at the cluster level.

In our study, women's education had a strong association with use of care similar to the findings by Fort et al from DHS surveys in Rwanda[17]. Higher educational attainment is more often associated with higher socio-economic status and greater awareness of maternal health care services[15]. Education could help women attain greater autonomy

and capable of negotiating and interacting with their family and community to access services and educated communities are capable of demanding better public services. This is also reflected in the positive association with partner testing where women are better able to negotiate with their partners to consider testing themselves for HIV.

Women counseled by a CHW to go to a facility for care were more likely to utilize postnatal services. CHW coverage in the region at the time of the baseline survey was low, and CHW did not routinely provide MNCH services. This reflects the need for building capacity among CHWs to counsel women to seek facility based postnatal services, in addition to strengthening the services at facilities. Women who reported testing their child for HIV were also more likely to go for a postnatal care. HIV testing of the infant is offered only to women who test positive during pregnancy or delivery or after delivery. This explains that women who are likely to be seropositive for HIV and require testing for their newborn are much more likely to access postnatal care.

Women delivering at home were significantly more likely to visit a health facility for postnatal care than those who delivered at a hospital, health center or dispensary. In previous studies, women receiving delivery care at a facility were considered, by default, as receiving postnatal care. In our study, we have considered only women who made a visit separate from that for delivery as having made a postnatal visit. This difference in the definition of what is considered a postnatal care between our study and previous research may have been a reason for the differences in findings. It is possible that women delivering at facilities were not being advised to return for care visits while women delivering at home feel the need to be checked or register the births by making a visit to a facility. Qualitative data from research conducted as part of the evaluation in the same

communities suggest that women come to the facility in the days after delivery with the specific intention of getting a card for the baby required for immunization and other services and end up receiving postnatal care (personal communication). Women reporting severe swelling of face and legs as a symptom (possibility of severe anemia) in the antenatal period , were significantly less likely to use postnatal care but we were unable to observe similar associations with reporting of other antenatal complications including eclampsia (n=29) due to small numbers in our sample. These women may have been unable to walk to health facilities even if they were living near one. This gap in knowledge warrants further research to validate and fully understand the relationships between anemia and other antenatal complications and use of postnatal care. Although complications during the intrapartum period or postnatal period were observed to be significantly associated with PNC in the bivariate analysis, they failed to achieve significance in the final model. This is most likely due to their low prevalence and subsequent loss in power when adjusting for many variables.

Other factors such as mother's age at delivery, birth order, and wealth were not associated with use of postnatal care in our study but have been found significant predictors elsewhere [16, 18, 19]. Spending money to access care was associated with lower likelihood of postnatal care when individual level factors alone are considered but the significance disappeared when community level factors were added to the model. Other studies have emphasized the importance of cost as a barrier to the use of health services in low - middle Income countries (LMIC) with one study from Tanzania reporting that 45% of women do not have a cash income and that the financial costs of

accessing these services, can be beyond the ability of families to pay [20-22]. The reason for different findings from literature may be due to the different definition of what is considered postnatal care between our study and previous research. The lack of significant associations for factors related to individual levels of poverty may be a result of the relatively homogenous socioeconomic profile of the study population in the Morogoro region and the inherently low levels of postnatal care utilization. Our lack of association for distance with facility use unlike other studies [23-25] may be due to the fact that Morogoro has a relatively better availability of health facilities.

Community-level factors were found to influence the health care seeking behavior of women residing in those communities[15]. The study found that district of residence; community levels of family planning and high levels of trust in advice by health providers on pregnancy and childbirth were significantly associated with postnatal care. Morogoro DC was associated with a significantly higher likelihood of women accessing postnatal care than the other study districts in the region (Mvomero, Kilosa and Ulanga). Morogoro DC is situated very close to a major town with a large regional hospital and multiple donor programs in maternal health, resulting in better access. The association with community levels of PPFP may be a proxy for the health behaviors and community norms as well as quality of health services available to the community [15]. This may be an enabling factor for women in shaping their intentions to seek postnatal care according to the Andersen model of health care utilization[12]. Living in communities where other women trust the health system on matters related to pregnancy and childbirth was positively associated with use of postnatal care. Gilson et al propose[26]two components of trust in the context of patient provider relationship -inter-personal trust and

institutional trust. However the present analysis only explores a part of the component of interpersonal trust that may be shaped by repeated interactions during the pregnancy. Repeated contact with health workers during pregnancy through antenatal care services could promote confidence and familiarity with the health system leading to increased trust in the health system.

When women did make a postnatal visit, many did not receive the services that they were supposed to have received. We found that only about two third of women reported receiving counseling messages on key topics such as exclusive breastfeeding, family planning, or newborn care. Dispensaries tended to fare poorly in delivery of these messages when compared to health centers and hospitals. Low quality of counseling as part of postnatal services has been reported in other settings in the literature with clinical examination being the focus and counseling taking a backseat [36]. Inappropriate infrastructure, and inadequate human and material resources were some factors have been blamed for the poor quality and providers skipped key topics like modern contraception due to religious reasons [37, 38]. Hospitals and health centers in Tanzania are considered better facilities than dispensaries due to their increased resources and the relatively better provision of postnatal services may not be surprising. Due to the paucity of studies on the quality of postnatal care in low resource settings, we were unable to identify any studies that looked at the differences in the quality by level of facility.

HIV positive women may be receiving better care due to the extra attention and resources from the PEPFAR program and its spillover effects onto other maternal health services[41, 42].

Limitations

We have interpreted postnatal care as any care sought at a health facility within 6 weeks of delivery without any exclusions to reason for seeking care (routine care vs care seeking for complications). This is unlikely to induce any selection biases based on recall of time of postnatal visit, and has the potential to reduce the magnitude of association, if any. The odds ratio estimates are more conservative (closer to the null) than estimates from smaller samples categorized on time of postnatal visit. Other limitations to this study include the small sample size of the level 2 groups (60 clusters) and the lack of precision for group-level variables resulting in wide confidence intervals. The villages in the Morogoro region of Tanzania vary greatly in size and structure. Sub-villages (or Vitongoji) may be so far from others of the same village unit that it may be difficult to group them as one homogenous cluster. Lack of accurate data on visits to health facilities in terms of time taken, precise costs incurred on transport and difficult terrain may hinder the precise measurement of geographic and economic access. Other than district of geographic residence, all the community variables were constructed by aggregating the individual-level characteristics at the community level.

The significance of the random intercept in the null multilevel model shows that many variables were not be accounted for in the multilevel analysis, particularly the different programmatic activities carried out at different levels of the health system or the targeted selection of communities into health system strengthening programs and projects. Traditional beliefs about the postnatal period play an important part in the use of care and are not adequately captured in our household survey. The analysis could not address the effects of these unobserved or unmeasured variables due to the lack of appropriate explanatory variables. Investigation of the quality of services provided was outside the

scope of this study. Moreover, in a cross-sectional survey, it is not possible to determine direction of causality or rule out confounding by unmeasured factors.

Policy Implications

Our results are most important to the MoHSW, in terms of considering policies aimed at expanding CHW coverage and deployment. The cadre of CHWs should be deployed to generate demand for postnatal services for the mother and child provided by health facilities starting from the immediate postnatal period to the extended postnatal period. At the district level, it would be helpful to look at the variations in use of care and critically analyze the factors for the differences. The differences in PNC use associated with place of delivery merit a more detailed investigation. The findings will not change existing guidelines for postnatal care but will initiate interest in program-level implementation research on how to increase utilization of postnatal care in varying health system contexts. Another key programmatic area of enquiry is the need to strengthen the counseling of women about the postnatal period and the benefits of returning to the facilities for postnatal care services. This counseling should be integrated into ANC and pre- discharge at health facilities after delivery. Rural Morogoro is comparable, in terms of access and utilization of MNCH services; to rural communities in other low resource settings with low postnatal care and these findings could form the basis for further enquiry.

Conclusion

Postnatal care (not including pre-discharge care) use is universally low in Morogoro with significant geographic differences. Even when women turn up for services, they do not

get all the services they are supposed to receive. The study findings represent a step toward an improved understanding of factors influencing women's use of postnatal care in Tanzania and other maternal health services globally. Individual factors like education, experiencing complications, need for HIV testing and counseling by CHWs along with community level factors like family planning norms, trust in the health system and geographic place of residence appear to influence postnatal care seeking to various degrees. Measurement and understanding of individual and community level factors, allow for better targeting and selection of communities for health system strengthening activities. This study reinforces the need to understand the contextual complexities of care seeking and the importance of building and strengthening systems through linkages between facility and community.

References for Aim 2

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Aim 3 - Assessing delivery of family planning counseling services through a continuum of care framework

Abstract

Background - The United Nation's Millennium Development Goal (MDG) 5 aimed to reduce maternal mortality by three quarters, between 1990 and 2015 for which the promotion of modern family planning (FP) among women in sub-Saharan Africa (SSA) was considered an important intervention. Postpartum family planning (PPFP) remains neglected in Tanzania and few studies have focused on the continuum of care approach to PPFP.

Methods - This study examines the role of FP counseling during the care continuum on the adoption of modern methods of FP in Morogoro region of rural Tanzania using data from a household survey. The survey interviewed recently delivered women (n=1968) who delivered within the last year of the date of interview to capture women who had a chance to experience facility based through the continuum of care and opportunity to make choices about FP. The primary outcome variables were the current use of a modern contraceptive method and Long Acting Permanent Methods (LAPM). The independent variables were of 2 types – i) factors related to delivery of counseling and, ii) external factors likely to influence outcomes including demographics, factors related to pregnancy and delivery and community characteristics.

Results – In the total sample of women from rural Morogoro, 68.7% (CI 64.4 – 72.5) of recently delivered women reported receiving counseling on FP during their antenatal care contact, 22.2% (CI 18.6-26.3) report receiving FP counseling through contact during their

delivery care and 14.9% (CI 11.3-19.3) report receiving counseling during their postnatal visit. Overall, 26.2% (CI 22.3-30.6) report having never received any FP counseling at point in the care continuum, 73.7%, (69.4-77.7) received counseling at least during one stage and only 5.8% (CI 4-8.3) reported receiving counseling at all three stages in the continuum. Counseling during antenatal, delivery and postnatal care was significantly associated with increased knowledge of modern contraceptive but not with knowledge of spacing interval. Overall, 34% (CI 30.5-37.8)) of recently delivered women reported using modern methods of FP and 7.2% (CI 5.7-9.1) reported using LAPM. After controlling for external factors, use of modern contraceptive methods was most likely to be associated with counseling during antenatal care (OR 1.55, 95% CI 1.22-1.97) and delivery care (1.3, 1.01-1.7) but not with counseling during postnatal care (1.07, 0.82-1.39). Women who reported that they were counseled at 1 or 2 stages (1.64, 1.27-2.12) or at all 3 stages (1.93, 1.26-2.96) in the continuum were positively associated with reported use of a modern method of contraception compared to those who did not receive any counseling. Women reporting receiving counseling at all 3 stages (2.97, 1.34-6.54) were more likely to report using LAPM than those counseled at fewer stages.

Conclusion – PPFP usage increases with the intensity of exposure to FP counseling during the maternal care continuum. This research strengthens the need to integrate and improve FP counseling during pregnancy, delivery and postnatal care periods.

Background

Globally an estimated 292,982 women died in 2013 from complications associated with pregnancy or childbirth [1]. Almost all (99%) of these deaths occurred in low resource settings; more than half in Sub-Saharan Africa [2]. The United Nation's Millennium Development Goal (MDG) 5 aims at reducing maternal mortality by three quarters, between 1990 and 2015 for which the promotion of modern family planning (FP) among women in sub-Saharan Africa (SSA) is an important intervention [3].

Birth spacing, defined as the recommended interval before attempting the next pregnancy, is an important predictor of maternal and perinatal outcomes. Birth to pregnancy intervals of less than six months are associated with 150% increased risk of maternal death, 70% risk of third trimester bleeding, 70% risk of premature rupture of membranes, and 30% risk of postnatal endometritis in the subsequent pregnancy [4]. Birth spacing also improves neonatal and infant outcomes, decreasing child mortality and morbidity [5, 6]. WHO advocates an interval of at least 24 months before attempting the next pregnancy in order to reduce the risk of adverse maternal, perinatal, and infant outcomes[7]. According to DHS surveys in 27 countries, two-thirds of women within one year of their last birth have an unmet need for contraception [8]

From a public health perspective, it helps to take advantage of every contact in the care continuum to offer women family planning counseling and services. The 'continuum of care' framework, highlighted as a core programmatic principle of Maternal Newborn & Child Health (MNCH) services [9-11]), looks at the provision of family planning services through the lifecycle of pregnancy, childbirth and the postnatal period by integrating them within existing package of basic MNCH services [10]. The periods of pregnancy,

delivery and postnatal periods are considered opportune for counseling women on the adoption of modern family planning (FP) methods due to frequent encounters with the health system [12-14]. At this time, women and their partners are highly motivated about the health of the mother-child dyad and are receptive to counseling about family planning practices and existing choices of contraception. These contacts provide a platform to educate women on the merits of optimal spacing of births to mother and child and the variety of contraceptive methods available [12]. Providing a continuity of care from antenatal services, including PMTCT, delivery, and postnatal care, increases the likelihood of effectively meeting women's health and fertility intentions [15]. The postnatal period has been traditionally considered as an important time for introducing and promoting contraception [16].

According to the 2010 Tanzania Demographic and Health Survey, the total fertility rate (TFR) in Tanzania is 5.4 children per woman- well above the national target of 4 children per woman [17]. More than a quarter of all pregnancies are unwanted (4%) or mistimed (23%), respectively [17]. Contraceptive prevalence rate (CPR) and unmet need among women of reproductive age are 34% and 25% respectively, with considerable rural–urban and regional disparities [17]. Despite having universal knowledge of contraceptives (90%), only 34 % of married women use any method of contraception, with only 27% using a modern method[17].

As common as programs on postnatal contraception have become, research evaluation of their effectiveness is still sparse [18]. Studies in literature have looked at the integration of family planning services into antenatal care [16] and postnatal care [12-14, 19-26]. We could not find any studies that had taken a ‘continuum of care’ perspective to the

impact of family planning counseling on the uptake of modern contraceptive method use. Since FP services are delivered as part of routine antenatal care, pre-discharge and postnatal care services in Tanzania, we had an opportunity to study the effect of receiving FP counseling at different points of contact (antenatal, delivery/pre-discharge and postnatal care) in the care continuum on the knowledge of birth spacing and usage of modern methods of PPFP. The present study seeks to a) assess the receipt of family planning counseling along the different stages of the care continuum – antenatal, delivery and postnatal care b) assess the association of such counseling on the uptake of modern methods of family planning in particular, long acting permanent methods of contraception (LAPM).

Methods

Study design

A baseline household survey of women who had a child birth in the preceding one year, hereafter referred to as recently delivered women (N=1968), was carried out from August 2011 to November 2011 in the Morogoro region of Tanzania. The survey was conducted as part of an evaluation of the Integrated Facility and Community Mother Newborn and Child Health (MNCH) program being implemented by the Tanzanian Ministry of Health and Social Welfare (MoHSW) with support from an international NGO known as Jhpiego.

Study area and sampling

The survey sample was designed to provide estimates for rural areas of four districts in the Morogoro Region of Tanzania. A two-stage sampling strategy was employed to select households from 60 villages, through probability proportional to size (PPS) sampling

using population estimates from 2002 Tanzania national population census. For each selected village, a list of the population and households was made based on data from the local government authorities, and sub-village units (Kitongoji) were grouped into clusters that were roughly composed of 1000 population and one cluster was chosen randomly for the survey. In each cluster, the survey team visited every household to interview women who had any pregnancy outcome (live born/stillbirth/abortion) in the previous year. If the household had more than one eligible woman, only one was randomly selected by lottery for the interview.

