Distribution Agreement

In presenting this thesis or dissertation as a partial fulfillment of the requirements for an advanced degree from Emory University, I hereby grant to Emory University and its agents the non-exclusive license to archive, make accessible, and display my thesis or dissertation in whole or in part in all forms of media, now or hereafter known, including display on the world wide web. I understand that I may select some access restrictions as part of the online submission of this thesis or dissertation. I retain all ownership rights to the copyright of the thesis or dissertation. I also retain the right to use in future works (such as articles or books) all or part of this thesis or dissertation.

Signature:

_____ _____

Anna L. Handley Date

Self-Efficacy and Delivery Service Provision among Community Health Workers: Lessons from Rural Ethiopia

By

Anna Handley
Degree to be awarded: MPH

Hubert Department of Global Health

_____

Rob Stephenson, PhD, MSc
Committee Chair

Self-Efficacy and Delivery Service Provision among Community Health Workers: Lessons from Rural Ethiopia

By

Anna Handley

B.A., University of South Carolina, 2008

Thesis Committee Chair: Rob Stephenson, PhD, MSc

An abstract of
A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements for the degree of
Master of Public Health in Global Health, 2011

Abstract

Self-Efficacy and Delivery Service Provision among
Community Health Workers: Lessons from Rural Ethiopia
By Anna Handley

Background: Despite a strong federal commitment, efforts to reduce maternal and newborn mortality in Ethiopia have been slow moving due to limited human resources and health infrastructure. To combat the inaccessibility of health services the Health Extension Program was created in 2003, and has deployed close to 30,000 community health workers. Mothers and newborns are at greatest risk for negative health outcomes during birth and accordingly, most community health workers received training in the delivery of normal births. The training, however, is primarily theoretical, and few community health workers are provided with delivery experience. Due to limited monitoring of the Health Extension Program it is unclear how effective the current training is in preparing community health workers to attend delivery amidst competing health responsibilities.

Objective: This study explores the factors than enable community health workers to provide delivery care in Amhara region, Ethiopia, particularly emphasizing the association between self-efficacy and the prioritization and self-marketing of delivery services.

Methods: Twenty-six in-depth interviews and 162 surveys were conducted with Health Extension Workers, voluntary Community Health Workers, and traditional birth attendants in Amhara region, Ethiopia to assess current patterns of delivery care provision and factors that enable the provision of delivery care.

Results: Generally, the survey reveals that despite formal training in delivery, many community health workers are not providing delivery services. Self-efficacy was found to be strongly associated with the provision of numerous maternal and newborn services, including delivery. Formative interviews indicate that experience with delivery promoted a sense of self-efficacy among community health workers, which prompted self-marketing of services, and increased the number of notification pathways for labor or pregnancy-related complications. Self-efficacy, when coupled with regular interaction with TBAs further increased the number of notification pathways.

Discussion: Though community health workers in rural Ethiopia have life saving knowledge and skills, often they are not in the right place at the right time to fully utilize their abilities. Mechanisms to get community health workers into the homes of women in labor or with complications need urgent exploration. This study offers emerging evidence that building self-efficacy through experience with delivery is critical for health workers to prioritize and self-market of delivery services. Furthermore, regular interaction with traditional birth attendants enhances the probability that community health workers will be notified of labor or pregnancy-related complications.

Self-Efficacy and Delivery Service Provision among Community Health Workers: Lessons from Rural Ethiopia

By

Anna Handley

B.A., University of South Carolina, 2008

Thesis Committee Chair: Rob Stephenson, PhD, MSc

A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements for the degree of
Master of Public Health in Global Health, 2011

Acknowledgements

I am extremely grateful for the patience and persistence of my adviser, Rob Stephenson, who helped me find my voice within scientific writing and continually provided mentorship, comic relief, and valuable insight on the development of this thesis. I would like to give special thanks to Craig Hadley for assistance navigating theoretical possibilities and to Lynn Sibley for welcoming me to MaNHEP with open arms. I also appreciate the unwavering enthusiasm from my mother and sister, who listened intently to the latest developments in the writing progress. Finally, to the community health workers and traditional birth attendants, whose dedication to improving maternal health is a true inspiration, I am thankful that you welcomed me into your community and shared your stories without reservation.

Table of Contents

List of Acronyms

CHW Community Health Worker (including HEWs and vCHWs)
HBLSS Home Based Life Saving Skills
HEP Health Extension Program
HEW Health Extension Worker
HSDP III Health Sector Development Program
FLW Frontline Health Worker (including HEW, vCHWs, and TBAs)
MaNHEP Maternal and Newborn Health in Ethiopia Partnership
MNH Maternal and Newborn Health
RCT Randomized Control Trial
TBA Traditional Birth Attendant
vCHW voluntary Community Health Worker
WHO World Health Organization

1- INTRODUCTION

Problem Statement

Each year a lack of skilled birth attendance accounts for two million preventable maternal deaths, stillbirths, and newborn deaths (Bhutta, Chopra et al. 2010). A disproportionate amount of these deaths occur in low-resource nations, many located in Sub-Saharan Africa, where the rates of skilled birth attendance are among the lowest in the world (Darmstadt, Lee et al. 2009). Ethiopia, with an immense population, limited health infrastructure, and insufficient human resources, contributes significantly to the global burden of maternal and newborn deaths with approximately 19,000 maternal deaths and 100,000 newborn deaths annually (Koblinsky 2010) (MaNHEP 2010). Specific barriers to skilled birth attendance in Ethiopia include the rare presence of facilities and skilled providers in rural areas, the lack of decision-making power among women, cultural preferences for home birth, distance to services, and a lack of transportation (Girma, Yohannes et al. 2007) (FMOH 2006; Health 2006).

The Millennium Development Goals highlight the importance of increasing skilled birth attendance as a key strategy for reducing maternal, under-five, and infant mortality by 2015. Despite global recognition on the importance of having a skilled provider at birth, actual progress towards universal skilled birth attendance in Sub-Saharan Africa is staggeringly slow. Each year in sub-Saharan Africa, skilled providers attend only 0.2% more births than the previous year (Darmstadt, Lee et al. 2009). In Ethiopia, as in many low

resource nations, alternative methods for improving delivery care urgently need exploration.

Recent reviews have suggested that training community health workers (CHWs) to provide childbirth care in low resource settings may be an alternative strategy to improve maternal, perinatal, and early neonatal health outcomes, where skilled attendance is commonly unavailable (Lawn, Kinney et al. 2009) (Lassi, Haider et al. 2010). Particularly, where there are low levels of institutional delivery and high total fertility, increasing the availability and use of trained community-health workers as birth attendants could dramatically improve maternal and newborn survival and wellbeing. Such a strategy, the Health Extension Program (HEP), was implemented in 2003 in Ethiopia through the training and placement of a new cohort of community level health providers in rural areas, however there has been limited monitoring of the HEP, and the extent to which Health Extension Workers (HEWs) are providing delivery services in most regions remains unknown (Koblinsky 2010). Formative research suggests that most HEWs in Amhara region have limited experience attending deliveries, and some have no experience at all. As a result, HEWs often feel ill equipped to provide delivery services, and prioritize other job-related responsibilities over attending birth (Hadley 2010). Qualitative and quantitative data collected for this thesis will explore the current state of community-based delivery care practices, examining specifically the role of self-efficacy as a key enabling factor among community-level health providers.

Objectives and Aims

The objective of this study is to investigate the role of self-efficacy on delivery care practices among frontline workers (FLWs) in Amhara region, Ethiopia. The aims of this study are 1) explore patterns of community delivery service provision using qualitative and quantitative methods, 2) quantify the association between self-efficacy and service provision, and 3) using qualitative methods, develop a conceptual framework detailing the relationship between self-efficacy and delivery service provision.

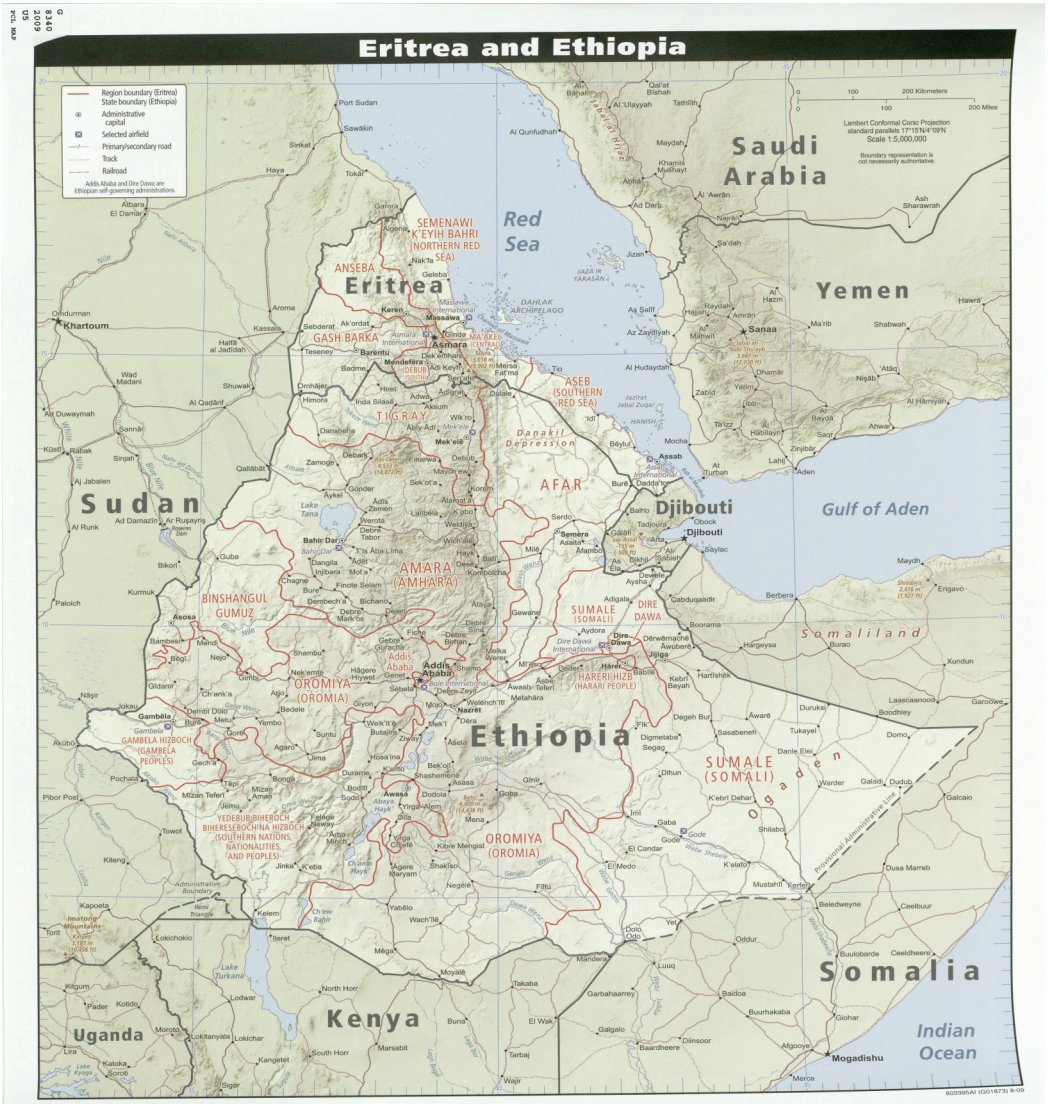
Frontline workers in Amhara region will be trained in a Home-Based Life Saving Skills curriculum, which teaches strategies to prevent maternal and newborn death and disability during the intrapartum period. The interviews and baseline survey document the pre-intervention reality of childbirth care at the community level through the lens of these health providers. The introduction of HEWs at the community level changes the structure of Ethiopia's health system and challenges cultural norms surrounding childbirth. The accounts of frontline workers give meaning to this period of transition and contribute to the current debate around the value of training community-level health providers to attend births.