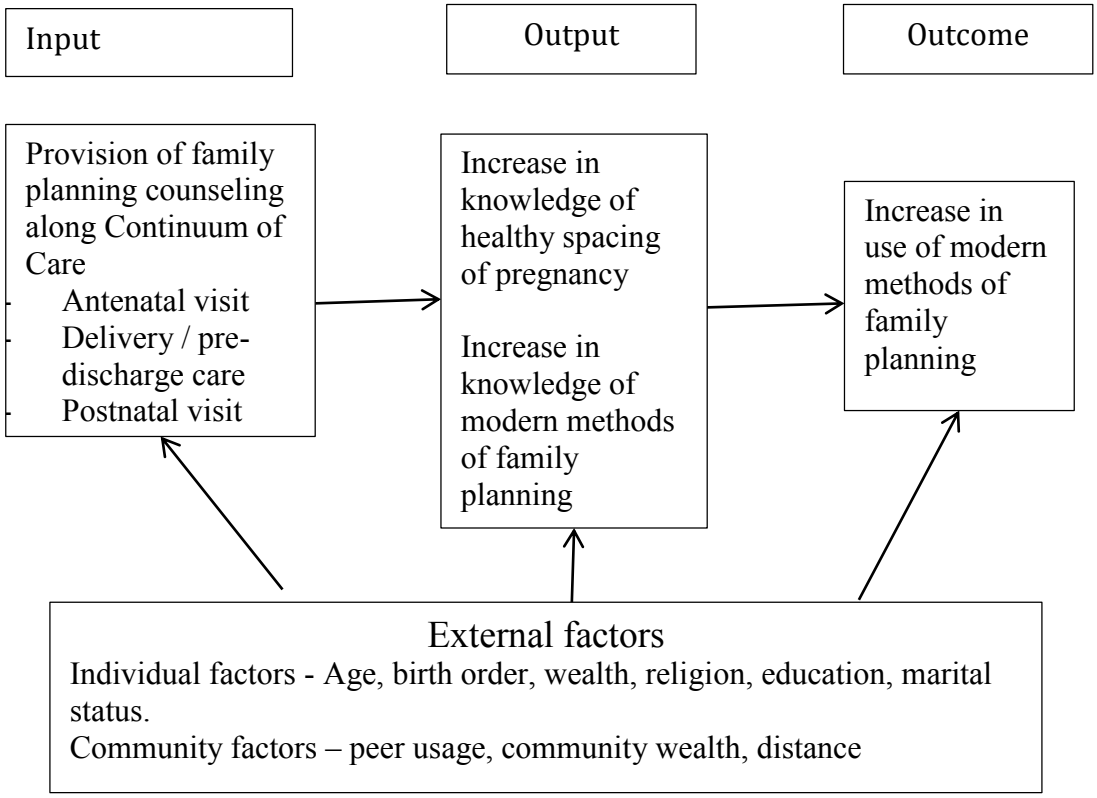
Instrument and Data collection

The respondent identified in each household was interviewed using a questionnaire adapted from instruments used by the MEASURE DHS program. The questionnaire was adapted to reflect relevant issues related to the larger ongoing evaluation in the region and collect information on background characteristics, pregnancy history, utilization of pregnancy, delivery, and postnatal care, content of care received in health facilities, and barriers to care seeking. Multiple births were considered as a single pregnancy event. The adapted questionnaire was translated from English into Kiswahili and pretested. Two teams of trained interviewers fluent in Swahili and English administered the survey. A field editor reviewed questionnaires from all the teams using a checklist for completeness, quality, and consistency at the end of each day. The field editor and team supervisor held daily briefings with team members to discuss and correct any visible errors in data collection. The study investigators made periodic checks to ensure quality of data collection and entry.

Framework for analysis

The MEASURE Evaluation Population and Reproductive Health (PRH) funded by the U.S. Agency for International Development (USAID) proposes a framework for evaluating the effects of Behavior Change interventions [27, 28]. We have adapted the framework to model the effects of FP counseling on the knowledge and adoption of modern methods of contraception (Figure 1) in Morogoro region of Tanzania (Figure 14).

Figure 14 - Framework for the effect of FP counseling on uptake of modern methods of contraception



Variables

The primary outcome variables were the proportion of women reporting the use of modern methods of family planning and in particular, use of LAPM. The contraceptive choices considered as 'modern methods' included male and female sterilization, intra-

uterine devices (IUD), injectables, intra-dermal implants, pills, male and female condoms, diaphragm, jelly and lactational amenorrhea method (LAM). LAPM methods included male and female sterilization, intra-uterine devices (IUD) and intra-dermal implants. Secondary outcome variables included the proportion of women reporting knowledge of contraceptive methods and the proportion of women reporting knowledge of correct spacing interval for births (At least 24 months after last pregnancy and before 60 months).

The study looked at 2 groups of explanatory variables – factors related to delivery of counseling at different stages of the care and external factors that are likely to influence the outcome. Women reported if they had received any form of counseling on family planning during their visit to a health facility for antenatal, delivery or postnatal care respectively. This was used to create 3 dummy variables – i) Received FP counseling during antenatal care, ii) Received FP counseling during delivery care (pre-discharge care) , and iii) Received FP counseling during postnatal care (does not include pre-discharge care). To measure the intensity of exposure, we created a composite variable by counting the number of stages (out of 3 – antenatal, delivery and postnatal) at which women reported any form of FP counseling. If women reported receiving FP counseling during antenatal, delivery and postnatal care, they were categorized as having 'received FP counseling at all 3 points of contact in care continuum'. If they received FP counseling at any stage but not at all 3 (antenatal, delivery or postnatal care), they were categorized as having 'received FP counseling at 1-2 points of contact in care continuum' and 'None' if there was no counseling at any point of contact.

External factors used as predictors included demographic variables such as woman's age, birth order, education, marital status, and number of children. An index of household wealth, based on household assets was created using principal components analysis (PCA) methods proposed by Filmer and Pritchett and used to group households into wealth quintiles[29]. The variables 'number of living children' and 'desire to limit family' were proxies for the fertility preferences of the respondent. History of complications during any part of the pregnancy was used as a proxy for perceived risk, as women who suffered complications might seek to space and / or avoid pregnancies. The asset score of the households in the cluster was averaged to generate a community poverty score that served as proxy for wealth of the community. The proportion of women using postnatal contraception in each cluster was used as proxy for community PPFP. Both the community level variables were categorized into tertiles – lowest, middle and highest. Survey teams also collected information on the presence of the nearest functioning health facility and the distance was recorded. The distance variable was categorized as 0 km (facility in the village), less than 5 km and more than 5 km. .

Analysis

The data were entered in the double entry format using FoxPro and the inputs were verified and cleaned to achieve a clean data set. This set was exported into STATA (version 13) for analysis. Descriptive and bivariate analyses using Chi Square were performed to explore the associations between explanatory and outcome variables. The multivariate logistic regression models were analyzed with adjustment for clustering due to survey design. Factors found in bivariate analysis to be significantly associated (P-value <0.1) with the outcome variables were included in the multivariate model. The

composite variable for frequency of exposure was input as an categorical variable for the multivariate models to assess any trends due to intensity of exposure. The multivariate models were adjusted for tribe, religion and geographic district of residence. All statistical analyses were carried out with STATA 13 using the *survey* functions. The full multilevel model was subjected to sensitivity tests to estimate the impact of missing data using multivariate imputations for the independent variables. The percentage change in the standard error between the original models and imputed models for all independent variables was less than 0.5% and the estimates derived from the imputed model are used.

Ethical approvals- Ethical and administrative approvals were obtained from the Ethics Review Committee of the Johns Hopkins University and the Muhimbili University of Allied Health Sciences, Dar es Salaam, Tanzania. Written informed consent was obtained from each participant.

Results

In our sample (n=1968) from rural Morogoro, 37 (2%) had experienced pregnancies that resulted in a miscarriage and did not have reason to access pregnancy care and were excluded from the analysis. Utilization of one or more antenatal care visits was nearly universal (98.2%, CI 96.7-99.6), while facility deliveries (66.2%, CI 59.2 – 73.2) and use of postnatal care services (23.1%, CI 18.4 – 27.9) were reported with lower frequency. The location of where women accessed care depended on the service and facility type. Most women accessed antenatal care from dispensaries (64%), 29% from health centers and only 8% from hospitals. Only 11% of women received postnatal care at hospitals, 41% at health centers and 48% at dispensaries. However, delivery care was accessed more equally at the 3 facility types: 30% of women delivered at hospitals, 32% from health centers, and 38% from dispensaries.

Receipt of counseling

Overall, most women (73.7%, CI 69.4-77.7) received FP counseling at one point or another in the continuum of care; 26.2% (CI 22.3-30.6) did not receive any counseling and only 5.8% (CI 4-8.3) of women reported receiving counseling at all three stages in the continuum. Among all women surveyed, 68.7% (CI 64.4 – 72.5) reported receiving counseling on FP during their antenatal care contact, 22.2% (CI 18.6-26.3) reported receiving FP counseling through contact during their delivery care and 14.9% (CI 11.3-19.3) reported receiving counseling during their postnatal visit. Whether or not a woman received FP counseling varied with the facility type for receipt of service (Figure 15). Of those receiving antenatal care, women at health centers (78.5%, CI 74.4-82.5) were more

likely to receive FP counseling than those at hospitals (69.5% CI 60.5-78.5) and dispensaries (66.9% CI 62.3-71.4). Of those receiving delivery care, women at a hospital (46.2% CI 39.5-52.8) were more likely to receive FP counseling than those delivering at health centers (35.6% 29.1-42.1) and dispensaries (24.1% CI 19.3-28.8). Of those receiving postnatal care, fewer women received FP counseling at dispensaries (57.2% CI 49.2-65.3) than those at hospitals (74.4% CI 60.7-88.1) and health centers (73.1% CI 64.8-81.4). Other characteristics of women that were associated with the receipt of FP counseling are presented below (Table 20).

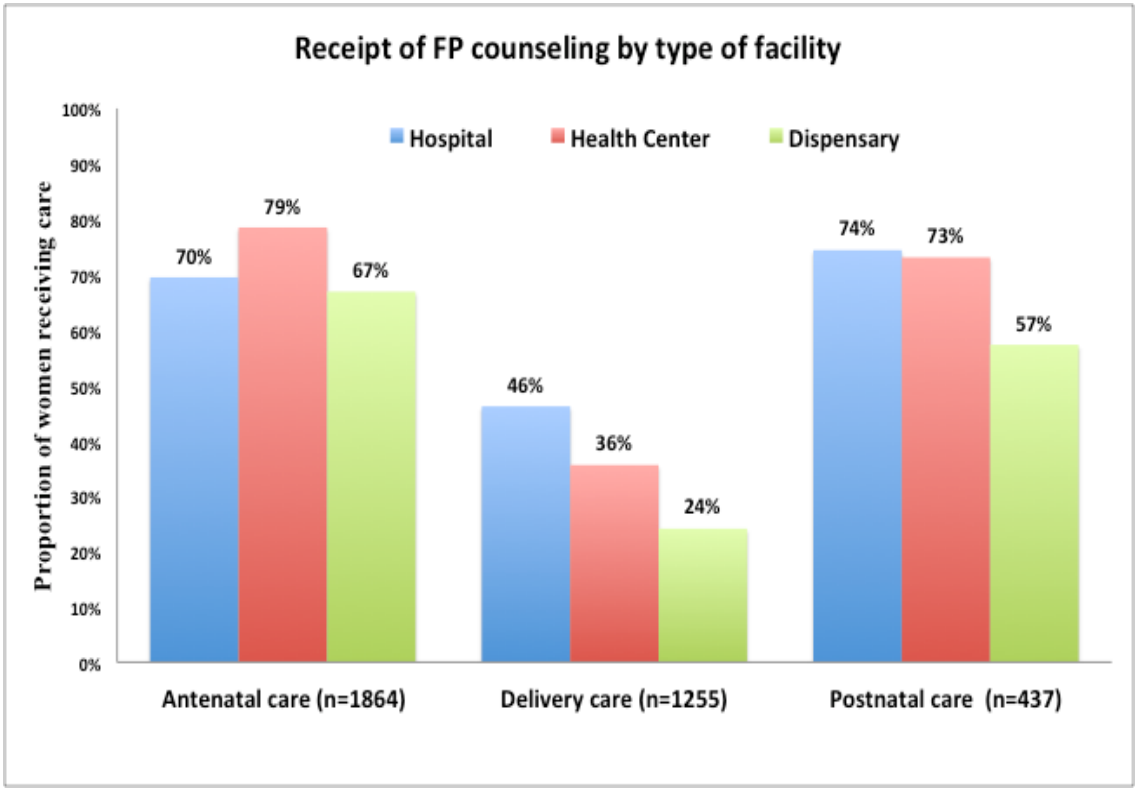
Table 20 - Receipt of FP Counseling among all respondents along Care Continuum by selected individual characteristics

Variables (n = 1931)	Categories		Received FP counseling during antenatal care		Received FP counseling during delivery care		Received FP counseling during postnatal care	
		N	%	p	%	p	%	p
Woman's age	15 - 19	291	60.8%	0.03*	22.7%	0.96	15.1%	0.11
	20 - 34	1334	69.9%		21.5%		14.3%	
	35 - 49	299	69.9%		22.1%		14.4%	
District	Morogoro DC	250	69.2%	0.12	25.6%	0.46	24.8%	0.03*
	Mvomero	520	63.8%		20.8%		17.9%	
	Kilosa	808	67.6%		19.3%		11.1%	
	Ulanga	353	76.8%		25.8%		9.3%	
Christian	No	688	71.5%	0.11	24.3%	0.14	15.3%	0.63
	Yes	1241	66.8%		20.2%		13.9%	
Tribe	Luguru	484	66.1%	0.02*	24.4%	0.01*	22.1%	0.00*
	Kaguru	375	61.1%		12.5%		8.5%	
	Pogoro	249	78.3%		26.5%		9.2%	
	Ndamba	25	68.0%		8.0%		8.0%	
	Others	793	70.4%		23.5%		14.2%	
Education of woman	No schooling	531	63.7%	0.02*	14.3%	0.00*	11.3%	0.00*
	Less than primary	203	66.5%		20.2%		7.6%	
	Primary or	1069	71.6%		26.3%		17.6%	

	more							
Education of partner	No schooling	233	57.6%	0.00^	15%	0.06*	11.4%	0.4
	Less than primary	108	61.1%		20.6%		12.3%	
	Primary or more	1165	72.7%		23.6%		15.2%	
	Not in union	378	65.9%		21.9%		15.7%	
Wealth quintiles	Lowest	424	68.2%	0.01*	17.7%	0.00*	10.4%	0.32
	Second	356	63.2%		14.6%		13.5%	
	Middle	389	65.3%		19.8%		14.9%	
	Fourth	380	69.5%		25.3%		16.1%	
	Highest	382	75.9%		31.2%		17.5%	
Birth order	1	408	64.2%	0.25	23.8%	0.49	14.2%	0.58
	2-3	724	68.0%		22.1%		15.1%	
	4-5	455	74.3%		21.3%		15.4%	
	6+	331	68.3%		19.3%		11.8%	
Complications in pregnancy / delivery/ postnatal period	No	1088	21.6%	0.42	70%	0.21	16.4%	0.05*
	Yes	803	23.3%		67.1%		12.8%	
Distance to nearest health facility	Facility in village	1181	68.6%	0.56	22.4%	0.37	12.8%	0.38
	1 – 5 Kms	352	71.9%		24.7%		21.0%	
	More than 5 Kms	398	65.1%		16.8%		13.3%	

*p <0.05 ^p<0.0

Figure 15 - Receipt of FP counseling by type of facility used



Knowledge of contraceptive methods and spacing

In our sample, 84.1% (CI 81-86.7) of women reported knowing at least one modern contraceptive method with 79.8% (CI 75.8-83.2) knowing at least two methods. However, only 40.4% (CI 37.9-42.1) knew the correct interval for spacing of births. FP counseling at each stage (antenatal, delivery and postnatal care) was positively associated with knowledge of contraception but not with knowledge of spacing. Women who reported receiving counseling at 1 or 2 stages and at all 3 stages were significantly more likely to report knowledge of contraceptive methods than those who reported no counseling. Those who reported counseling at all 3 stages in the continuum reported greater knowledge of contraceptive methods than those receiving counseling at 1 or 2 stages but this association failed to attain statistical significance (Table 21).

Table 21 - Counseling along Care Continuum and Knowledge of Contraception & Spacing

		N	Knows at least one modern contraceptive method	Knows 2 or more modern contraceptive methods	Knows correct time interval for birth spacing
			% (95% CI)	%(95% CI)	% (95% CI)
Overall		1931	84.1% (81-86.7)	79.8% (75.8-83.2)	40.4% (37.9-42.1)
Counseling during ANC	No	597	75.1% (70.2-79.5)	68.7% (63-74)	38.2% (34.1-42.4)
	Yes	1322	88.2% (85.6-90.4)	84.1% (81.6-87.8)	41.5% (38.9-44.5)
Counseling during Delivery care	No	1449	81.6% (78.2-84.6)	76.6% (72.4-80.4)	41.4% (38.5-44.4)
	Yes	419	92.5% (88.7-95.1)	90.6% (86.3-93.7)	38.3% (32.9-44.1)
Counseling during Postnatal care	No	1597	82.7% (79.4-85.7)	78.3% (74-82)	41.2% (38.8-43.7)
	Yes	278	90.2% (85.5-93.4)	87.4% (82.6-91)	36.6% (30.4-43.3)
Number of stages in care continuum at which counseling received	None	499	73.2% (67.7-78.1)	66% (59.8-71.7)	37.7% (33.3-42.3)
	1 – 2	1291	87.6% (84.9-89.9)	84.4% (80.9-87.3)	41.8% (39-44.7)
	All 3	110	94.9% (87.7-98)	90.9% (82.8-95.4)	35.1% (26.6-44.7)

Adoption of contraceptive methods

In our sample, 37.2% (CI 33.5- 41.1) of recently delivered women reported current use of any family planning method, 34% (CI 30.5-37.8) reported using any modern contraceptive methods (including short acting and long acting) and 7.2% (CI 5.7-9.1) reported using LAPM. FP counseling during antenatal and delivery care was significantly positively associated with use of any contraception, modern method of contraception and LAPM. Postnatal counseling was associated with use of any contraceptive and use of modern method contraceptive methods but not with LAPM. Women who reported receiving counseling at 1 or 2 stages and at all 3 stages in the continuum were

significantly more likely to report use of any contraception, modern method contraceptive methods and LAPM than those who reported no counseling (Table 22).

Table 22 - Counseling along Care Continuum & Adoption of Family Planning

		N	Current use of any contraception	Current use of modern method of contraception	Current use of LAPM
			% (95% CI)	% (95% CI)	% (95% CI)
Overall		1931	37.2% (33.5- 41.1)	34% (30.5-37.8)	7.2% (5.7-9.1)
Counseling during ANC	No	597	28.3% (24-33)	24.6% (21-28.7)	5.1% (3.4-7.7)
	Yes	1322	41.5% (37.4-45.8)	38.7% (34.7-42.9)	8.3% (6.4-10.6)
Counseling during Delivery care	No	1449	34.1% (30.3-38.2)	31% 27.3-34.9)	5.8% (4.3-7.7)
	Yes	419	47.7% (42.2-53.2)	44.2% (38.8-49.8)	11.3% (8.2-15.4)
Counseling during Postnatal care	No	1597	36% (32.2-39.8)	32.8% (33.2-48.5)	7% (5.4-9)
	Yes	278	43.6% (35.7-51.9)	40.7% (33.2-48.5)	8.4% (5.5-12.7)
Number of stages in care continuum at which counseling received	None	499	27.2% (22.5-32.5)	23.4% (19.5-27.8)	4.4% (2.8-6.9)
	1 – 2	1291	39.7% (35.7-43.9)	36.9% (33-41)	7.7% (5.9-10.1)
	All 3	110	52.8% (42.4-63)	48.1% (37.5-59)	7.3% (10.3-20.8)

Multivariate analysis

We assessed the effect of counseling at different stages of the care continuum through two sets of models – first with the individual variables for each stage of counseling (Table 23) and second, for the frequency of receipt of counseling (Table 24).

Table 23 - Regression models for effect of individual stages of counseling on current use of contraception

Predictors (N =1931)	Categories	**Current Use of Modern Method**			**Current Use of LAPM**		
Individual level variables		OR	95% CI		OR	95% CI	
Received FP counseling during postnatal care	No	Ref			Ref		
	Yes	1.07	0.82	1.39	1.04	0.58	1.87
Received FP counseling during antenatal care	No	Ref			Ref		
	Yes	1.55^	1.22	1.97	1.22	0.72	2.07
Received FP counseling during delivery care	No	Ref			Ref		
	Yes	1.3*	1.01	1.7	1.57	0.94	2.6
Woman's age	15 – 19	Ref			Ref		
	20 – 34	1.05	0.71	1.54	1.36	0.57	3.24
	35 – 49	0.76	0.46	1.27	0.9	0.3	2.76
Education of partner	No partner / Not in union	Ref			Ref		
	No schooling	1.22	0.76	1.96	1.22	0.42	3.6
	Less than primary	2.45^	1.46	4.11	2.8*	1.34	5.86
	Primary or more	2.11^	1.65	2.68	1.63	0.96	2.77
Education of woman	No schooling	Ref			Ref		
	Less than primary	1.05	0.64	1.74	1.78	0.94	3.36
	Primary	1.01	0.75	1.35	1.27	0.75	2.15
	Secondary or more	1.07	0.61	1.89	2.78*	1.23	6.33
Wealth quintiles	Lowest	Ref			Ref		
	Second	0.9	0.62	1.32	0.28*	0.1	0.82
	Middle	1.08	0.73	1.6	1.24	0.68	2.29
	Fourth	0.98	0.71	1.37	0.93	0.48	1.81

	Highest	0.91	0.6	1.36	1.13	0.59	2.17
Desire to limit family	No	Ref			Ref		
	Yes	0.79	0.62	1.01	1.14	0.7	1.87
Birth order	1	Ref			Ref		
	2-3	1.27	0.82	1.97	0.92	0.45	1.86
	4-5	1.11	0.66	1.86	0.56	0.23	1.35
	6+	1.07	0.53	2.16	0.46	0.13	1.61
Complications in pregnancy / delivery/ postnatal period	No	Ref			Ref		
	Yes	1.16	0.9	1.48	1.1	0.67	1.8
Number of living children	Continuous variable	1.07	0.96	1.2	1.31	1.1	1.57
Cluster level variables							
Distance to nearest health facility	Facility in village	Ref			Ref		
	1 – 5 Kms	1.12	0.9	1.4	0.86	0.48	1.53
	More than 5 Kms	1.05	0.83	1.33	1.18	0.6	2.33
Community levels of FP use	Lowest	Ref			Ref		
	Middle	1.97^	1.55	2.52	3.54^	1.74	7.21
	Highest	4.02^	2.85	5.69	3.73*	1.49	9.32
Community levels of Poverty	Lowest	Ref			Ref		
	Middle	0.77*	0.61	0.97	1.01	0.55	1.85
	Highest	0.83	0.62	1.11	1.44	0.72	2.89
All models are adjusted for tribe, religion and geographic district of residence							

*p <0.05 ^p<0.01

Table 24 - Regression models for effect of intensity of counseling exposure on current use of contraception

Predictors (N =1931)	Categories	**Current Use of Modern Method of Contraception**			**Current Use of LAPM**		
Individual level variables		**OR**	**95% CI**		**OR**	**95% CI**	
Number of stages in care continuum at which counseling received	None	Ref			Ref		
	1 – 2	1.64*	1.27	2.12	1.47	0.86	2.54
	All 3	1.93^	0.8	1.81	2.97^	1.11	3.61
Woman's age	15 - 19	Ref			Ref		
	20 - 34	1.06	0.72	1.55	1.46	0.6	3.55
	35 - 49	0.79	0.47	1.32	0.97	0.32	3
Education of partner	No partner / Not in union	Ref			Ref		
	No schooling	1.25	0.77	2.02	1.21	0.4	3.64
	Less than primary	2.47^	1.49	4.07	2.53*	1.22	5.26
	Primary or more	2.16^	1.68	2.78	1.67	0.92	3.05
Education of woman	No schooling	Ref			Ref		
	Less than primary	1.05	0.63	1.73	1.88	0.98	3.59
	Primary	1.04	0.77	1.4	1.33	0.79	2.25
	Secondary or more	1.22	0.73	2.05	3.24*	1.36	7.74
Wealth quintiles	Lowest	Ref			Ref		
	Second	0.94	0.65	1.36	0.36*	0.15	0.83
	Middle	1.08	0.73	1.59	1.21	0.66	2.21
	Fourth	0.98	0.71	1.36	0.87	0.45	1.69
	Highest	0.89	0.59	1.33	1.08	0.57	2.05

Desire to limit family	No	Ref			Ref		
	Yes	0.81	0.63	1.04	1.16	0.73	1.87
Birth order	1	Ref			Ref		
	3-Feb	1.24	0.8	1.92	0.91	0.45	1.85
	5-Apr	1.1	0.66	1.84	0.56	0.22	1.43
	6+	1.06	0.53	2.13	0.48	0.14	1.65
Complications in pregnancy / delivery/ postnatal period	No	Ref			Ref		
	Yes	1.17	0.91	1.49	1.18	0.74	1.88
Number of living children	Continuous variable	1.06	0.95	1.19	1.3^	1.09	1.55
Cluster level variables							
Distance to nearest health facility	Facility in village	Ref			Ref		
	1 – 5 Kms	1.11	0.89	1.38	0.85	0.47	1.54
	More than 5 Kms	1.04	0.82	1.31	1.28	0.66	2.51
Community levels of FP use	Lowest	Ref			Ref		
	Middle	1.97^	1.55	2.5	3.32^	1.72	6.41
	Highest	4.01^	2.84	5.66	3.43*	1.47	7.99
Community levels of Poverty	Lowest	Ref			Ref		
	Middle	0.77*	0.61	0.98	1.02	0.53	1.97
	Highest	0.84	0.64	1.11	1.54	0.79	3.01
All models are adjusted for tribe, religion and geographic district of residence							

*p <0.05 ^p<0.01

The first set of models (Table 23) showed that, when adjusted for confounders, counseling during antenatal care (OR 1.55 95% CI 1.22-1.97) and delivery care (1.3 1.01-1.7) was positively associated with use of modern contraceptive methods but counseling during postnatal care (1.07, 0.82-1.39) did not show such association. These models did not show any association for the use of LAPM and receipt of FP counseling during antenatal (1.22, 0.72-2.07), delivery care (1.57, 0.94-2.6) and postnatal care (1.04, 0.58-1.87). The second set of models (Table 24) show that women who reported that they were counseled at 1 or 2 stages (1.64, 1.27-2.12) and those receiving counseling at all 3 stages (1.93, 1.26-2.96) in the continuum were more likely to use a modern method of contraception compared to those who did not receive any counseling. Women who reported receiving counseling at all 3 stages were significantly more likely to use LAPM (2.97, 1.34-6.54) than those who reported no counseling. Those who reported being counseled at 1 or 2 stages (1.49, 0.86-2.57) did not differ significantly in the use of LAPM from those who did not report any counseling.

Other variables were also associated with use of modern contraceptive methods. Women with primary education or more (3.24, 1.36-7.74) were more likely to use LAPM than those with lesser education but no such association was observed for the use of modern contraceptive methods. Women whose partners had an education either less than primary (2.47, 1.49-4.07) or primary education or more (2.16, 1.68-2.78) had a higher odds of contraceptive use than those whose partners had no schooling (1.25, 0.77-2.02) or did not have a partner. Among LAPM users, only women whose partners had less than primary schooling (OR 2.53 CI 1.22-5.26) showed a significantly higher usage. Wealth was not observed to be significantly associated with use of modern contraceptive methods but the

second poorest quintile (OR 0.36 CI 0.15-0.83) was observed to have much lower likelihood of using LAPM than the other quintiles. Number of living children was significantly associated with use of LAPM (OR 1.3 CI 1.09-1.55) but not with the use of modern contraceptives overall. Variables not observed to have any significant associations with modern contraceptive use or LAPM use include distance, birth order, presence of any complications during pregnancy, desire to limit family, age and religion.

Discussion

This study looks first at the extent of the reported receipt of FP counseling by women at various stages of contact for care in the maternal health services continuum and if this was associated with the use of modern contraception. We found that there appeared to be many opportunities where women could have been provided family planning counseling and when receipt of such counseling was reported, it was associated with increased uptake of contraceptives. Repeated counseling of women at multiple points in the care continuum from antenatal to postnatal period was associated with higher prevalence of modern contraceptive use and LAPM

Antenatal care was the most important point in the care continuum for FP counseling with more than two third reporting receipt of counseling and most likely to be associated with contraceptive use. One third report being counseled as part of delivery care and three quarters reported counseling as part of postnatal care. After adjusting for less than optimal rates of skilled delivery care and very low coverage of postnatal care, less than one in four women in our entire sample reported receiving counseling as part of delivery care and this dropped to less than one in six for postnatal care. Very few women report

receipt of counseling through all stages of the continuum; of note, over one fourth do not receive at any stage of the continuum. Hospitals and health centers were much more likely to provide counseling than dispensaries with the differential being the highest for delivery care and least for antenatal care. A study on the quality of delivery of FANC model showed that very little time was being spent on the counseling of women and would indicate that FP counseling was not prioritized during the antenatal period. From other research, it seems unlikely that workers would have spent time on talking to women about optimal spacing intervals[30-32]. Knowledge of modern contraceptive methods was high with more than four in five women reporting knowledge of at least one modern contraceptive method., consistent with findings from the DHS[17]. However, knowledge of spacing was poor, with less than one in four women able to recall the correct spacing interval. This is supported by a community assessment of maternal health care seeking practices showed that although women had high knowledge of contraceptive methods their knowledge of birth spacing was poor[33]. The high level of knowledge of modern contraceptive methods but low level of knowledge on spacing interval could be due to a greater focus on contraceptive methods in contrast to counseling on optimal spacing as has been seen in Nigeria [34].

Antenatal counseling on family planning has been a part of the Focused Antenatal Care (FANC) package that has been the focus at health facilities in Tanzania for the past decade but in similar settings the quality of antenatal FP counseling has been documented to be poor through facility assessments [32, 35-41], The low prevalence of reported delivery care and postnatal care based FP counseling can be explained in terms of two distinct but related missed opportunities - one, women do not access facility based

care and two, those who accessed care at facilities failed to report receiving any FP counseling. Dispensaries appear to have the most room for improvement compared to hospitals and health centers. Since most women seek care at dispensaries, the lower rates of reported counseling at dispensaries result in lower rates for the population in general. A possible reason for the apparent low quality at different points include high client loads leading to crowding out of counseling, in general, and FP counseling, in particular [32, 42]. Other reasons put forward by providers to not talk about PPFP have included concerns that discussing family planning in the antenatal period makes women feel that the provider is not concerned about the current pregnancy; and superstitious beliefs of waiting to discuss contraception until they have had a healthy infant, especially among primiparas [43]. Provider perceptions that women not expected to have sex do not require contraceptive advice may also contribute to some confusion in initiation of FP counseling during a postnatal visit [43].

When counseling was available as part of antenatal and delivery care, it was associated with an increased use of modern contraceptives. Our effects are consistent with those seen in at least some other studies where counseling was provided as part of regular antenatal care [44] and delivery care[41, 45]. There is support for the effects of antenatal counseling on postnatal contraceptive use with some evidence from high-income countries showing that women are more receptive to advice given antenatally [18, 45, 46] although other research has not shown any benefits [16]. Another study from Egypt on the impact of antenatal counseling on couples' knowledge and practice of contraception, showed that counseling sessions did improve couples' knowledge and practice in the study group[47]. The integration of FP counseling into the care continuum has the

potential to increase contraceptive use in two ways. First, it promotes an early start to the family discussion on FP allowing women and their partners ample time to discuss the issue without the distraction of tending to the newborn[34]. Second, it lends to repeated delivery of key messages reinforcing knowledge and attitudes[34]. The 'early start' effect is potentially supported by the greater effect of the magnitude of counseling during antenatal and delivery care based on contraceptive use as compared to postnatal counseling[48]. The evidence for postnatal period counseling is mixed with some showing success[45] and reporting poor association between postnatal care and contraceptive uptake, hypothesizing that the postnatal period can be an inadequate time for counseling due to distractions [20, 26, 45, 49]. A recent Cochrane review looked at the effectiveness of postnatal counseling on the uptake of contraception and found low to moderate quality of evidence with multiple sessions proving more effective than single time contacts [50]. Postnatal care was yet to gain much attention at the time of this study and hence may have had limited impact on contraceptive uptake.

Repeated FP counseling sessions are associated with the uptake of long acting permanent methods of contraception, whose levels are very low in Tanzania. Counseling at all 3 stages was associated with use of LAPM since women and their partners may have needed sufficient time to discuss and mentally prepare themselves for long term or permanent contraception method like IUD implantation or tubal ligation. Using multiple points of contact can potentially reduce the number of women who may not be reached and may help reinforce key messages to women already contacted previously. More operational research is needed to ascertain the most effective strategies that will also be cost effective, especially for resource-constrained settings.

Limitations

A key limitation of the research is the possible 'recall bias' in the reporting of receipt of family planning counseling by women. Women who are current users of contraceptive methods are much more likely to recall the FP counseling they received at various stages over a one to two year time frame. This can cause an overestimate of the impact of counseling on contraceptive use. Second, the small sample of LAPM and postnatal care users reduces the power of the study to assess small effects. Third, the quality and content of counseling services provided in the continuum of pregnancy to delivery was not studied. Lastly, the present study is a cross-sectional survey limiting our findings to associations between variables and the ability to attribute causality. Further prospectively designed studies are needed to causally attribute the impact of repeated FP services on contraceptive use. These prospective studies could look more closely at the content and quality of counseling on the knowledge and use of family planning.

Policy implications

The study is based on actual implementation of regular services in the context of a functioning regional health system. The findings will not change existing guidelines on FP counseling but help to focus on increasing the coverage of good quality counseling by health care providers. The capacity of health workers, who will counsel about available modern methods, address fears about negative side effects and enable fully informed choice, should be addressed. Delivery of family planning counseling services in the region need to be strengthened, with a particular focus on dispensaries, which cater to the greatest proportion of pregnant women.

Conclusion

Postpartum family planning is a service ripe for promotion and dissemination among the women of Tanzania. There are many missed opportunities for FP counseling in the care continuum and hence much room for improvement in adoption of modern methods of family planning, especially LAPM. Repeated counseling during the care continuum has the potential to increase knowledge of birth spacing and the use of modern contraceptives. Integration of FP counseling into the continuum will be necessary to improve the CPR to 60%, based on the Tanzanian MoHSW's roadmap.

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Conclusions

Our research findings can be used to improve the MNCH integration and reduce dropouts from the continuum of care. We conclude by presenting a summary of the key findings, limitations, and implications from the three papers.