Background of Ethiopia

Ethiopia, a land-locked country in Eastern Africa, is the second most populous African country, home to approximately 88 million residents, and is tenth-largest geographically with an area of 1,100,000 km^2 (CIA 2010). Ethiopia is located in the horn of Africa, bordered by Eritrea in the north, Djibouti and Somalia to the east, Sudan to the west, and Kenya to the South. Administratively,

Ethiopia is divided into nine regions and 68 zones. Below the zones are districts, which are called *woredas*. *Woredas* are partitioned into the lowest administrative unit in Ethiopia, the *kebele*, which means community. **Figure 1.1** below illustrates the regional administrative boundaries of Ethiopia, as well as bordering countries.

Figure 1.1: Map of Ethiopia



Source: University of Texas Perry-Castañeda Library Map Collection, 2009

Ethiopia reports one of the highest fertility rates in the world with women having on average 5.4 births over the life course, exposing women to the risks of pregnancy and childbirth repeatedly over time and perpetuating a pronatalist environment where pregnancy is a normal status, and birth is a normal process (Macro 2006). Gender gaps in literacy, educational attainment, and work status contribute to the economic marginalization of Ethiopian women, further normalizing childbearing as women's predominant social role (Ethiopian Society of PopulationStudies 2008). The non-medical status of pregnancy and childbirth has serious health consequences for Ethiopian women and their newborns, exacerbating barriers to accessing preventative and curative health services by stigmatizing women who are unable to fulfill the social obligation of childbearing. Additional social factors influencing the reproductive experience of Ethiopian women and contributing to poor maternal health indicators include high fertility preferences (4.5 children), early age at first marriage (16.5 years) and first sex (16.5 years), and low uptake of modern contraceptive methods (9%) (Macro 2006). There is a strong cultural preference for homebirth, with 94% of births taking place in the home attended primarily by family members and when available, TBAs (Macro 2006). In this context, Ethiopian women have a shockingly high risk of maternal death at just 1 in 27 (Macro 2001).

Ethiopia's Health System

Ethiopia has shown a strong commitment to improving maternal health by advocating for the advancement of the Millennium Development Goals, highlighting maternal health as a priority in the Health Sector Development Program (HSDP III) (Koblinsky 2010), and finding national funding sources

which account for over half of all maternal and child health expenditures (Bhutta, Chopra et al. 2010). A key strategy of the HSDP III, the Health Extension Program (HEP) was introduced in 2003 in recognition of the systematic challenges to delivering health services in many parts of the country. The HEP adds a new community-level tier to the Ethiopian health system by deploying Health Extension Workers, 2 per *kebele,* at health posts throughout the country. HEWs are expected to spend 75% of their time conducting community outreach providing a connection between the home and health post (Koblinsky 2010), and in theory, linking rural Ethiopian women with the formal health system.

Health Extension Workers are young women with at least grade 10 education who are recruited by *kebele* and *woreda* councils and undergo a year of community health training at Technical and Vocational Training and Education Centers followed by full time employment with the *Woreda* Health Office (Koblinsky 2010) (Argaw 2007). Health Extension Workers are the lowest level providers of Ethiopia's Essential Health Services Package, providing preventative and select curative services in the following areas: (1) family health services; (2) disease prevention and control; (3) hygiene and environmental sanitation; and (4) health education and communication (Argaw 2007). Essential maternal and newborn health care services are part of the family health services package, which includes training in the delivery of normal births (Koblinsky 2010).

As of 2009, the Federal Ministry of Health trained and deployed over 30,000 HEWs and had constructed 73% of all required health posts, laying the necessary foundation for the HEP (Messelech 2009). HEWs *should* now be providing community-based delivery services to mothers across Ethiopia.

However, findings from MaNHEP formative research and baseline survey, as well as other recent surveys, indicate that many HEWs lack the essential knowledge, skills, and self-efficacy needed to provide delivery services. HEWs often do not prioritize delivery services and allocate significantly less time to providing maternal and newborn services compared with other responsibilities (L10K 2009; Hadley 2010; Stephenson, Dynes et al. 2010). Critics of the HEP cite inadequate training of HEWs and weak interactions between HEWs and referral health centers as major challenges in managing acute maternal health problems (Wakabi 2008). Associated with these challenges is the HEP's limited progress in educating communities on danger signs related to pregnancy and childbirth (Tesfaye 2010). Indeed, these shortcomings may greatly hinder the HEP's anticipated progress towards MDG #4 and MDG #5a if additional techniques for promoting maternal and newborn health (MNH) service provision among HEWs are not explored.