Key findings

1. *Many women dropout from the care continuum at the stage of delivery care and postnatal care.*

Our present study highlights that less than 10% of women receive the 'recommended' set of contacts for care (4 antenatal visits, delivery care and at least one postnatal care) in the care continuum. The largest dropouts occur at the stage of delivery and postnatal care. The factors associated with dropout from the continuum varied widely for different points of care with the poor being most likely to dropout from the care continuum and receive less than optimal care.

2. *Strengthening postnatal care at health facilities appears to improve the retention of women in the care continuum.*

Women living in the catchment areas of health centers that were implementing the IFC program were associated with greater use of postnatal care at health facilities. It is possible that health providers, recently trained in PNC, are much more aware of the importance of postnatal care and subsequently counsel women to return at an appropriate date.

3. *There is considerable variation in the content of postnatal services delivered at facilities.*

Even when women turn up for services, they do not get all the services they are supposed to receive. Hospitals and health centers are better than dispensaries in providing the content of services prescribed in the guidelines. The fact that more women use dispensaries for postnatal care results in more women, overall, receiving subpar care.

4. *Higher trust and CHW counseling appear to improve retention of women in the continuum*.

Communities with a high level of trust in the advice provided by health providers report higher use of care. When CHWs counsel women on PNC, it is associated with a lower dropout from the continuum. Improving the reach of the continuum of care across the place dimension appears to have a beneficial effect on the time dimension.

5. *Family planning counseling and services are provided at various stages in the maternal health continuum but the provision is variable across different stages and types of facilities.*

Family planning counseling appear to be better provided along with antenatal and postnatal care services than delivery care but the quality is variable. As with postnatal care, health centers and hospitals appear to be better than dispensaries in delivering family planning counseling. Over one in four women reported not receiving any FP counseling and only one in twenty reported receiving it at all stages.

6. *Frequent delivery of family planning counseling along the care continuum is associated with a higher level of adoption of modern contraceptives.*

Repeated emphasis of FP messages is associated with higher use of modern methods, especially the use of LAPM. Antenatal delivery of messages appears to be the most

positively associated with contraceptive use.

Strengths

1. We could not identify any studies in literature that have used the continuum of care approach to identify the gaps in maternal health services in the Tanzanian setting and the results of this study have contributed to existing gaps in evidence.
2. Our study was also unique in its effort to use continuum of care framework to look at the provision of family planning on the use of contraceptives. The study evaluates the routine use of health services based on actual implementation of regular services in the context of a functioning regional health system.

Limitations

1. The entire study is based on a single cross-sectional survey. Corroboration and triangulation of the findings from other sources of data would have greatly strengthened the findings.
2. In the present study we look at the points of contact for care and do not account for content delivered or quality of content. We would have preferred to investigate further the quality and content of counseling services provided, but the data from the present survey did not permit such an analysis. We did not collect data on characteristics of the health system for the present sample, although a separate facility assessment was conducted and will be reported separately.
3. Our findings are drawn from a geographically small area, Morogoro region of Tanzania, and may not be generalizable to the rest of Tanzania or sub-Saharan Africa.
4. Moreover, the present study is a cross-sectional survey limiting our findings to

associations between variables and unable to determine direction of association or causality.

5. We were unable to test for program effects of the IFC program using an experimental design due to the fact that the evaluation was conceived after some of the program activities had been implemented.
6. There is a possible 'recall bias' in the reporting of receipt of family planning counseling by women. Women who are current users of contraceptive methods are much more likely to recall the FP counseling they received at various stages over a one to two year time frame resulting in an overestimate of the impact of counseling on contraceptive use.
7. The small sample for some indicators like LAPM and HIV status may have resulted in the lack of power to detect differences between groups.

Policy implications

The findings are most important to the MoHSW, in terms of supporting policies aimed at expanding coverage of services in the maternal care continuum. District level variations should be critically analyzed with a focus on what works in the better performing areas. The differences in the content of postnatal counseling provided by location and type of facility merit a more detailed investigation. There will not be any change in existing maternal health care guidelines but will generate interest in the implementation research of FANC and other MNCH programs – key strategies may include the need to encourage women to contact the health system early in pregnancy and checklists to ensure providers do not miss important items. The findings will not change existing guidelines on FP counseling but help to focus on increasing the coverage of good quality counseling by

health care providers.

Globally, this research will add to the evidence base for policies aimed at expanding CHW coverage and deployment. The cadre of CHWs could be deployed to provide seamless transition from care provided by health facilities to community based care. The findings will not change existing guidelines for postnatal care but will initiate interest in program-level implementation research on how to increase use of postnatal care and quality of care provided in various health system contexts.

In conclusion, our research highlights the importance of integrating MNCH packages in different contexts and the need for further improvements in monitoring and evaluation in order to effectively guide progress towards greater coverage along the continuum of care to save the lives of women and children. Strengthening the continuum of care means focusing global attention to tracking relevant data and strengthening capacity to use such data to design and improve services, especially at district level. The postnatal period, in particular, is a notable gap that has been neglected by maternal health strengthening activities until recently. The continuum framework offers a comprehensive thinking of planning and provision of MNCH services. Improved policies and increased investments using this framework can contribute to meeting the needs of mothers, neonates and children, by increasing coverage of proven interventions.

Appendix

Household survey instrument

Household Questionnaire for Women who have given Birth within the Last one Year

How to fill the questionnaire

RESEACHER'S EFFORTS TO VISIT THE HOUSEHOLD

	First Visit	Second Visit	LAST VISIT
Appointment for the day of visiting the household	**Date** **Time**	**Date** **Time**	**Date** **Time**
Actual date for household visiting	**Date** **Time**	**Date** **Time**	**Date** **Time**
Results after the interview. (Use subsections from number 101)			
101. Outcome of reseracher's efforts to complete the interviewer			
Only the household questionnaire is filled to completion 11. The selected participant refused to participate 12. No one met the criteria for pariticipation from the household==========> 13. The selected participant was not available at home==========> 14. The selected participant has postponed the interview			Re-visit is needed Re-visit is needed
Mother's questionnaire has not been filled to completion 21. The pariticipant didn't like to continue with the interview==========> 22. The remaining part of interviewer has been postponed till next time			Re-visit is needed
Interviewer has been completed 31. Questionnaire has been filled to completion			
102. The date when interviewer was conducted to completion			
103. A person who confirmed the completion of the interviewer			

104. Comments

2. Interviewee's personal information.

201.	When were you born? Please tell me the date, month and the year you were born	----------/---------/----------	
202.	What is your age, in terms of years? ***COMPARE AND THEN CORRECT 201 AND/OR 202 TO ENSURE CONSISTENCY.***	Write down the age, in terms of years	[ ]
203.	What is your religion?	1. Christian 2. Muslim 3. Hindu 4. Budha 5. Others (Mention) _____	[ ]
204.	What is your tribe?	1. Luguru 2. Kaguru 3. Pogoro 4. Ndamba 5. Others (Mention) _____	[ ]
205.	What activity are you engaged in to earn living?	**Agriculture** 1. Crops / Animal keeping 2. Fishing **Employed** 3.Government and other institutions 4.Private sector **Self employed (Not in agriculture/Animal keeping)** 5. Has employed other people 6. Has not employed anyone 7. S/he is involved in family projects (non-agricultural projects) without gaining any payment(s). **Not working** 8. S/he is ready to work 9. S/he is not ready to work 10.Dealing with domestic activities/housewife 11. Student 12. Can not work (Old age, retired, sick, disabled)	[ ]

		13.Other activities (Mention) _____	
206.	What is your relationship with the head of this household?	1. Head of household 2. Wife 3. Daughter 4. In-law (Married) 5. Grand daughter 6. Mother 7. Mother in-law 8. Sister 9. Sister in law 10. Relative 11. Adopted/step daughter 12. Domestic servant 13. Friend 14. Others-not relatives based: (Mention) _____	[ ]
207.	What is the head of household doing to earn the living? (income generating activity done by the head of household)	**Agriculture** 1. Crops / Animal keeping 2. Fishing **Employed** 3.Government and other parastatals 4.Private sector **Self employed (Not in agriculture/Animal keeping)** 5. Has employed other people 6. Has not employed anyone 7. S/he is involved in family projects (non-agricultural projects) without gaining any payment(s). **Not working** 8. S/he is ready to work 9. S/he is not ready to work 10.Dealing with domestic activities/housewife 11. Student 12. Can not work (Old age, retired, sick, disabled) 13.Other activities (Mention) __	[ ]
208.	Have you ever been to school for formal education?	1. Yes 2. No ***(GO TO QUESTION 210)***	[ ]
209.	What is your level of eduvation? That is ,how many years did you spend in school or college/university?	Write down the number of years spent in attending school or college/university.	[ ]
210.	Now, i request you to read the following sentence. ***SHOW THE CARD WITH THAT PARTICULAR SENTENCE TO THAT PARTICIPANT. IF THE PARTICIPANT CAN NOT READ THE WHOLE SENTENCE, INVESTIGATE***: Can you read any part or any words from this sentence?	1. Was able to read the whole sentence 2. Was able to read some parts of that sentence 3. can not read the given sentence 4. Blind/has eye(s) problems	[ ]

211.	Are you currently married or do you live with any man in any marital relationship?	***1. Yes (GO TO QUESTION 213)*** 2. No	[ ]
212.	**If NO,** what type of marital relationship are you currently in? Widow, divorced, separated from your partner?	1. Widow 2. Divorced 3. Separated from my partner **4. Never been married – GO TO QUESTION 215**	[ ]
213.	Has your husband or your partner got formal school education?	1. Yes 2. No 9. I don't know/I don't remember	[ ]
214.	What is the education level of your husband or partner?	Mention the years spent in school	[ ]
215.	How old were you when you became pregnant for the first time?	Years ____	[ ]
Please let me ask you few questions concerning your household.			
216.	What is the main source of drinking water and water for other uses in your household?	1. Tap water,, available inside the house 2. Tap water, available outside the house 3. Tap water, from the community water supply. 4. Open water well, found outside the house 5. Open well for community uses 7. Constructed water well, located outside the house 8.Springs/Rivers/water channels/pond/lake 9. Other (Mention)_____	[ ]
217.	Is your household with the toilet?	1.Yes 2.No ***(GO TO QUESTON 219)***	[ ]
218.	If yes, what type of toilet is it?	1. Toilet not using water to flash waste materials (not shared one). 2. Toilet using water to flash waste materials (shared with other household(s)) 3. Pit latrine,allowing air in but not shared with other household(s). 4. Pit latrine, allowing air in and shared with other households. 5. Toilet constructed under traditional settings but not shared with other households 6. Toilet constructed under traditional settings and shared with other households 7. other type(s) (Mention)_____	[ ]
219.	What are the materials used to roof the house where the head of this household lives in? (**INVESTIGATE AND KEEP THE RECORD OF THINGS YOU WILL SEE)**	1. Grasses/ Leaves/ Soil 2. Roofing iron sheets 3. Tiles 4. Cement 5. Asbestos 6. Another type (Mention)_____	[ ]
220.	What is are the materials used to	1. Trees and soil	

	make the walls of that house? ***(KEEP THE RECORD OF THE THINGS YOU WILL SEE. IN CASE MORE THAN ONE MATERIAL HAS BEEN USED, SHOW THAT ONE THAT HAS BEEN USED MAINLY)***	2. building blocks made using soil 3. building blocks burnt in furnaces 4. Timber 5. Cement blocks 6. Stones 7. other materials (mention) _____	[ ]
221.	What are materials used in making the floor of that house? (**INVESTIGATE AND KEEP THE RECORD OF THE THINGS YOU WILL SEE)**	1. Soil/Sand 2. Animal secretions 3. Wood planks/bamboo trees 4. Polished timber 5. Ceramic 6. floor tiles 7. Cement 8. Other (Mention) _____	[ ]
222.	Is the house mentioned above owned by your household?	1.Yes ***(GO TO QUESTION 224)*** 2. No	[ ]
223.	If this household doesn't own this house, have you rented it?	1.we have rented the house 2. another arrangement (Mention) _____	[ ]
224.	Does your household own land?	1.Yes 2. No ***(GO TO QESTION 226)***	[ ]
225.	If your household owns the land, what is the size in acres ?	Write down(an estimation) the number of acres 998 I don't know	[ ]
226.	Is your house with electric power?	1.Yes 2.No	[ ]
227.	Is your house with the following?(put a mark on the corresponding item) A. Radio and music instruments B. chickens or ducks C. Cow or donkey D. Sheep, goat, pig E. Bicycle F. motorcycle G. car or tractor H. Television I. Fridge J. mobile phone K. Home telephone (not mobile phone) L. shop/kiosk/bar M. sawing machine N. Sofa/Sofa set. O. Special table for food.	A. 1=YES 2=NO B. 1= YES 2=NO C. 1= YES 2=NO D. 1= YES 2=NO E. 1= YES 2=NO F. 1= YES 2=NO G. 1= YES 2=NO H. 1= YES 2=NO I. 1= YES 2=NO J. 1= YES 2=NO K. 1= YES 2=NO L. 1=YES 2=NO M. 1=YES 2=NO N. 1=YES 2=NO O.1=YES 2=NO	[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

3 Pregancy history and services received **May i please ask you about your history of prenancy and health services?**			
301.	Is there any biological child of yours that you are living with currently?	1.Yes 2.No	[ ]
302.	How many sons of yours are you currently living with? How many daughters of yours are you currently living with?	***IF NO CHILDREN WRITE '00'***	[ ] [ ]
303.	Do you have any biological children that you are not living with at this moment?	1.Yes 2. No **(Go to 305)**	[ ]
304.	If yes, how many sons that you are not living with currently? How many daughters that you are not living with at this time?	The number of male children living far The number of female children living far. ***IF NO CHILDREN LIVING FAR AWAY, WRITE '00'***	[ ] [ ] [ ]
305.	***REFER QUESTIONS NUMBER: (302 + 304), COMPARE AND THEN CORRECT TO CONFIRM THE REAL TOTAL NUMBER OF CHILDREN*** Currently you have_____living children.	1.yes 2 .No	[ ]
306.	Have you ever given birth to a living child who died later? ***IF THE ANSWER IS NO PROBE: ANY CHILD WHO CRIED OR SHOWED SIGNS OF LIFE IMMEDIATELY AFTER BIRTH BUT DIED AFTER HOURS OR FEW DAYS.***	1. Yes 2.No (**Go to question 308**)	[ ]
307.	How many male children of yours have died so far? How many female children of yours have died so far?	***IF NO CHILDREN HAVE DIED, WRITE '00'***	M[ ] F[ ]
308.	Some pregnancies could face various intra utero damages or abortions. Some could cause a woman to deliver prematurely or to give birth to a dead baby who has no any signs of life. Have you ever faced any of the above situations at different moments of your pregnancies such as giving birth to a dead child?	1.Yes 2 .No **(Go to question 310)**	[ ]
309.	How many times have these incidences of abortions or giving birth prematurely have happened to	Number of such incidences _____	[ ]

	you?		
310.	Add answers from questions 305, 307, and 309 so that you get the total number of pregnancies and then write on the space given on the right side.	Total number of pregnancies	[ ]
311.	***REFER TO QUESTIONS: (305 + 307 + 309) AND COMPARE AND CORRECT TO CONFIRM THE INTERVIEW ON THE NUMBER OF CHILDREN.*** For now you have _____children (Question number 305) a number children who died _____ (Question 307) number of pregnancies delivered prematurely _____ (Question 309) Is given information above correct ?	1.Yes 2 .No	[ ]

Please tell me about your last pregnancy			
312.	How many months did your last pregnancy last? ***WROTE DOWN IN TERMS OF COMPLETE MONTHS.***	**Write down the pregnancny age _____** ***(iF IT IS LESS THAN 7 MONTHS ,GO TO QUESTION 318;OTHERWISE ASK THE NEXT QUESTION)***	[ ]
313.	How many children did you deliver during your last pregnancy	Write the total number of children_____	
314.	Did that child/children cry, get any shaking of the body or breath after birth?	Child 1 1= Yes, 2 = No 9 = I don't remember child 2 1= Yes, 2 = No 9 = I don't remember child 3 1= Yes, 2 = No 9 = I don't remember	[ ] [ ] [ ]
315.	Is that child/children still alive?	Child 1 1= yes, 2 = no 9 = I don't remember child 2 1= yes, 2 = no 9 = I don't remember child 3 1= yes, 2 = no 9 = I don't remember **IF NO GO TO QUESTION 317**	[ ] [ ] [ ]
316.	If s/he or they are there alive: (NAME) what is her/his age?	Child 1: Months[ ] days [ ] child 2: Months[ ] days[ ] total numbe of days child 3: Months[ ] days[ ] **Go to question 318**	[ ] [ ] [ ]