Background of Amhara Region

Amhara region is one of the most populous regions in Ethiopia with 19,624,000 residents, creating an immense challenge in providing health services in an already overburdened health system (Wamai 2009). With a health facility to population ratio of one hospital to 1,177,933 people and one bed for 11,051 people, the Amhara regional health system cannot accommodate the current population, much less the anticipated population growth (Wondwosen, Amare et al. 2004). The underperformance of the regional health system has implications for care seeking as shown in the results of a regional household survey. Sixty-one percent of respondents with a perceived sickness in Amhara did not seek services

within the health system at all, most reporting that they did not anticipate benefits from seeking health services, which reveals a severe lack of confidence in formal health services (Afework 2010). In addition to a lack of health infrastructure, Amhara region lacks trained health providers, and as a result has a severe shortage of skilled birth attendants. Serving the population of 19.6 million are a mere 133 physicians and 11,013 nurses, though these providers are highly centralized in zonal hospitals and *woreda* health centers (Wamai 2009). The health provider to population ratios, 1 physician per 147,549 people and 1 nurse per 1,782 people (Wamai 2009), demonstrate the critical need for exploring alternative providers like community health workers as a possible solution to the skilled birth attendant shortage in Amhara region.

Of all regions in Ethiopia, Amhara region reports the highest proportion of home births and the lowest rate of skilled attendance (Macro 2006). Adolescent marriage is common in Amhara region with a median age at first marriage of 15 years, and though spacing between marriage and the first birth is significant at 45 months, the median age at first birth is only 18 years of age, the lowest in all of Ethiopia. Divorce is not uncommon among Amhara women, with 58.9% of first marriages ending in divorce (Macro 2006). Most divorces result from a parentally arranged marriage, though the vast majority of Amhara women remarry and continue childbearing, which contributes to the high regional total fertility rate of 5.1 children. Subsistence agriculture is a major economic activity in Amhara and children are viewed as an economic asset, which contributes to Amhara region's high fertility rate and perpetuates pronatalist views (Ethiopian Society of PopulationStudies 2008). The vast majority of women (68.5%) report

undergoing circumcision, which is significantly associated with life threatening complications for both mothers and newborns during childbirth. Sixty-three percent of women report working, mostly in agriculture, and the vast majority of women continue physical labor during pregnancy. Exceptionally low rates of skilled delivery, young age at first birth, high total fertility, fertility pressures associated with remarriage, female circumcision, and agrarian labor during pregnancy place Amhara women at substantial risk for poor maternal health outcomes in an environment where access to health services is severely limited and skilled providers are far and few.

Table 1.1 on the following page summarizes the demographic characteristics described above and provides details on the social conditions surrounding the reproductive experience of Amhara women compared to all Ethiopian women.

Table 1.1: Demographic characteristics reported by women of reproductive age in Ethiopia and Amhara region		
Characteristic	**Ethiopia**	**Amhara region**
Total fertility rate	5.4 births	5.1 births
Ever married	75%	83.6%
Married more than once	15.2%	48.1%
Median age at first marriage	16.5 years	15 years
Median age at first birth	19.2 years*	18 years
Homebirths	94.1%	96.3%
Births with skilled attendant	5.7%	3.7%
Divorce first marriage	6.6%	58.9%
Frequent access to media	26.3%	16.3%
Completed primary education	1.9%	1.4%
Married by age 18	61.8%	80.4%
Female circumcision	74.3%	68.5%
Accepts wife beating for at least one reason	81%	91.3%
Low decision making autonomy	8.3%	7.7%
Engaged in any kind of work	28.9%	62.7%
Any contraceptive method	15%	16.1%
Under five mortality	123 deaths/1,000 births	154 deaths/1,000 births

* Denotes a sub-sample of 20-29 year olds

Source: Adapted from Macro 2006 and Ethiopian Society for Population Studies 2008

Host Organization

In recognition of the critical need for community-oriented maternal and newborn health services, Lynn Sibley and colleagues have been working in Ethiopia since 2003 (Sibley, Buffington et al. 2004). Their strategy, Home-Based Life Saving Skills (HBLSS), is designed for high mortality settings where home birth with unskilled attendance is normative. HBLSS relies on a competency-based training program to promote the use of life-saving techniques within the home and, through problem recognition and planning, decrease delays in reaching referral facilities when life-threatening complications occur (Sibley, Buffington et al. 2006). Most recently HBLSS will be implemented as part of the MNH care package developed by the Maternal and Newborn Health in Ethiopia Partnership (MaNHEP), which seeks to demonstrate the scalability of this community-oriented model for nationwide use in Ethiopia. To this end MaNHEP is employing four strategies including: (1) the implementation of a MNH care package at the community level; (2) a quality improvement approach to identify barriers and solutions to accessing and obtaining MNH services; (3) behavior change communications, and (4) strengthening the abilities of district level managers to advocate for and support MNH activities at each level of the health system (Dynes et al 2011, in press). **Table 1.2** on the following page illustrates the key components of the MNH training package, the foundation of the MaNHEP intervention.

Table 1.2: Key Competencies of the MaNHEP MNH Training Package as implemented in Amhara region, Ethiopia

Maternal and Newborn Health Package of Care	
Mother	**Newborn**
Care at Delivery • Clean delivery • Uterotonics • Uterine massage	**Postnatal health assessment** • Color check • Activity check • Feeding check
Postpartum health assessment • Breast check • Bleeding check • Trauma check (fistula) • Fever check	**Counseling** • Breastfeeding • Thermal care •Hand washing & cord care • Illness care seeking • Pneumonia management

Source: Hadley 2010

HBLSS has not been field tested in Amhara region, and it is unclear how the intervention may be best adapted for this environment. Furthermore, the rollout of the Health Extension Program provides an additional challenge, altering the context of previous HBLSS interventions by introducing a new cohort of childbirth attendants. This mixed methods study was designed to document the pre-intervention context in Amhara region, and explore current childbirth care practices among community health workers, with particular emphasis on factors that enable consistent delivery care. The results of this analysis will be used to inform the behavior change communications and quality improvement

strategies of MaNHEP, and may inform the implementation strategies of related projects in Amhara region.

Summary

Globally, the low coverage of skilled birth attendance places mothers and newborns at risk for death and disability from complications. Efforts to train skilled birth attendants are slow moving, particularly in Sub-Saharan Africa, and often place skilled birth attendants into an inaccessible yet overburdened health system. Though skilled birth attendance and institutional delivery for all women is desirable, the dire state of the health system and a strong cultural preference for home birth in Ethiopia requires exploration of alternative mechanisms for improving maternal and newborn survival and well-being. MaNHEP is implementing a MNH training package, focusing on enabling community health workers and families to manage common complications during labor, birth, and the immediate postpartum period. There have been few studies documenting the provision of delivery services at the community-level in Amhara region, and the mechanisms through which community-level health providers provide childbirth care within the home are unknown. This thesis will explore these gaps, detailing the provision of delivery services focusing particularly self-efficacy as a factor that enables community health workers to be present at the time of birth.

2 - LITERATURE REVIEW

Community-based Maternal and Newborn Health Interventions

Section Summary: The training of community health workers is associated with decreases in newborn morbidity and mortality, and maternal morbidity. It is unlikely that maternal mortality will show substantial declines until community-based strategies are linked with scaled up facilities for emergency obstetric care.

Since the inception of the Safe Motherhood movement in 1987, there has been increasing recognition that many life-saving procedures can be conducted at the community-level in health centers or first aid posts (Maine and Rosenfield 1999). Some critics, however, argue that without access to emergency obstetric care (which typically cannot be performed by community-level providers), there will be no substantial decline in maternal mortality worldwide (Maine and Rosenfield 1999). The basic question of this ongoing debate is whether maternal deaths are more likely to be averted through interventions delivered in scaled up facilities or via community-based services (Montagu, Yamey et al. 2011) Facility-based approaches were lauded as the best intrapartum-care strategy in the Lancet's series on maternal survival (2006) , however achieving this type of structural change will require long-term commitment from national health systems. The question remains, what should be done in the meantime to prevent death and disability from treatable health problems? A secondary analysis of Demographic and Health Survey data from 43 developing nations found that globally, most poor women deliver at home, which suggests that community-based strategies are the most direct way to impact maternal and newborn health,

at least in the near future, in areas where facility-based approaches are not presently feasible (Montagu, Yamey et al. 2011).

Community-oriented strategies for maternal and newborn health are justifiable considering the high level of homebirths, the lack of health facility infrastructure, and the severely limited human resources in many developing nations. Recent reviews show that training community health workers produces consistent health benefits for both mothers and newborns. Lassi, Haider et al (2010) reviewed 18 cluster-randomized/quasi-randomized trials of community-based maternal and newborn health interventions. The interventions did not significantly impact maternal mortality, however it should be noted that maternal mortality is a rare event and as such it is very difficult to assess changes in mortality over time. Maternal morbidity was significantly reduced (RR 0.75, 95% CI 0.61 to 0.92), as was neonatal mortality (RR 0.76; 95% CI 0.68 to 0.84), stillbirths (RR 0.84; 95% CI 0.74 to 0.97), and perinatal mortality (RR 0.80; 95% CI 0.71 to 0.91). Referrals to a health facility for pregnancy-related complications increased significantly by 40% (RR 1.40; 95% CI 1.19 to 1.65), though only two of the 18 studies assessed this outcome (n=22,800) so this finding may be less generalizable than the other findings of Lassi and colleagues (2010).

Other reviews report similar findings. A meta-analysis of controlled-trails in southern Asia by Gogia and Sachdev (2010) found that home visits for antenatal care and neonatal care by community health workers are associated with reductions in both neonatal mortality (RR 0.62, 95% CI 0.44-0.87) and stillbirths (RR 0.76, 95% CI 0.65-0.89). While Darmstadt, Lee et al (2009) found that community-health worker training interventions were associated with

reductions in perinatal mortality (RR 0.72, 95% CI 0.62-0.84) and early neonatal mortality (RR 0.64, 95% CI 0.56-0.73).

The reviews suggest that newborn mortality and morbidity, and maternal morbidity are sensitive to community-level strategies while maternal mortality is most sensitive to the availability of skilled obstetric care. Though there are no experimental study designs testing the effect of emergency obstetric care on maternal mortality, there is a strong evidence base for the strategy in quasi-experimental, ecological, and observational studies (Paxton, Maine et al. 2005). Even in settings where home birth without skilled attendance is normative, Paxton and colleagues (2005) found that referral access to emergency obstetric care dramatically reduced maternal mortality. These findings echo the sentiments of Maine and Rosenfield (1999) who believed maternal mortality would not show substantial declines until skilled emergency-obstetric care is available for women with pregnancy-related complications.