317.	If there is no living child, at what age did that child die? If the answer is 1 month or 30 days , probe in oder to cofirm. Ask: what age was s/he i terms of days at the time of death?	child 1: Months[ ] days [ ] child 2: Months[ ] days [ ] total number of days child 3: Monhs[ ] days [ ] ***(IF IT IS LESS THAN 1 MONTH, WRITE DOWN THE ANSWER IN TERMS OF DAYS, IF IT IS MORE THAN ONE MONTH, WRITE DOWN I TERMS OF MONTHS)***	[ ] [ ] [ ]
318.	Did you at any time see a health expert so that he/she investigates about your health when you were pregnant	1. Yes ***(GO TO QUESTION 320)*** 2. No 9. s/he has refused to respond	[ ]

319.	If you didn't do that, why? ***ASK IF THERE WAS A ANY OTHER REASON ?*** ***GO TO QUESTION 331 1= S/HE HAS MENTIONED THE REASON*** ***2= S/HE HAS NOT MENTIONED THE REAOSON.***	A. Distances and high transport costs B. time of offering services does not correspond with schudule. C. Unsatisfactory attitude of the health services provide D. little skills of the health provider E. lack of confidentiality F. lack of medications G. long waiting time H. high costs of the required services I. religious reasons J. no any benefits K. I didn't know the benefit of doing so L. I didn't get the permission of dong so M. he/she was not aware of the availability of the center for health services N. other reasons (mention)_____	[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]
320.	If you met the health expert for investigations into your heath when you were pregnant, where did you get him/her? ***1=YES, HE/SHE MENTIONED*** ***2=NO/SHE DID NOT MENTION***	A. Morogoro regional hospital B. another hospital_____ C. health center_____ D. dispensary _____ E. pharmacy _____ F. traditional birth attendant G. other heatlh services centers, mention_____ ___	[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

321.	If you went to the anti natal clinic for investigations into your health, at least once, please answer the following questions about the investigation(s) that was done to you when you were pregnant ***READ THE ANSWERS, WRITE*** ***1=YES*** ***2=NO***	A. Was you weight measured? B. Was your height measured? C. Was your blood taken for investigations? D. Was your blood pressure measured/taken? E. Were urine investigations done? F. Was your abdomen checked by palpation? G. Were you told of any signs of danger throughout the period of your pregnancy? H. Were you told were to go, in case of any health problem throughout the period of your pregancy ? I. Were you given counselling with regard to HIV testing ? J. Did you have discussions on the mother to child transmission of HIV ? K. Were you given counselling regarding family planning ? L. Were you given mosquito net discount card? M. Did you have discussions on the preparations for delivery? N. Did you have discussions on breastfeeding of the baby continually without mixing any other food?	[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

322.	What are danger signs that were mentioned to you by the health services provider that can make you go the heath centre quickly without delay? **READ THE ANSWERS** **1 = YES** **2 = NO**	A. Too much tiredness and difficult in breathing B. bleeding through vagina C. severe headache and blurred vision D. loss of consciousnesss or eclampsia E. too much swelling of hands or the face F. severe abdominal pain G. pre term labour pain H. leakage/flow of amniotic fluid(rupture of amniotic membrane) I. flowing of bad smelling discharge from/through the vagina J. severe/high grade fever K. reduced or complete lack of intra utero fetal movements/activities.	[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]
323.	How old was your pregnancy when you went to the clinic for first time?	Months_____	[ ]
324.	How old was your pregnancy when you went to the clinic for the last time?	Months_____	[ ]
325.	How many time did you attend ante natal clinic throughout that pregnancy?	Total number of visits to the clinic _____ 99= she doen't know **IF IT IS MORE THAN 3 TIMES, GO TO 327**	[ ]

326.	If you went to clinic less that 3 times , what are the reasons that made you not continue with visits for the remaining period of time.? ***DO NOT READ OUT THE ANSWERS, ASK IF THERE IS ANY OTHER REASON(S)*** ***1=YES, SHE MENTIONED THE REASON*** ***2=NO, SHE DID NOT MENTION THE REASON*** ***AFTER SHE HAS MENTIONED ALL THE REASON GO TO 331***	A. Distance and high transport costs. B. Time for offering services does not go with the schudule C. bad attitude of the health services provider D. little skills of the health services provider E. lack of confidentiality F. lack of medications G. long waiting time/hours H. high costs of the required service(s) I. religious reasons J. no any benefit obtained from this K. she did not know the importance of doing that. L. She did not see the benefit of doing so. M. She was not aware of the availability of the health center N. other reason(s) (mention)_____	[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]
Home based health services: I now request to ask you about the home based health services			
347	Do you know any person who is the provider of the community based health services here in the village, who is helping mothers and their children in the community?	1= Yes 2 = No **(Go to question 359)**	[ ]
348	If so, how many persons do you know ?		[ ]
349	Has the village health worker ever visited you at your home when you were pregnant?	1= Yes 2 = No (**GO TO 355**)	[ ]
350	How many times did that worker visit you at your home when you were pregnant?	Number of times she was visited _____ ***IF SHE DOES NOT REMEMBER, REMEMBER TO WRITE DOWN NUMBER "99".***	[ ]
351	What was the age of your pregnancy when this health worker visited you at your home for the first time?	Write down the number of complete months _____. ***IF SHE DOES NOT REMEMBER, REMEMBER TO WRITE DOWN NUMBER "99".***	[ ]
352	What was the age of your pregnancy when this health worker visited you for the last time before you gave birth?	Write down the number of complege months_____ ***IF SHE DOENS NOT REMBER , REMEMBER TO WRITE DOWN NUMBER "99".***	[ ]

353	Did that health worker give you any counselling regarding health matters for pregnant women and newborn children?	1 = Yes 2 = No (**GO TO QUESTION 355**)	[ ]
354	So, what was the counselling/advice he/she gave to you regarding pregnant mother's health? **READ OUT THE ANSWERS** **1 = YES** **2 = NO**	A. To do regular health check ups during pregnancy B. To get polio vaccine C. To use medications that help to increase blood in the body D. To sleep under insecticide treated nets(ITNs) E. To use malarial prophylaxis F. To test HIV G. To know the danger signs during pregnancy H. To increase the amount of food intake I. To rest J. To avoid/ abstain from heavy tasks K. To save some money for any emergencies L. To prepare transport in case of emergencies M. To give birth at the hospital N. To meet with the person responsible for family planning matters O. To prepare someone who will look after the baby after delivery P. To prepare the cloths that will be used during delivery Q. To make preparations for delivery R. To start immediately to continuously breastfeed the baby without feeding him/her anything. S. others (mention)_____	[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]
355	Has the village health worker ever visited you at home after delivery?	1= Yes 2 = No (**GO TO 359**)	[ ]
356	After how many days since delivery did this health worker visit you for the first time?	Mention days _____	[ ]
357	How many times did this health worker visit you at home after delivery?	Number of times she was visited _____ ***IF SHE DOES NOT REMEMBER, REMEMBER TO PUT THE NUMBER "99".***	[ ]
358	What advice/counselling did did s/he give to you regarding young baby's s health	A. To clean the baby immediately after birth	[ ] [ ]

359	Whom do you trust more than others to give you an advice on the matters of pregnancy and maternal issues?	1. A health professional at the health center. 2. Village health worker 3. Your husband/your partner 4. Your mother. 5. Your mother-in-law 6. A friend/Another relative 7. Another one (mention) ……	[ ]
360	Did you face any of the following situations when you were pregnant? ***DANGER SIGNS ARE ON THE RIGHT SIDE. THE PARTICIPANT SHOULD AFGREE OR DISAGREE FOR EERY RESPONSE.*** **(1=YES, 2= NO)**	N. Too much bleeding through the vagina during pregnancy O. High fever during pregnancy P. Vaginal discharge of foul smelling watery wastes during pregnancy Q. Eclampsia (epileptic like attacks associated with pregnancy) R. Swelling of legs and face ***IF NON OF THESE CONDITIONS HAPPENED TO HER GO TO QUESTION NUMBER 401***	[ ] [ ] [ ] [ ] [ ]
361	Did the village health worker advice to go for treatment for that problem to any heath centre?	1=Yes 2=No	[ ]
362	If you ever faced any of the above problems, did you go for treatment?	1=Yes ***(Go to question 364)*** 2=No	[ ]
363	If you did not seek treatment or advice for the above stated problems, what was the reason(s) **ASK: OTHER REASON(S)?** **1= SHE HAS MENTIONED** **2= SHE HAS NOT MENTIONED** **AFTER STATING THE REASON(S), GO TO QUESTION NO. 401**	A. distance and high cost for transporti B. time for services does not correspond with schudule C. Unpleasant behavior shown by health service provider? D. Inappropriate attitude of the health care provider E. Lack of confidentiality F. Lack of medications G. Long waiting time H. High costs of the required service(s) I. Religious reason(s)i J. There is no any benefit(s) K. I did not know the importance of doing so L. I did not the permission to do so N. Any other reasons (mention)	[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]
364	If you looked for treatment, where did you go for that treatment? **99= I DONT KNOW/I CANT MENTION(ASK THE NEXT QUESTION)**	1. Morogoro regional hospital 2. Another hospital(mention)_____ 3. Health centre (mention)_____ 4. dispensary(mention)_____ 5. anther health services centre (mention)_____ 6. pharmacy 7. traditional birth attendant	[ ]

365	What type of transport did you use to go for that treatment(s)? ***(DO NOT READ OUT ANSWERS BUT PROBE TO FIND OUT: OTHER REASON(S)?*** ***1= SHE HAS MENTIONED*** ***2= SHE HAS NOT MENTIONED)***	A. walking of foot B. Stretchers C. motorcycle D. Bicycle E. Private or Hired car F. Public transport G. 98= others(mention)_____	[ ] [ ] [ ] [ ] [ ] [ ] [ ]
366	How much time you spent while travelling from home to the health centre where you went for treatment for the first time?	minutes _____ hours_____ days _____ ***(write down the total number of minutes)*** i don't know=00	[ ]
367	How much time did you spend while waiting for see the health services provider when you arrived at that health centre?	minutes _____ hours_____ days _____ ***(write down the total number of minutes)*** I don't know= 00	[ ]
368	Did you receive instructions to to another health centre or to another health provider/expert so as to look for the solution of your problem?	1=Yes 2=No (**GO TO 371**)	[ ]
369	Where were you told to go?	1. Morogoro regional hospital 2. Another hospital(mention)_____ 3. Health centre (mention)_____ 4. dispensary(mention)_____ 5. anther health services centre (mention)_____ 6. pharmacy 7. traditional birth attendant	[ ]
370	Did you go to that place as you were instructed?	1=Yes (**GO TO 372**) 2=No 9=she doensn't know/she doesn't remember	[ ]
371	If no, did you go to another health center?	1=Yes 2=No (GO TO **374**)	[ ]

372	What type of transport did you use to reach the health centre which you were instructed to go to.	A. Walking on foot B. Stretchers C. motorcycle D. Bicycle E. car F. public transport G. 98= others (mention)_____	[ ] [ ] [ ] [ ] [ ] [ ] [ ]
373	How much time did you spend to travel from your home to that place you were instructed to go to for further treatment(s)?	minutes_____ hours_____ days_____ ***(write down the total number of minutes)*** I don't know= 00	[ ]
374	If you didn't go to that health center you were instructed to go to, what were the reasons causing that situation? ***(DO NOT READ OUT THE ANSWERS FOR HER BUT PROBE AND ASK: OTHER REASON(S)?*** ***1= SHE HAS MENTIONED 2= SHE HAS NOT MENTIONED)*** ***AFTER SHE HAS MENTIONED ALL REASONS, GO TO QUESTION NUMBER 401***	A. Distance and high cost for transport B. Time for services does not correspond with schudule C. Unpleasant behavior shown by health provider D. Inappropriate attitude of the health care provider E. Lack of confidentiality F. Lack of medications G. Long waiting time H. High costs of the required service(s) I. Religious reason(s) J. There is no any benefit(s) K. I did not know the importance of doing so L. I did not have the permission to do so N. Other reasons (mention)	[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]
375	Did you pay any money in order to receive health services from that health center?	1= Yes , 2= No (GO TO **401)**	[ ]

376	If yes, how much money did you pay for the following services? ***PROBE FOR EVERY SECTION AND WRITE DOWN THE AMOUNT OF THAT MONEY IN SHILLINGS*** ***WRITE '0' IF NO MONEY WAS SPENT*** ***WRITE '9' IF SHE DOESN'T KNOW***	A. Medications and Vitamins_____ B. Costs for counselling _____ C. Transport _____ D. Other costs (Mention) _____ **IF THE PARTICIPANT/RESPONDENT KNOW THE TOTAL AMOUNT ONLY, WRITE DOWN THAT TOTAL AMOUNT DOWN HERE** E. Total costs_____	

4 Health problems during delivery/intra-utero fetal death(s) **Now i request to ask you about the problems you faced during pregnancies**			
401	Where was the delivery of your baby conducted? ***IF SHE DOES NOT KNOW WEATHER IT WAS THE HOSPITAL, HEALTH CENTRE, OR GOVERNMENT CLINIC OR PRIVATE ONE: WRITE DOWN THE NAME OF WHERE SHE IS.***	1. Morogoro regiona hospital **(GO TO 403)** 2. Other hospitals (Mention)_____ **(GO TO 403)** 3. Health center (Mention)_____ **(GO TO 403)** 4. Dispensary (mention)_____ **(GO TO 403)** 5. Pharmacy **(NENDA 403)** 6. Anther centre for health services (Mention)_____ **(GO TO 403)** 7. At the home of the traditional birth attendant 8. At my home? 9. At the home of the community health worker 10. At the home of somebody else 11. Along the way	[ ]
402	If you did not deliver at the health centre, what was the reason(s)? **1= she has mentioned; 2=she has not mentioned** ***(don't read out the answers but probe)***	A. A distance and high cost for transport B. time for services does not correspond with schudule C. Unpleasant behavior shown by health provider D. Inappropriate attitude of the health care provider E. Lack of confidentiality F. Lack of medications G. Long waiting time H. High costs of the required service(s) I. Religious reason(s)i J. There is no any benefit(s) K. I did not know the importance of doing so L. I did not the permission to do so N. any other reasons (mention)	[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]
403	Who helped you at the time of delivery? ***(DO NOT READ OUT THE ANSWERS BUT PROBE OR ASK: OTHER REASON(S)?*** ***1= SHE MENTIONED 2= SHE DID NOT MENTION)***	A. Heath worker at the dispensary B. Health worker at the health center C. Health worker in the hospital D. Health worker in the village E. Traditional healer F. Traditional birth attendant G. Brother/sister/friend/neighbour H. Another one I. She doesn't know/she doesn't remember	[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]
404	Did the village health worker advice that you go to deliver at the health center?	1. Yes 2. No	[ ]
405	For how many hours did your labour pain last? (that is, how long did pain associated with labour last? **PROBE**	minutes_____ hours_____ days _____ ***(write the total number of minutes)*** I don't know= 00	[ ]

406	Did you get any problem during delivery or immediately after delivery?	1= yes , 2= No (**GO TO 409**)	[ ]
407	If yes what at those problems did you face during delivery or shortly after delivery? **DANGER SIGNS ARE ON THE RIGHT SIDE. GIVE THE RESPONDENT A CHANCE TO CHOOSE FROM EVERY ANSWER PUT FORWARD BY SAYING:** **1=YES, 2=NO**	1 Too much bleeding through the vagina 2 eclampsia 3 Swelling of the legs and the face? 4 Difficult in baby's descent(i.e. baby moving through the birth canal with difficult)? 5 Placenta coming out with difficulty 6 Loss of consciousness 7 Other signs_____	[ ] [ ] [ ] [ ] [ ] [ ] [ ]
408	Did the village health worker advice you to seek treatment for that problem from the health centre?	1. Yes 2. No	[ ]
409	What was your method of delivery?	1=normal method 2= operation(caesarean section) 3= by suction using iron materials 4= another method (mention)…… **IF SHE DELIVERED WHILE AT HOME, GO TO NUMBER 422.**	[ ]
410	Before discharge, after (NAME) was born, was there any health worker who investigated and/or checked into your health?	1=Yes 2=No (**GO TO 412**)	[ ]

411	If yes, ***READ OUT ANSWERS FOR HER*** ***WRITE*** ***1= YES 2= NO)***	A. Did the health worker emphasize that you stay with the baby till when you were discharged from the heath centre? (Yes/No) B. Did the health worker emphasize that you eat and drink regularly? (Yes/No) C. Did the health worker instruct you to press your uterus on regular bases? (Yes/No) D. Did the health worker check on you for danger signs on regular bases?(Yes/No) E. Did the health worker insist that you go to the toilet for a short call often? (Yes/No) F. Did the health expert help you during the initiation of breastfeeding of the baby? (Yes/No)	[ ] [ ] [ ] [ ] [ ] [ ]
412	How much time did it take for you to be discharged from the health center after the delivery?	minutes _____ hours_____ days _____ ***(write down the total number of minutes)*** I don't know= 00	[ ]
413	Were you given any professional advice before discharge from that centre/place of delivery?	1=yes 2= no (**GO TO 424**) 9= she doesn't know	[ ]
414	Before discharge, were you advised to breastfeed the baby continuously without giving him/her any other foods? [continuous breastfeeding means that the baby is living only on mother's breast milk and no any other thing such as water, porridge or any other thing for the period of six months].	1=yes 2= no	[ ]
415	What are the benefits of continuous breastfeeding the the child without any other foods for the period of first six months? 1. She mentioned 2. She did not mention	A. it is one of the methods of preventing pregnancies because during this period normally you have not gained back menses B. to prevent transmission of HIV from the mother to the baby C. it is the nice food/diet the young baby	[ ] [ ] [ ]
416	Were you advised to attend the children clinic at that center?	1=Yes 2= No **(GO TO 418)**	[ ]