It should be noted that though reviews of community-health worker training are promising, one-method approaches to care have historically proven ineffective at making pregnancy and childbirth safer (AbouZahr 2003). It takes a continuum of strategies to make motherhood safer including care for women during pregnancy, delivery, and in particular, access to emergency obstetric care in referral centers for complications. To achieve the maximum health benefits for mothers and newborns, community-oriented services must be linked with referral facilities because some life threatening complications (for example, obstructed labor) simply cannot be managed at the community level.

The reviews illustrate that generally community-based interventions targeting at maternal and newborn health are an effective strategy where health facilities and skilled birth attendants are far and few, but these strategies alone may have limited impact on maternal mortality. However, linking community-oriented strategies with health center referrals for obstetric emergencies is an evidence-based strategy for reducing maternal mortality. Ultimately, the debate on health-facility strengthening versus community-based approaches is a false dichotomy (Pagel, Lewycka et al. 2009) as both strategies are needed to impact maternal health, and the balance of the two strategies must mirror the resources and political will of a given context.

Elements of Success and Failure

Unfortunately, the reviews to date have not differentiated between types of community-based interventions to determine which specific techniques have been most effective at improving maternal and newborn health. Haines and colleagues (2007) point out this significant gap suggesting that methods need to be explored to achieve and maintain a high standard of performance by community workers. In light of the current momentum surrounding community-based maternal and newborn health interventions, it is vital to document the successes of specific community-oriented strategies in order to maximize the benefits of community health worker programs.

Traditional Birth Attendant Involvement

Section Summary: Evidence on the impact of TBA training is mixed, though studies suggest that TBA training may increase appropriate referral for obstetric emergencies.

There has been interest in providing formal training to TBAs since the Alma Ata Declaration of 1978, such interest in fact, that 85% of low-income countries had a TBA training program by the year 2000 (Darmstadt, Lee et al. 2009). However in the 1990s, the WHO shifted perspectives to focus on increasing the availability of skilled birth attendants rather than raising the capacity of TBAs, and in 2004 TBAs were officially excluded from the skilled birth attendant category (Darmstadt, Lee et al. 2009) (WHO 2004). Evidence of the direct effect of TBA training on maternal and perinatal mortality is lacking (Darmstadt, Lee et al. 2009), and most studies emphasize the relationship between TBA training and increased uptake health services by community women. A meta-analysis of 10 studies by Sibley and Sipe (2004) showed a 38% increase in prenatal care use associated with TBA training. This suggests that TBA training may indirectly impact mortality as TBAs link women with the formal health system during the prenatal period, which is associated with increased care seeking for labor and for obstetric complications.

There is mixed evidence regarding the impact of TBA training on appropriate referral for obstetric emergencies by TBAs. A TBA training program in Fortaleza, Brazil resulted in a significant increase in hospital referrals (Janowitz 1988). Nearly half on all women in hospitals with pregnancy-related complications were referred by TBAs for obstructed labor (40%), first births

(12%), abnormal presentation (9%), and maternal hemorrhage (7%). The program has not been reproduced, however, and other TBA training programs show conflicting results. A Guatemalan TBA training program resulted in a significant increase in referrals in both intervention and control areas, while meta-analysis of 13 studies assessing found a modest increase in obstetric referrals associated with TBA training, but the authors could not attribute the effect to TBA training alone because of data quality issues (Sibley and Ann Sipe 2004).

A large cluster randomized control trail (RCT) in Sindh, Pakistan shows the most promising results regarding TBA training and referral for obstetric emergencies. A total of 585 TBAs received training in the recognition and referral of obstetric emergencies, which resulted in a 50% increase in emergency obstetric referral among women attended by trained TBAs (RR 1.50, 95% CI 1.19-1.90) (Jokhio, Winter et al. 2005). Importantly the RCT in Pakistan prioritized developing a partnership between Lady Health Workers (Pakistan's community health worker program) and TBAs, effectively linking TBAs with the formal health system through their interactions with Lady Health Workers. Strategies that solidified the relationship between Lady Health Workers and TBAs included high frequency and high quality interactions between the two groups which took place during birth kit distribution and community-based clinics.

Though the empirical evidence for TBA training is mixed, including TBAs as stakeholders in community-based maternal and newborn health strategies is undoubtedly important in areas where homebirth with TBAs is normative. Malaysia, who has largely succeeded in achieving universal skilled delivery,

provides a historical example the benefits of incorporating TBAs as stakeholders in the pathway towards skilled delivery (Darmstadt, Lee et al. 2009). With TBA involvement, Malaysia was able achieve a gradual cultural shift where skilled midwifes first attended homebirths, followed by providing care in institutions, and finally the creation of birthing homes where women close to delivery could wait for labor to begin. In Ethiopia, much like Malaysia, TBAs hold a respective community position yet they are often described as neighbors or friends (Hadley 2010). As a friendly authority, TBAs are in an ideal position to share new information with community women in a non-threatening way. Regardless of the direct impact of TBA training on health outcomes, involving TBAs in training and dialogue can impact local perceptions of social norms surrounding birth, which is a necessary precondition for social change. TBAs can act as positive deviants through encouraging safe birth practices, facility-based delivery, and referral of complications, which will greatly assist with the diffusion of these ideas throughout a community.