417	When were you told to attend the children clinic? **READ OUT ALL ANSWERS, WRITE 1= YES, 2=NO**	A. Within 24 hours B. Within 7 days after delivery C. On the 28th day after delivery D. on the 42nd day after delivery E. six months after delivery	[ ] [ ] [ ] [ ] [ ]
418	Were you advised to get important supplements for your health?	1=Yes 2= No	[ ]
419	Were you advised on getting medication for boosting the amount of blood in your body	1=yes 2= no	[ ]
420	Were you told anything concerning family planning and the use of family planning methods?	1=yes 2= no **(GO TO. 422)**	[ ]
421	Please, let me now ask you about what you were told concerning family planning after delivery **READ OUT ALL ANSWERS FOR HER.** **WRITE 1= YES, 2=NO**	A. Were you told anything concerning family planning? B. Were you told when you could regain your ability to once again become pregnant after delivery or termination of pregnancy?. C. Where you told to go and get famly planning medications from the healh center? D. Were you told how to involve your husband/partner in the issues of family planning? E. Were you told that if you continued to breastfeed, you will have an extended period of ammenorrhea? F. Were you given any other advice on family planning? Please mention _____	[ ] [ ] [ ] [ ] [ ] [ ] [ ]
422	Were you told how to identify the danger signs on post delivery women?	1=Yes 2= No	[ ]
423	Were you advised on how to identify the danger signs that happens to young babies?	1=Yes 2= No	[ ]
424	Did you pay any money to get health services related to delivery or to get treatment in relation to your health problems during delivery?	1= Yes 2= No **(GO TO 426)**	[ ] [ ]

425	If yes, how much did you pay for the following services? ***PROBE FOR EACH SECTION AND WRITE DOWN THAT AMOUNT IN SHILLINGS.*** ***WRITE '0' IF NO MONEY WAS SPENT*** ***WRITE '9' IF SHE DOES NOT KNOW***	A. Medications an vitamins_____ B. Counselling costs _____ C. transport _____ D. .other costs (mention) _____ **IF THE RESPONDENT KNOWS THE** **TOTAL COSTS, WRITE DOWN THAT** **FIGURE HEREUNDER,** E. Total costs_____	[ ]

After delivery; please let me now ask you about the services after delivery.			
426	Did the village health worker visit you after delivery?	1=Yes 2= No ***(GO TO 432)***	[ ]
427	How many times did he/she visit you?	***WROTE DOWN THE NUMBER OF TIME OF THOSE VISITS***	[ ]
428	When she visited you, was it within 24 hours after delivery at home/after discharge from the heath center?	1=Yes 2= No	[ ]
429	Did s/he visit you in any of following moments listed here? **READ OUT ALL ANSWERS FOR HER. WRITE 1= YES, 2=NO**	A. Within one week after delivery B. Within 2-4 weeks after delivery C. On the 42nd day after delivery D. Six months after delivery	[ ] [ ] [ ] [ ]

430	What did that village health worker advise you about? **READ OUT ALL ANSWERS FOR HER.** **WRITE 1= YES, 2=NO**	A. About breastfeeding B. How to take care of a child C. About family planning D. About balanced diet E. About personal and environmental hygiene F. About testing for HIV infections G. About prevention of mother to child transmission HIV(PMTCT) H. On prevention against malaria I. Where to go in case i have a problem J. About where to attend clinic after delivery. K. I was given medications for personal/self use. L. I received medications for the baby M. Other(s) Mention_____	A.[ ] B.[ ] C.[ ] D.[ ] E.[ ] F. [ ] G.[ ] H.[ ] I. [ ] J .[ ] K .[ ] L .[ ]
431	Did that village health worker ever tell you to attend the clinic for the post delivery women?	1=Yes 2= No	[ ]
432	Have you been to the health center for any check up after delivery or termination of pregnancy?	1=Yes 2= No **(GO TO 436)**	[ ]
433	When was that check up done after delivery or termination of your immediate last pregnancy?	Minutes _____ hours _____ days _____ ***(write the total number of minutes)*** I don't know= 00	[ ]
435	Where was that check up done? **PROBE AND FIND OUT THE NAME OF THE LOCATION** ***IF SHE CAN'T IDENTIFY WHETHER IT WAS THE HOSPITAL, HEALTH CENTER, THE GOVERNMENT CLINIC OR PRIVATE CLINIC, THEN WRITE DOWN THE NAME OF THE LOCATION WERE SHE IS FOUND***	1. Morogoral regional hospital 2. Another hospital (mention)_____ 3. Health centre (mention)_____ 4. dispensary (mention)_____ 5. another health centre(mention)_____ 6. at the home of the traditional birth attendant 7. in my home 8. at the home of the community health worker 9. at the home of somebody else 10. another location/site (mention)_____	[ ]

435	Would you please answer the following question concerning what was done during that health check up? ***Read out the questions.*** ***MARK*** ***1= YES, 2= NO***	A. Was you asked if you have any health problem? B. Were your heart beats examined? C. Was your body temperature taken? D. Did the expert examine in your perineal region?(perineum) E. Was your stomach examined? F. Were your breasts examined? G. Were your legs examined? H. Were you counselled to breastfeed your baby without any other dietary supplements I. Were you counselled on how to take care of your baby's health? J. Were you advised on family planning issues? K. Were you advised on important matters concerning nutrition? L. Were you advised on personal hygiene? M. Were you counselled to go for HIV test? N. Were you advised on prevention of mother to child transmissions of HIV? O. Were you advised on preventing yourself from getting Malaria? P. Were you advised where to go when you have health problem? Q. Were you advised when you should go to health facility for baby's health check up? R. Were you yourself given any medicine? S. Was your child given medicine? T. Mention other_____	[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]
436	Did you experience any problem after delivery or termination of your pregnancy?	1=Yes 2= No (**SKIP TO 451**)	[ ]

437	If yes,what problem did you have? ***(USIMSOMEE MAJIBU ILA DODOSA) 1= AMETAJA 2= HAKUTAJA***	A. Serious bleeding through vagina. B. Fever C. Vaginal stinky fluid. D. Epilepsy/loss of consciousness E. Facial and leg swelling. F. Abdominal pain and vaginal pains. G. Breathing problems H. Serious headache and visual problems. I. Leg muscular pain. J. Swelling /pain of breasts. K. Pain or problem when urinating. L. Colour change in Palms/tongue/eyes M. Others_____	[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]
438	Were you advised by community health worker to go to health facility for treatment of that problem?	1=Yes 2= No	[ ]
439	Did you go to health facility to receive treatment?	1=Yes (**SKIP TO 441**) 2=No	[ ]

440	If no, why did you not look for treatment? ***PROBE FOR OTHER REASONSLIZA: SABABU NYINGINE?*** ***1= AMETAJA 2= HAKUTAJA*** ***BAADA YA KUWEKA ALAMA KWENYE MAJIBU HUSIKA, NENDA NO. 451.***	A. The health facility is far and it is expensive to get there by transport. B. Muda wa kutoa huduma hauendani na ratiba C. Service providers do not behave well before patients. D. Poor knowledge of the health providers. E. Lack of confidentiality F. Medical supply is not enough G. Patients wait for along time to get heath services H. The cost of health services is not affordable I. Religous reasons. J. There are no benefits to do so. K. A respondent did not realize the importance of going to health facility to get services. L. Respondent was not given permission to do so. M. A respondent did not know if the health facility is available. N.Other reasons(Mention)….. ***SKIP TO NO. 451.***	[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]
441	Which means of transport did you use to go to health facility for treatment of that problem?	A. On foot B. Motorcycle C. Bicycle D. Car E. Public transport F. 98=Other(Mention)_____	[ ] [ ] [ ] [ ] [ ] [ ]
442	How long did it take you to move from your home to that health facility where you received health services?	Minute _____ Hour_____ Day_____ ***(Write the total in minutes)*** I dont know = 00	

443	For how long did you wait outside to see the medical expert since you arrived at that health facility?	Minute _____ Hour_____ Day_____ ***(Write the total in minutes)*** I dont know = 00	
444	Did the medical health worker of that facility refer you to medical expert of another health facility for further treatment?	1=Yes 2=No ***(SKIP TO 501)***	[ ]
445	Where were you referred to?	5. Morogoro regional hospital 6. Another hospital_____ 7. Health center_____ 8. Dispensary _____ 9. Medical store_____ 10. A place was not specified 11. Other Health facility(Mention)_____	[ ]

446	Did you go to a place where you were refered to?	1=Yes (**SKIP TO 448)** 2=No 9=He/she does not know/remember	[ ]
447	If no, did you go to another health facility?	1=Yes 2=No **(SKIP TO 450)**	[ ]
448	Which means of transport did you use to go to health facility for further treatment of that problem?	A. Walking on foot B. motorcycle C. Bicycle D. Car E. Public transport F. 98= others (mention)_____	[ ] [ ] [ ] [ ] [ ] [ ]
449	How time did you spend while travelling from home to that health center where you instructed to go for further treatment?	minutes _____ hours_____ days_____ **(Go to 501)**	

450	If you did not go to that place where you were instructed to go for further treatment, what were the reasons? ***(DO NOT READ OUT ANSWERS FOR HER BUT PROBEOR ASK: OTHER REASON(S)?*** ***1= SHE HAS MENTIONED 2= SHE HAS NOT MENTIONED)***	A . distance and high cost for transport B. time for services does not correspond with my schudule C. Inappropriate attitude of the health care provider D. Little on skills on the part of the health services provider. E. Lack of confidentiality F. Lack of medications G. Long waiting time H. High costs of the required service(s) I. Religious reason(s)i J. There is no any benefit(s) K. I did not know the importance of doing so L. I did not get the permission to do so N. any other reasons (mention)	[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]
451	Now i request to ask you about the costs you used to to get services after delivery? Did you use any money to get those services?	1= Yes 2= No (**GO TO QUESTION 501)**	[ ]
452	If yes, how much money did you pay for the following services? ***PROBE FOR EVERY SECTION AND WRITE DOWN THE AMOUNT IN SHILLINGS.*** ***WRITE '0' IF NO MONEY WA SPENT*** ***WRITE '9' IF SHE DOES NOT NOT KNOW***	A. Medications and vitamins_____ B. Costs for couselling _____ C. transport _____ D. other costs (mention) _____ **IF THE RESPONDEND ONLY KNOWS THE TOTAL AMOUNT SPEND, WRITE THAT AMOUNT HEREUNDER,** E. Total amount_____	

5 Newborn health **Now,i would like to ask you the questions concerning things that were done immediately after delivery**			
501.	Was the baby/babies born with bigger size, bigger size than normal, average size, smaller size than average, a very small size? ***1. BIGGER SIZE*** ***2. BIGGER SIZE THAN NORMAL*** ***3. AVERAGE SIZE*** ***4. SMALLER SIZE THAN AVERAGE*** ***5. A VERY SMALL SIZE THAN NORMAL*** ***9. I DON'T KNOW***	Baby 1 Baby 2 Baby 3	[ ] [ ] [ ]
502.	Was that baby/those babies' (Name/Names) weights measured after delivery.	1=yes 2= no (**GO TO 504**) 9= she cant say/She does not know	[ ]
503.	If yes, what was the baby/each baby's weight? ***WRITE DOWN THE WEIGHT IN KILOGRAMS AS SHOWN IN THE CLINIC CARDS OF THOSE BABIES , IF THEY WILL BE AVAILABLE***	baby 1_____kg baby 2_____kg baby 3_____kg 9.	[ ] [ ] [ ]
504.	If the baby was born before time (premature), or if was born with low birth weight, were you give any advice?	1. Yes 2. No **3.** The bay was not born before normal time /did not have low birth weight.**GO TO 506**	[ ]
505.	What advice were you given? **DON'T READ OUT ALL ANSWERS FOR HER** **1=SHE HAS MENTIONED** **2=SHE HAS NOT MENTIONED**	A. Give warmth to the baby by resting him/her on your chest so that you touch each other through skin contacts (Kangaroo Mother Care). B. The baby should be dressed in hut and socks. C. Breastfeed the baby regularly, after every 2-3 hours during the day and night D. If the baby still can not suck the milk well for a long time, you can milk the breast/squeeze out your own milk using a cup to make sure that the baby gets that first yellowish milk. E. Breast milk is the best food among all foods to ensure the baby gains good weight.	A.[ ] B.[ ] C.[ ] D.[ ] E.[ ]

506.	What was the first thing to be done to the newborn (or the first born) immediately after birth? **PROBE DEEPLY ESPECAILLYT IN CASE OF TWINS** **ENCYLE ONE ANSWER**	1. Cutting the cord 2. To place the baby on the mother's chest/mother's abdomen. 3. Baby was left alone. 4. Baby was cleaned using a piece of cloth (in order to dry the some water/moisture)) 5. Baby was covered using clothes 6. Baby was bathed 7. Baby was left to sleep 8. Baby was breastfed 9. Baby was given water with sugar or any other thing to eat/drink 10. 98=other thing (mention) _____ 11. 99=she doesn't know/ she doesn't remember.	[ ]
507.	Was the baby dried up in order to remove the watery moisture from his/her body?	1=Yes 2=No ***(GO TO 509)***	[ ]
508.	If yes, was the baby dried up before or after coming out of the placenta?	4 Before coming out of the placenta 5 After coming out of the placenta 9. She doesn't know/she doesn't remember.	[ ]
509.	Was the baby covered with clothes after delivery	1=Yes 2= No ***(NENDA 511)*** 9= she doesn't know/she doesn't remember **(Go to 511**)	[ ]
510.	If yes, was the baby covered wit clothes before or after the coming out of placenta?	1. 1. Before coming out of the placenta 2. After coming out of the placenta 9. She doesn't know/she doesn't remember	[ ]
511.	Did your baby cry spontaneously after delivery?	1=Yes **GO TO 514)** 2= No	[ ]
512.	If the baby didn't cry immediately, was there anything that was done to the baby to make him/her cry/breath after delivery?	1=Yes 2= No **GO TO 514)**	[ ]
513.	If yes, what was done to make the baby cry or breath?	_____	[ ]
514.	What was the time duration post delivery when the baby was breastfed?	minutes _____ hours_____ days_____ ***(write down the total number of minutes)*** I don't know= 00	
515.	Was the baby breastfed on the initial mother's yellowish milk?	1=Yes 2= No 9= she cant say/she doesn't know	[ ]

516.	Was the baby given anything orally before he/she was breastfed with mother's milk ?	1=yes 2= no ***(GO TO 518)*** 9= She cant say/she doesn't know ***(GO TO 518)***	[ ]

517	If yes, what was given to the baby ? ***(DONT READ OUT THE ANSWERS BUT PROBE FOR MORE)*** ***MARK*** ***1= MENTIONED 2= NOT MENTIONED)***	H. Honey I. Water J. Water mixed with sugar K. Fruit juice L. Tin packed milk M. Fresh cow milk N. 98=Other (mention)_____	[ ] [ ] [ ] [ ] [ ] [ ] [ ]

518	Was anything applied to baby's navel/umbilicus after cutting and tying up the umbilical cord?	1=Yes 2= No(**SKIP TO 520**) 9= He/she does not (**SKIP TO 520**)	[ ]
519	What was applied to baby's navel after cutting the umbilical cord?	Mention_____	[ ]
520	How much time passed before the baby was bathed for the first time?	1 Just after delivery 2 First day 3 Second day 4 Third day 5 More than three days after delivery 9=She/he does not	[ ]
521	Was the baby given tuberculosis(TB) vaccine within the month of delivery	1=Yes 2= No 9= He/she does not know.	[ ]
522	Was the baby given polio vaccine within the month of delivery?	1=Yes 2= No 9= He/she does not know.	[ ]
523	Do you have birth certficateJ(s) for your baby(ies)? ***ASK TO SEE CERTIFICATE***	1=Yes 2= No 9= He/she does not know.	[ ]

Newborn babies' health problems			
524	Did your baby get sick within a month of delvery?	1=Yes 2= No(**NENDA 601**) 9= He/she does not know.(**NENDA 601**)	[ ]
525	If yes,did the community health worker advise you to go to health facility to get proper treatment?	1=Yes 2= No	

526	If a baby got sick within a month of delivery,what was the sickness? ***(DO NOT READ OUT ANSWERS.PROBE FOR MORE ANSWERS. ASK:OTHER? MARK 1= MENTIONED 2= NOT MENTIONED***	A. Baby could not suck the mother's milk. B. Diarrhoea C. Pus in the navel D. A navel becomes reddish. E. Eyes were reddening F. High fever G. H. Lowering of the baby's body temperature I. convulsion J. Burning-like skin effect K. Failure to breath or to cry L. Fast breathing M. Difficulty in breathing N. Failure to urinate O. Failure to defecate P. Cough and flue 98.Other(Mention) _____	[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]
527	If a baby got any sickness within a month post delivery,did you go for treatment?	1=yes 2= No (**SKIP TO601**)	[ ]
528	If yes,how many times did you go for treatment? ***9=HAFAHAMU/ HAWEZI KUSEMA (NENDA SWALI LINALOFUATA)***	1. Morogoro regional hospital 2. Other hospital_____ 3. Heath center_____ 4. Dispensary_____ 5. Pharmacy _____ 6. Traditional birth attendant 7. Other health facility_____	[ ]
529	Which means of transport did you use to get there for your baby's treatment? ***(READ NOT THE ANSWERS ASK IF THERE ARE OTHER MEANS OF TRANSPORT MARK*** ***1= MENTIONED 2= NOT MENTIONED***	A. On foot B. Motorcycle C. Bicycle D. Car E. Public transport F. 98=Other (mention)_____	[ ] [ ] [ ] [ ] [ ] [ ]
530	How long did it take you to travel from your home to the health facility where there was treatment for your baby?	Minute_____ Hour_____ Day _____ I dont know	[ ]
531	How much time did you spend before consulting/meeting health expert at that health center?,	Minute_____ Hour_____ Day _____ I dont know=00	[ ]
532	Were you referred to a medical expert of another health facility?	1=Yes 2=No (S**KIP TO 601**)	[ ]

533	If yes,where were you told to go?	1. Morogoro regional hospital 2. Other hospital_____ 3. Heath center_____ 4. Dispensary_____ 5. Pharmacy _____ 6. Traditional birth attendant 7. Respondent did not go anywhere 8. Other healthy facility.(mention).....	[ ]
534	Did you go to that health facility which you were referred to?	1=Yes **(SKIP TO 536)** 2=NO 9=He/she does not know	[ ]
535	If no,did you go to another health facility?	1=Yes 2=No (**SKIP TO 538**)	[ ]
536	Which means of transport did you use to get there for your baby's more treatment? ***(READ NOT THE ANSWERS ASK IF THERE ARE OTHER MEANS OF TRANSPORT MARK*** ***1= MENTIONED 2= NOT MENTIONED***	A. On foot B. Motorcycle C. Bicycle D. Car E. Public transport F. 98=Other (mention)_____	[ ] [ ] [ ] [ ] [ ] [ ]

537	How long did it take you to travel from your home to the health facility to get further treatment for your baby?	Minute_____ Time_____ Day_____ **(SKIP TO 539)**	
538	If you did not go there for further treatment of your baby,why did you not go as directed? ***(READ NOT THE ANSWERS ASK IF THERE ARE OTHER REASONS .*** ***MARK*** ***1= MENTIONED 2= NOT MENTIONED***	A. The health facility is far and it is expensive to get there. B. Time of service delivery is inconvinient C. Service providers do not behave well before the patients D. Poor knowledge of the service provider E. Lack of confidentiality F. Lack of medical suppl G. Patiens wait outside for a long time to get health services H. Religious reasons I. There are no benefits to do so. J. A respondent did not realize the importance of going to health facility to get health services K. The respondent was not given permission to do so L. The respondent did not know if the health facilityis available M. Other reasons (Mention)	[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]
539	For how long was your baby admitted at the health facility when He/she was still neonate within a month of delivery?	**Number of days** ***(IF YOU WERE NEVER ADMITTED FOR TREATMENT AT THE HEALTH FACILITY.WRITE "00")***	[ ]

540	How many times was your child required to be taken to the healthy facility to receive treatment(within the first month after birth)?	times_____	[ ]
541	Did you spend any amount of money to access the treatment you received?	1= Yes , 2= No (**GO TO QUESTIOM 601)**	[ ]
542	If yes ,how much did you pay to access those healthy services? ***PROBE FOR EVERY SECTION AND WRITE DOWN THAT AMOUNT IN SHILLINGS:*** ***WRITE '0' IF MONEY WAS NOT SPENT AT ALL*** ***WRITE '9' IF THE RESPONDENT DOES NOT KNOW***	Medicine and vitamin _____ A. Counselling cost _____ B. Transport _____ C. Other cost (Mention)_____ **IF THE RESPONDENT REMEMBERS ONLY THE TOTAL COST,WRITE THAT TOTAL HERE.** D. Total cost_____	

6 RESPONDENT 'S HOSPITAL ATTENDANCE AND SATISFACTION TOWARDS HEALTHY SERVICES:

Now ,may I please ask you about your attendance at the hospital and the level of your satisfaction towards healthy services you received?

601.	Did you have an access to healthy facility in the past six months?	1. Yes **2.** No **(GO TO 701)**	[ ]
602.	What kind of healthy facility did you attend last time?	1. Morogoro regional hospital. 2. Other hospital_____ 3. Healthy centre_____ 4. Dispensary_____ 5. Other healthy facilities. (Mention)_____	[ ]
603.	What kind of healthy services did you want to get when you attended that healthy facility?	**1**.To attend antenatal care clinic 2.to give birth. 3.Post natal services 4.child vaccination 5.The baby was sick 6.Other(specify)----------	[ ]

Now, Would you remember the last time you attended that healthy facility. I will read out a series of questions concerning the different services you got and the level of your satisfaction to those services.						
SW #	**QUESTION**	**VERY DISSATISFIED**	**A BIT DISSATISFIED**	**SATISFIED**	**VERY SATISFIED**	**NO COMMENT**
604.	How satisfied are you with the level of cleanliness of healthy facility?	1	2	3	4	0
605.	How satisfied are you with way the service providers of the healthy facility respect each other and respect patients?	1	2	3	4	0
606.	How satisfied are you with the way the service provider explain the treatment of your any healthy condition?	1	2	3	4	0
607.	How satisfied are you with level of privacy shown by service provider last time you attended there?	1	2	3	4	0
608.	How satisfied are you with the amount of time the	1	2	3	4	0

	service provider spent with you last time you went there.?					
609.	In general,how satisfied are you with the services that you were provided with by service provided?	1	2	3	4	0

7 HIV/AIDS & PMTCT – I would like to ask you a few questions about HIV/AIDS and PMTCT			
701.	Have you ever heard of a disease called AIDS?	1=Yes 2= No ***(SKIP TO 801)*** 9= Can not say/does not know ***(SKIP TO 801)***	[ ]
702.	How HIV can be transmitted from one person to another? ***DONT READ OUT THE OPTIONS BUT PROBE FOR OTHER REASONS:*** ***MARK*** ***1= MENTIONED 2= NOT MENTIONED***	U. Through sexual intercourse with infected person. V. Through infected mother to her child W. Through blood transfusion X. Through other means(specify)----------	[ ] [ ] [ ] [ ]
703.	How can HIV/AIDS transmissions be prevented? ***(DONT READ OUT THE OPTIONS BUT PROBE FOR OTHER REASONS:*** ***MARK*** ***1= MENTIONED 2= NOT MENTIONED)***	A. Abstinence B. Being faithful to your ane partner C. Using condoms during sex D. Through other means(specify)---------- –	[ ] [ ] [ ]
704.	If a woman has HIV ,can she transmit virus to her baby during delivery?	1=Yes 2= No 9= Can not say/does not know	[ ]
705.	If a pregnant woman has been infected with HIV ,can she transmit virus to her unborn child during pregnancy?	1=Yes 2= No 9= Can not say/does not know	[ ]
706.	If a woman has AIDS virus ,can she transmit it to her baby through breastfeeding?	11=Yes 2= No 9= Can not say/does not know	[ ]

707.	Can you tell me any health services that are given to prevent mother to child transmission of HIV during pregnancy,, during delivery or during breastfeeding ***DONT READ OUT THE OPTIONS BUT PROBE FOR OTHER REASONS:*** ***MARK*** ***1= MENTIONED 2= NOT MENTIONED***	A. Anti retro virals (ARVs) B. Exclusive breastfeeding for six months C. non breastfeeding D. Other (mention)_____	[ ] [ ] [ ] [ ]

708.	Has any body told you about mother to child AIDS virus transmissions?	1=Yes 2= No (**SKIP TO 710**)	[ ]
709.	If yes ,who told you about it?	1. Healthy service provider 2. Friend 3. Spouse/partner 4.Other (Mention)……..…….	[ ]
710.	Have you ever been told about the possibility of being tested for AIDS VIRUS?	1=Yes 2= No (**SKIP TO 712)**	[ ]
711.	Who told you about it?	1. Healthy service provider 2. Friend 3. Spouse/partner 4.Other (Mention)…….	[ ]
712.	Is there anybody who has ever told you about preventing yourself from getting HIV?	1=Yes 2= No(**SKIP TO 714**)	[ ]
713.	Who told you about it?	1. Healthy service provider 2. Friend 3. Spouse/partner 4.Other (Mention)……..…….	[ ]
714.	Do you know the place where people can go for HIV test?	1=Yes 2= No (**SKIP 716**)	[ ]
715.	If yes,would you please tell me the place where people can go for HIV test to know their HIV status.? ***(ASK FOR NAMES OF HEALTHY FACILITIES DEPENDING ON SELECTED HAMLET)***	(**OPEN ENDED QUESTION)**	
716.	Have you ever heard about the program of prevention of mother to child transmission of HIV?	1=YES 2= NO	[ ]
717.	I am not interested in knowing your HIV status,but I would like to know whether you were tested for HIV or not as part of your antenatal care in your last pregnancy .	1=YES 2= NO (**SKIP 723**) 9= Can not say/does not know (**SKIP 723**)	[ ]

718.	Where was that test done?	(Open ended question)	[ ]
719.	I am still not interested in knowing your HIV test results, but I would like to ask the following question:Did you receive your HIV test results?	1=YES 2= NO (**SKIP 723**) 9= Can not say/does not know	[ ]
720.	Regardless of HIV test results ,all women who were tested need to be given counseling after receiving their HIV test results .Did you receive counseling after being given results?	1=Yes 2= No 9= Can not say/does not know	[ ]
721.	Did you share your HIV test results with anybody else apart from health facility worker who gave you the results?	1=Yes 2= No ***SKIP TO 723)*** 9= Can not say/does not know	[ ]
722.	If you did so,who was the first one to know your HIV Test results?	1= Healthy service provider 2= Husband 3= Sexual partner (not husband) 4= Mother 5= Sister 6= Other relative in a family. 7= Friend 8=Other (Mention) _____	[ ]
723.	Has your husband or sexual partner been tested for HIV?	1=Yes 2= No (**SKIP TO 725**) 9= Sifahamu (**SKIP TO 727**)	[ ]
724.	If your husband or sexual partner has been tested for HIV,who was the first one among you to be tested?	1= Myself 2= My husband/sexual partner 3=We were tested together. **(SKIP TO 727)**	[ ]
725.	If your husband or sexual partner was not tested for HIV as part of antenatal care clinic,why was he not tested?	1= He refused to go to healthy centre to be tested. 2= He was not told to get tested. 9=Other reason.(mention) _____ _____	[ ]

726.	If your husband or sexual partner was not tested for HIV as part of antenatal care clinic,why was he not tested?	1= He refused to go to healthy center to be tested. 2= He was not told to get tested. 9=Other reason.(mention) _____ _____	[ ]
727.	If you yourself was not tested for HIV when you were pregnant,why were you not tested?	1= I did not want to go to healthy facilty to get tested 2= No one told me about getting tested. 9= Other reason.(mention) _____	[ ]
728.	Whether the baby is alive or not,was she or he tested for HIV?	1=Yes 2= No 9= Can not say/does not know	[ ]

729.	Do HIV positive pregnant women use anti-retro virals(ARVs)	1=Yes **(SKIP TO 801)** 2= No 9= I dont know **(SKIP TO 801)**	[ ]
730.	If they don't use ARVs ,what do you think are the reasons for not doing so? ***(DO NOT READ THE OPTIONS BUT PROBE FOR MORE REASONS.MARK 1= AMETAJA 2= HAKUTAJA)***	A. Can not afford the cost B. Afraid of being seen using ARVs C. Healthy facility is very far. D. ARVs are not good for health. E. They are not aware of the availabity of ARVs.Hawafahamu kuhusu uwepo wa dawa hizo F. Other reason(mention)_____	[ ] [ ] [ ] [ ] [ ] [ ]

8 Family planning** ***Now I would like to ask you questions concerning family planning			
801.	Were you still enthusiastic to have more children at the end of your last pregnancy?	1. Yes 2. No **(SKIP TO NO. 803)** 3. I am not sure	[ ]
802.	If yes,how much time do you or did you wish to have before you become pregnant once again?	Months _____ Years _____	[ ]
803.	Were you given counseling on family planning during your last pregnacy ?	1. Yes 2. No **(SKIP TO 805)**	[ ]
804.	If yes,who gave you that counseling? ***READ OUT ALL OPTIONS. MARK 1=NDIYO 2=HAPANA***	A. Health facility expert	[ ]
		B. Community healthy worker	[ ]
		C. Other (Mention): _____	[ ]
805	If yes , how much time before delivery were you advised concerning family planning?	1. Months before delivery	[ ]
		2. Weeks before delivery	[ ]
806	Were you given advice concerning family planning before giving birth?	1. Yes 2. No(**SKIP TO NO. 810)**	[ ]
807	Who gave you that advice? ***READ ALL OPTIONS MARK 1=YES, 2=NO***	A. Health facility expert	[ ]
		B. Community healthy worker	[ ]
		C. Other (Mention): _____	[ ]

808	Now I am going to ask you about what you were taught concerning family planning issues. Please answer "yes" if you were taught and "no" if you were not taught the family planning issues am going to ask you now. ***MARK*** ***1=YES*** ***2=NO***	A. Were you told about child spacing?	[ ]
		B. How much time were you told should pass before you could become pregnant again after your last pregnancy?	[ ]
		C. Were you advised to go to the heath facility to receive family planning services?	[ ]
		D. Were you told how to talk to or share with your husband or sexual partner about family planning?	[ ]
		E. What else were you told concerning family planning? (mention) _____	[ ]
809	If yes,how much time after delivery were you given advice concerning family planning?	1. Months after delivery	[ ]
		2. Weeks after delivery	[ ]
810	Do you know different family planing methods that are available?	1 = Yes 2 = No (**SKIP TO 812)**	[ ]
811	Which family planning methods do you know? ***DO NOT READ OUT THE A NSWERS.*** ***PROBE UNTIL SHE SAYS ALL METHODS SHE KNOWS*** ***1 = MENTIONED*** ***2 = NOT MENTIONED***	a. Male sterilization	[ ]
		b.female sterilization)	[ ]
		c..ligation	[ ]
		d.Injections	[ ]
		e.Intra-dermal implants	[ ]
		f.Pills	[ ]
		g.Male condoms	[ ]
		h.Female condoms	[ ]
		I.Diaphragm	[ ]
		j.Jelly	[ ]
		k.Lactational Amenorrhea method(LAM)	[ ]
		l.Calendar method	[ ]
		m..Withdrawal	[ ]
		n. Other (mention).....	[ ]
		a. Other (mention).....	[ ]
812	Which family planning method do you know? ***MARK BY CIRCLING ALL THE ASWERS THAT WERE ALREADY MENTIONED IN A***	a. Male sterilization	[ ]
		b.female sterilization)	[ ]
		c..ligation	[ ]
		d.Injections	[ ]
		e.Intra-dermal implants	[ ]

	PREVIOUS QUESTION(QUESTION NO 811).READ OUT ALL THE ANSWERS NOT MENTIONED ABOVE AND ASK THE RESPONDENT WHETHER SHE /HE KNOWS THE FAMILY PLANNING METHODS THAT SHE DID NOT MENTION IN A QUESTION NUMBER 811. ***MARK*** ***1 =YES*** ***2 = NO***	f.Pills	[ ]
		g.Male condoms	[ ]
		h.Female condoms	[ ]
		I.Diaphragm	[ ]
		j.Jelly	[ ]
		k.Lactational Amenorrhea method(LAM)	[ ]
		l.Calendar method	[ ]
		m..Withdrawal	[ ]
		n. Other (mention).....	[ ]
			[ ]
813	What are the benefits of family planning methods ? ***READ OUT ALL ANSWERS.*** ***MARK*** ***1=YES*** ***2=NO***	A. To reduce the possibility of deliveries at shorter spacing and giving birth to children who are underweight.	[ ]
		B. To reduce the possibility of getting problems/complications related to pregnancy and childbirth.	[ ]
		C. To have enough time to nurture your child and take care of your family.	[ ]
		D. Other benefits(Mention) ……. .	[ ]
814	How much time after delivery can the woman become pregnant again if she is exclusively breastfeeding her baby?	**DURATION IN MONTHS.** **IF SHE/HE DOES NOT KNOW WRITE 99**	[ ]
815	How much time after delivery can the woman become pregnant again if she is not exclusively breastfeeding her baby?	**DURATION IN MONTHS.** ***IF SHE/HE DOES NOT KNOW WRITE 99***	[ ]