Drug provision

Section Summary: Community-based drug provision of misoprostol (for hemorrhage) and oral antibiotics (for sepsis) is a promising strategy for reducing maternal mortality, particularly when coupled with health facility strengthening. However, local causes of maternal mortality should be assessed before implementing a community-based drug distribution program.

Child survival programs have illustrated the high impact of distributing life saving-drugs at the community-level (Darmstadt, Bhutta et al. 2005), yet there have been limited attempts to mirror this approach in maternal health

strategies. In Africa, the two most common causes of maternal death, hemorrhage (34% of maternal deaths) and sepsis (12% of deaths), are both highly treatable with drugs that could be distributed at the community level (Khan, Wojdyla et al. 2006).

It has been theorized and tested through mathematical modeling and controlled trials that misoprostol (a drug that produces uterine contractions) is an effective substitute to treat and prevent post-partum hemorrhage in areas where standard care (oxytoxin prophylaxis) is not possible (Sutherland, Meyer et al. 2010). Oxytoxin prophylaxis requires a cold chain, skilled providers, and sterile equipment to be administered, while misoprostol has none of these requirements. The strongest evidence for the community- based administration of misoprostol as a preventative measure comes from a randomized, double-blind, placebo-controlled trial in Pakistan. The study found that the administration of 600ml of misoprostol by trained TBAs during the third stage of labor reduced the rate of post-partum hemorrhage by 24% compared to control areas (Mobeen, Durocher et al. 2011) .

Pagel et al (2009) developed a mathematical model show the effect of community-based drug distribution of misoprostol and oral antibiotics on maternal mortality in sub-Saharan Africa compared to health facility strengthening alone. Health facility strengthening alone resulted in a 12% decrease in maternal deaths per year, while combining heath facility strengthening with improved drug provision via community-based workers and female volunteers nearly tripled the impact, resulting in a 32% reduction in annual maternal deaths. The combined package would prevent approximately

59,000 maternal deaths per year in sub-Saharan Africa, compared to 21,300 deaths prevented by health facility strengthening alone. The accuracy of Pagel's model (2009) greatly depends on the parameter estimates used by the authors, who readily acknowledge the difficulty of estimating the probability that a woman with sepsis obtains antibiotics. However, the other parameters have a stronger evidence base, and the impact of community-based drug distribution on mortality is undeniable though the size of the impact may vary significantly by the local causes of maternal mortality.

For example, in settings where a large proportion of maternal deaths result from non-obstetric causes, the community-based distribution of misoprostol and oral antibiotics will have diminished effects. Ahmed and colleagues (2010) describe such a setting in a 2-year retrospective study of 251 maternal deaths at the University Teaching Hospital, Lusaka, Zambia. Over 50% of maternal deaths were attributable to non-obstetric causes including malaria, tuberculosis, respiratory infections, and HIV-associated opportunistic infections (Ahmed, Mwaba et al. 2010). Misoprostol and broad-spectrum antibiotics would have little if any impact on these causes of death. Selection bias may play a role in Yusuf's findings, as women in a hospital setting would likely be treated for hemorrhage and sepsis, reducing the proportion of mortality associated with these conditions. Additionally, death certificates in a hospital more commonly list a diagnostically confirmed causes of death, which would result in an underreporting of hemorrhage (which is usually visually diagnosed as >500 ml of blood loss after a vaginal delivery).

The key advantage of community-based distribution of misoprostol and oral antibiotics is increased geographic accessibility to evidence-based life-saving medicines, particularly in countries with poor health infrastructure, few skilled providers, and a high proportion of home births. Nonetheless, the Zambia study highlights the importance of determining local causes of maternal mortality and their susceptibility to medicines before implementing a community-based drug distribution intervention.

Integration into the public health sector

Section Summary: Training public sector community-level workers will promote sustainability and scalability of community-based MNH services.

Significant gains in maternal and newborn health have been observed through community-level approaches in many countries; however, to date there is little knowledge on the scalability of such programs, particularly scalability within a country's public health sector (Hodgins, McPherson et al. 2010). Community-based training programs often require a significant time commitment including recruiting workers, initial training, refresher training courses, and monitoring skills acquisition of the workers. Furthermore, each community's catchment area is relatively small, so an enormous amount of communities need to implement the strategy to achieve a population-level effect. Though effective, community-based training programs take tremendous coordination to systematically scale-up.

One approach used to demonstrate the scalability of community-based maternal and newborn health services has been to utilize community-health

workers already working within a country's primary health system (Hodgins, McPherson et al. 2010). Such workers (Lady Health Workers in Pakistan, Health Extension Workers in Ethiopia, and Community-based health volunteers in Nepal) are largely available at the community-level throughout the country providing a broad infrastructure to build upon with advanced training in maternal and newborn health. Additionally, these health workers already have some training, reducing the burden of MNH trainers to provide basic health training. Furthermore, these community health workers (with the exception of voluntary workers) receive salaries through the country's government, which increases the sustainability of their position by decreasing dependence on foreign donors to directly fund the program.