816.	How much time should a woman wait before getting another pregnancy since the last delivery?	**DURATION IN MONTHS.** ***IF SHE/HE DOES NOT KNOW WRITE 99***	[ ]
817.	Do you know about family planning method based on breastfeeding?(lactational Amenorrhea Method)	1 = Yes 2 = No **(SKIP TO 820)**	[ ]

818.	What are the main criteria used to confirm if the Lactional Amenorrhea Method is working effectively? **DO NOT READ THE ANSWERS .PROBE MORE UNTIL SHE/HE SAYS ALL THE CRITERIA SHE/HE KNOWS.** **1 =MENTIONED** **2 = NOT MENTIONED**	A. Menses has not resumed	[ ]
		B. Exclusive breastfeeding day and night without supplementation of other foods apart from breast milk.	[ ]
		C. Baby is less than six month old.	[ ]
819.	What are the main criteria used to confirm if the Lactional Amenorrhea Method is working effectively? **MARK THE CRITERIA HE/SHE HAS ALREADY MENTIONED IN QUESTION NO.818 . ASK WHETHER HE/SHE KNOWS THE CRITERIA WHICH HAVE NOT BEEN MENTIONED.** **MARK** **1 =MENTIONED** **2 = NOT MENTIONED**	A. Menses has not resumed	[ ]
		B. Exclusive breastfeeding day and night without supplementation of other foods apart from breast milk.	[ ]
		C. Baby is less than six month old.	[ ]
820.	Have you ever used any family planning method?	1. Yes 2. No (**SKIP TO NUMBER 822)**	[ ]

821	If yes, which family planning method have you ever used? ***(DO NOT READ THE GIVEN ANSWERS.PROBE FOR MORE ANSWERS HE/SHE KNOWS.*** **MARK** **1 =MENTIONED** ***2 = NOT MENTIONED*** **SKIP TO QUESTION 823**	a. Male sterilization	[ ]
		b.female sterilization)	[ ]
		c..ligation	[ ]
		d.Injections	[ ]
		e.Intra-dermal implants	[ ]
		f.Pills	[ ]
		g.Male condoms	[ ]
		h.Female condoms	[ ]
		I.Diaphragm	[ ]
		j.Jelly	[ ]
		k.Lactational Amenorrhea method(LAM)	[ ]
		l.Calendar method	[ ]
		m..Withdrawal	[ ]
		n. Other (mention).....	[ ]
822.	If you never used any method. Why not?	…… …….. …… ……	[ ]
823.	Did community healthy worker advise you to go to health facility to access family planning services after your last delivery?	1=Yes 2= No(**SKIP TO QUESTION 826)**	[ ]
824.	If yes,did you go to the health facility to access family planning services after your last delivery as advised by community health worker?	1=Yes **(SKIP TO QUESTION NO. 826)** 2= No	[ ]
825.	If no,why did you not go as advised by community health worker?	(**OPENED ENDED QUESTION)**	[ ]

826.	Are you now using any family planning method after your last delivery?	1. Yes (**SKIP TO QUESTION 828)** 2. No	[ ]
827.	If no,why are you not using any family planning method? ***DO NOT READ OUT ANSWERS*** ***MARK*** **1 =MENTIONED** ***2 = NOT MENTIONED***	A. Too much costs	[ ]
		B. I dont think am at risk to get pregnancy.	[ ]
		C.I think they have negative side effects	[ ]
		D.I want to get pregnant now.	[ ]
		E. I am not having sex.	[ ]
		F. My husband does not want me to use family planning method;	[ ]
		G. My mother-in-law does not want me to use family planning methods;	[ ]
		H. Other reasons(mention)_____	[ ]
828.	If yes, what family planning methods are you using? ***DO NOT READ OUT ANSWERS*** ***MARK*** **1 =MENTIONED** ***2 = NOT MENTIONED***	a. Male sterilization	[ ]
		b.female sterilization)	[ ]
		c..ligation	[ ]
		d.Injections	[ ]
		e.Intra-dermal implants	[ ]
		f.Pills	[ ]
		g.Male condoms	[ ]
		h.Female condoms	[ ]
		I.Diaphragm	[ ]
		j.Jelly	[ ]
		k.Lactational Amenorrhea method(LAM)	[ ]
		l.Calendar method	[ ]
		m..Withdrawal	[ ]
		l.Njia nyingine za kisasa taja……..	[ ]
		m.Njia za jadi taja…….	[ ]
829.	Where did you receive it? ***TAJA JINA LA SEHEMU***	1. Morogoro regional hospital. 2. Other hospital_____ 3. Healthy center_____ 4. Dispensary _____ 5. Other healthy facility_____ 6. Drug shop	[ ]

	PANAPOHUSIKA	7. Traditional birth attendant's home. 8. At own home 9. At community healthy worker's home 10. Van for drug delivery 11. Other place _____	
830.	Have your menses resumed after your immediate last delivery?	1 = Yes 2 = No	[ ]
831.	Did have an abortion after the birth of your last child?	1 = Yes 2 = No	[ ]
832.	Are you now pregnant ?	1=Yes 2= No 3. I am not sure.	[ ]
833	If yes,how old is your pregnancy?	Months _____	[ ]

CURRICULUM VITAE

Diwakar Mohan

PERSONAL DATA

Business address	**Home address**
Institution - Johns Hopkins Bloomberg School of Public Health Address – 615 N Wolfe St Baltimore, Maryland, USA Phone and fax Email – dmohan3@jhu.edu	Address – 400 S 45th street Apt 1A Philadelphia PA 19104 Phone and fax – 2153166260 (M) Email – dr.dmohan79@gmail.com Date of Birth – 9 December 1979 Place of Birth – Ernakulam, India

EDUCATION AND TRAINING

Degree	**Year**	**Institution**	**Field**
DrPH	2015	Johns Hopkins Bloomberg School of Public Health	International Health
MPH	2008	Johns Hopkins Bloomberg School of Public Health	Comparative health systems
MD	2006	Post Graduate Institute of Medical Education and Research – Chandigarh, India	Community Medicine
MBBS	2002	Madras Medical College – Chennai, India	Medicine, Surgery

Medical Board or Other Certification

- Medical Council of India
- Tamil Nadu Medical Council

PROFESSIONAL EXPERIENCE

Position (Start with Current Faculty Position)	**Dates**	**Institution**
Research Analyst (student)	**Nov 2010 – May 2015**	**Johns Hopkins Bloomberg School of Public Health**

Principal Responsibilities:

Focus area: Evaluation of Integrated Maternal and Newborn Health Care Program, Morogoro Tanzania. Funded by USAID

- Collaborated with local researchers to develop an evaluation of a Maternal, Neonatal, and Child Health program in Tanzania
- Refined methodology, research protocols and tools for data collection
- Trained data collection teams and managed data collectors throughout survey period
- Presented findings to local stakeholders
- Developed log frame to guide analysis
- Authored multiple reports and academic articles as deliverables

Focus area: Evaluation of national scaling up of therapeutic provision of zinc for the treatment of diarrhea in children 1-59 months in Uttar Pradesh and Gujarat,

India

- Analyzed data and provided support for costing and effectiveness estimates
- Worked on equity analyses to inform scale up of zinc provision in Gujarat and Uttar Pradesh

Position	Dates	Institution
Quality Improvement Specialist	**Jan 2010 – Oct 2010**	**URC, Bethesda**

Principal Responsibilities:

Focus area: Research & Evaluation unit, Health Care Improvement (HCI) project. Funded by USAID

- Evaluated quality improvement programs throughout Sub-Saharan Africa
- Designed process evaluation of program on use of 'Expert patients' in HIV/ AIDS program in Uganda
- Provided research & evaluation support to different country programs
- Authored multiple reports

Position	Dates	Institution
Short Term Consultant	**Oct 2009 – Dec 2009**	**World Bank**

Principal Responsibilities:

Focus area: Evaluation of public financial management reforms on service delivery

- Assessed the impact of decentralization and public financial management reforms on service delivery of health (lead role) and education (supporting role)
- Identified bottlenecks and recommended operational measures to improve service delivery
- Developed case studies and presented results with teams from Ministry of Finance

Position	Dates	Institution
Research Associate (student)	**June 2008 – Sep 2009**	**Future Health Systems, Johns Hopkins Bloomberg School of Public Health**

Principal Responsibilities:

Focus area: Health Systems Research, Funded by DFID

- Provided technical assistance to The World Bank on the Health Results Based Financing (HRBF) program of country pilot schemes and impact evaluations
- Evaluated primary prevention programs for chronic diseases in Southeast Asia
- Authored systematic review on links between poverty and chronic disease

Position	Dates	Institution

Resident	Jan 2004 - Dec 2006	School of Public Health, PGIMER, Chandigarh, India

Principal Responsibilities:

- Monitored and supervised WHO sponsored Intensified Pulse Polio Initiative
- Evaluated public health programs including Integrated Disease Surveillance Project, Maternal & Child health programs, Malaria and Tuberculosis control programs
- Planned implementation of Integrated Management of Childhood Illnesses (IMCI) in districts of Haryana, India and trained health care providers in IMCI techniques
- Developed proposals for institution of Maternal Mortality Audit in districts of Haryana, India
- Planned creation of the National Center for Cardiovascular Diseases, Diabetes and Stroke at PGIMER, Chandigarh, India
- Acted as Academic Coordinator, Short Course on Health Management, School of Public Health

Position	Dates	Institution
House surgeon	July 2002 – Aug 2003	Government General Hospital, Chennai, India

Principal Responsibilities:

Clinical work in Internal Medicine, General Surgery, Obstetrics and Gynecology and Pediatrics

- Managed routine ambulatory and outpatient care for a adults and children
- Provided emergency and critical care in ICU settings
- Assisted with simple surgeries including vasectomy, caesarean sections, minor surgeries
- Conducted deliveries of full-term pregnancies and resuscitated newborns

EDITORIAL ACTIVITIES

Peer Review Activities

Reviewer – Journal of Health Care for the Poor and Underserved

PUBLICATIONS

Journal Articles – Published peer reviewed

1. An SJ, George AS, LeFevre A, Mpembeni R, Mosha I, **Mohan D**, Yang A, Chebet J, Lipingu C, Killewo J, Winch P, Baqui AH, Kilewo C. Program synergies and social relations: implications of integrating HIV testing and counselling into maternal health care on care seeking. BMC Public Health. 2015 Jan 21;15(1):24.
2. Shields CL, Ramasubramanian A, Ganguly A, **Mohan D**, Shields JA. Cytogenetic testing of iris melanoma using fine needle aspiration biopsy in 17 patients. Retina. 2011 Mar;31(3):574-80.

3. Palaniswamy C, Mellana WM, Selvaraj DR, **Mohan D**. Metabolic Modulation: A New Therapeutic Target in Treatment of Heart Failure. Am J Ther. 2010 Apr 10.
4. Sukhija R, Aronow WS, Palaniswamy C, Singh T, Sukhija R, Kalapatapu K, **Mohan D**, Pucillo AL, Sorbera C, Kakar P, Weiss MB, Lal P, Monsen CE. Major adverse cardiac events in patients with moderate to severe renal insufficiency treated with first-generation drug-eluting stents. Am J Cardiol. 2010 Feb 1;105(3):293-6.

Journal Articles – In Press, Accepted for publication, Submitted for publication

1. **Mohan D**, Lefevre A, Gupta S, Bazant E, Killewo J, Baqui A. Determinants of use of postpartum care at health facilities in rural Tanzania: Multilevel analysis of a household survey. BMC Pregnancy & Childbirth. July 2014
2. McMahon S, **Mohan D**, LeFevre A, Mpembeni R, Mosha, Chase R, Baqui AH, Winch P. Early Discharge Post Delivery; factors contributing to early exit after facility-based birth in Morogoro Region, Tanzania. BMC Pregnancy & Childbirth. August 2014.
3. Lefevre A Mpembeni RC, Chitama, D, George A, **Mohan D,** Gupta S, Feldhaus I, Urassa D, Chebet J Kilewo C, Perriera A, Besana G, Semu H, Cooper C, Lutale H, Baqui AH, Killewo J, Winch PJ. Profile, knowledge and work patterns of a cadre of maternal, newborn and child health CHWs focusing on preventive and promotive services in Morogoro Region, Tanzania.
4. An SJ, George AS, LeFevre A, Mpembeni R, Mosha I, **Mohan D**, Yang A, Chebet J, Lipingu C, Killewo J, Winch P, Baqui AH, Kilewo C. Supply side dimensions and dynamics of integrating HIV testing and counselling into routine antenatal care: A facility assessment from Morogoro region, Tanzania. BMC Public Health. September 2014.
5. Mosha I, Feldhaus I, Silverman M, Lefevre A Mpembeni RC, Chitama, D., **Mohan D,** Chebet J Urassa D, Kilewo C, Plotkin M, Besana G, Semu H, Winch PJ, Baqui A, Killewo J, George A. Equally able, but unequally accepted: Gendered profile and experiences of community health volunteers promoting maternal, newborn, and child health in Morogoro region, Tanzania. Int Jour Equity in Health. January 2015.

Journal Articles and Editorials – Not peer reviewed

1. Nagpal SJS, Karimianpour A, Mukhija D, Mohan D, Dissemination of 'misleading' information on social media during the 2014 Ebola epidemic: an area of concern, Travel Medicine and Infectious Disease (2015), doi: 10.1016/j.tmaid.2015.05.002

Reports, Manuals and Technical Guidelines

1. **Mohan D**, Franco LM, Sabou D, Boucar M, Saley Z, E Broughton,. 2011.Validity of Quality Improvement Team Self-Assessment in Monitoring Maternal and Newborn Indicators in Niger – Comparison of data from external record review, observation and case-simulation. Research and Evaluation Report. Published by the USAID Health Care Improvement Project. Bethesda, MD: University Research Co., LLC (URC)
2. Boucar M, Franco LM, Sabou D, Saley Z, Jennings L, **Mohan D**. 2011. Sustaining Better Maternal and Newborn Care and Quality Improvement in Niger: Challenges and Successes. Research and Evaluation Report. Published by the USAID Health Care Improvement Project. Bethesda, MD: University Research Co., LLC (URC)
3. Boucar M, Franco LM, Jennings L, **Mohan D** Sabou D, Saley Z,. 2011. How do quality improvement teams function after an improvement intervention ends? A description of

team performance after the end of an obstetric and newborn QI initiative in Niger. Research and Evaluation Report. Published by the USAID Health Care Improvement Project. Bethesda, MD: University Research Co., LLC (URC)

4. Tanzania Spread Study Team. 2011. Spread of PMTCT and ART Better Care Practices through Collaborative Learning in Tanzania. *Research and Evaluation Report*. Published by the USAID Health Care Improvement Project. Bethesda, MD: University Research Co., LLC (URC).
5. Tanzania PQI Study Team. 2011. The Partnership for Quality Improvement to Improve PMTCT and ART Services in Tanzania: Assessment of Results, Capacity, and Potential for Institutionalization. *Research and Evaluation Report*. Published by the USAID Health Care Improvement Project. Bethesda, MD: University Research Co., LLC (URC).

PRACTICE ACTIVITIES

Conference Presentations

1. **Mohan D**, Lefevre A, Gupta S, Bazant E, Killewo J, Baqui A. Determinants of the use Post Partum Care (PPC) among Rural Women in the Morogoro Region of Tanzania. Poster presentation, Third Global Symposium on Health Systems Research 2014, Cape town, South Africa.

2. **Mohan D**, Walker D. Will Bangladesh benefit from the introduction of Pneumococcal vaccination? – A cost effectiveness analysis. Poster presentation, The Johns Hopkins Vaccine Initiative Vaccine Day 2009.

3. Chitama, D., **Mohan D**, Lefevre A Mpembeni RC, Frumence, G, Urassa D, Mosha I, Chebet J, Killewo J, Winch, P J. Incentives for motivating and retaining Community Health Workers (CHWs) and their relative importance; Insights from Discrete Choice Experiment in Morogoro rural-Tanzania. Third Global Symposium on Health Systems Research 2014, Cape Town, South Africa.

4. Jou E, **Mohan D**, Ayyappan S, Gligich O, Billett H, Chan A and Raghupathy R. Retrospective Exploratory Study of HIV+ Patients With and Without Paraproteinemia for Association with HIV status, Comorbidities and Development of Hematological Malignancies. Poster presentation, 2012 American Society of Hematology Annual Meeting, Atlanta, GA

5. Jou E, Gligich O, Chan A, **Mohan D**, Felsen UR, Billett HH, Chan A and Raghupathy R. The Incidence and Risk Factors for Hematological Malignancies and Premalignant Hematological Disorders in HIV. Poster presentation, 2013 American Society of Hematology Annual Meeting, New Orleans, LA

6. Jou E, **Mohan D**, Ayyappan S, Gligich O, Billett HH, Chan AT, Raghupathy R. Risk of Hematological Malignancies Conferred by Paraproteinemia in HIV Positive Patients. Poster presentation, 2013 American Society of Hematology Annual Meeting.