A pre-post survey conducted in Nepal shows that providing MNH training for female community-health volunteers working in the primary health system resulted in improvements in household birth practices and health service utilization. Importantly, the initiative also allowed for broad coverage with 82% of women (N=1,740) reporting antenatal counseling within the catchment areas (Hodgins, McPherson et al. 2010). A cluster randomized effectiveness trial in Pakistan also supports the use of pre-existing human resources to meet community maternal and newborn health needs (Bhutta, Soofi et al. 2011). Lady Health Workers in the intervention group were trained in antenatal care provision, maternal health education, the use of clean delivery kits, facility births, immediate newborn care, danger sign identification, and promotion of care seeking. The neonatal mortality rate was reduced in the intervention clusters (RR 0.85, 95% CI 0.76-0.96). Coverage of births was limited with only 24% of births

visited by a Lady Health Worker. Increasing coverage of services should be a key priority and with increasing coverage, it is likely that the invention could have a heightened effect.

Other projects to date have relied largely on cadres of workers recruited and supported by the project rather than the country's public health sector. However the examples of Nepal and Pakistan illustrate comparable results by relying on public sector health workers. The evidence supporting use of pre-existing human resources within communities is strong and allows new initiatives, like community-based MNH services, to build upon existing infrastructure promoting the sustainability of service provision over time rather than replicating efforts by training newly recruited workers.

Evidence-based Program Planning and Implementation

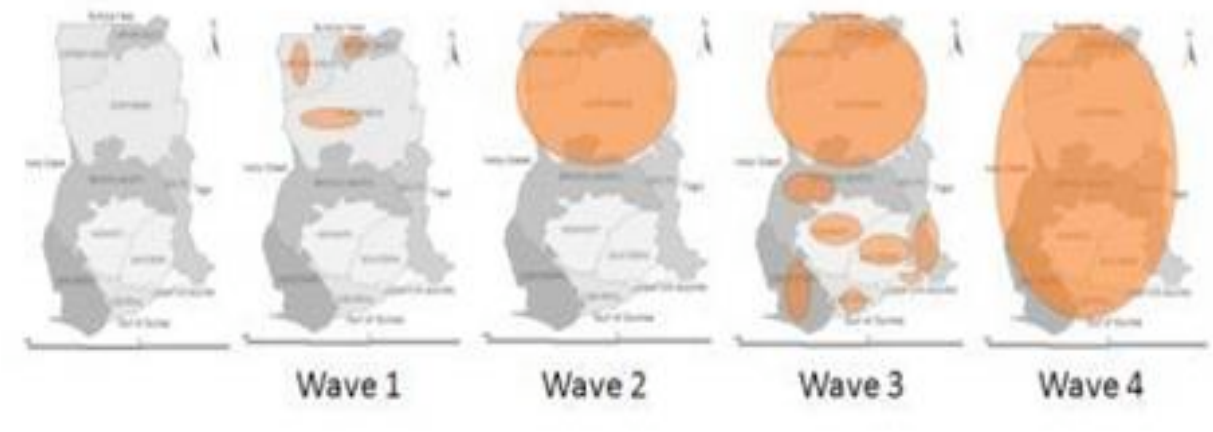
Section Summary: A quality improvement framework allows local staff to solve operations challenges and, when public sector workers are used, this framework also supports the goals of nationwide scalability and health systems strengthening.

A recent maternal and child health initiative, Project Fives Alive in Ghana, illustrates the importance of conducting quality improvement research throughout the intervention to maximize the efficiency of implementation. Rather than import a preexisting service delivery framework, Project Fives Alive assists community-level health workers in brainstorming solutions to operational challenges, developing and testing change ideas (solutions to operational challenges), and implementing and sustaining successful change ideas. For example, 24 quality improvement teams decided to implement male advocacy

groups to promote skilled delivery, however other teams did not suggest nor implement this idea (PFA 2010). As a result, the implementation strategy for Project Fives Alive is community-driven and key barriers to health service delivery for mothers and children are overcome through local knowledge.

The aforementioned issue of scalability is also reinforced by Project Fives Alive's quality improvement strategy, and the fact the Project Fives Alive works within Ghana's existing public sector health infrastructure. As stated in the project objectives the quality improvement framework allows Fives Alive to "start small, learn quickly and scale up rapidly with a change package." **Figure 2.2** below illustrates the waves of the project, which allow Project Fives Alive to innovate and measure successful ideas before scale up. Wave 1 included only 4 districts in northern Ghana and allowed for extensive implementation and evaluating change ideas, while Wave 2 scaled up a simplified package of effective change ideas to 38 districts in northern Ghana. Wave 3 spread the improvements within the southern hospital system for further testing and innovation, while Wave 4 spread these improvements to the remaining southern districts. The result is a general set of effective change ideas, which spreads throughout the country, with some variation in service delivery strategy depending on the particular change ideas implemented by the local quality improvement team.

Figure 2.2: Implementation areas of Project Fives Alive training package in Ghana using a quality improvement framework



Though Project Fives Alive has not been formally evaluated, and Wave 4 is not yet complete, early results are promising. After Wave 1 of the project, skilled delivery increased from 56% coverage to 67% in target areas and postnatal care within 2 days of delivery increased from 10% to 70% coverage (PFA 2010). The death rates of neonates in institutions within target areas fell from 7.9 to 3.4 deaths/1,000 births, likely associated with decreased delays in care seeking (IHI 2010). Trials have suggested that scalability of community-based programs can be achieved through utilizing an existing health infrastructure, though Project Fives Alive is one of the first programs to attempt a national scale-up. The impressive results of Project Fives Alive demonstrate the effectiveness of quality improvement research to inform the scale up of community-oriented programs to the national level.

Theoretical Frameworks and Community Health Worker Training

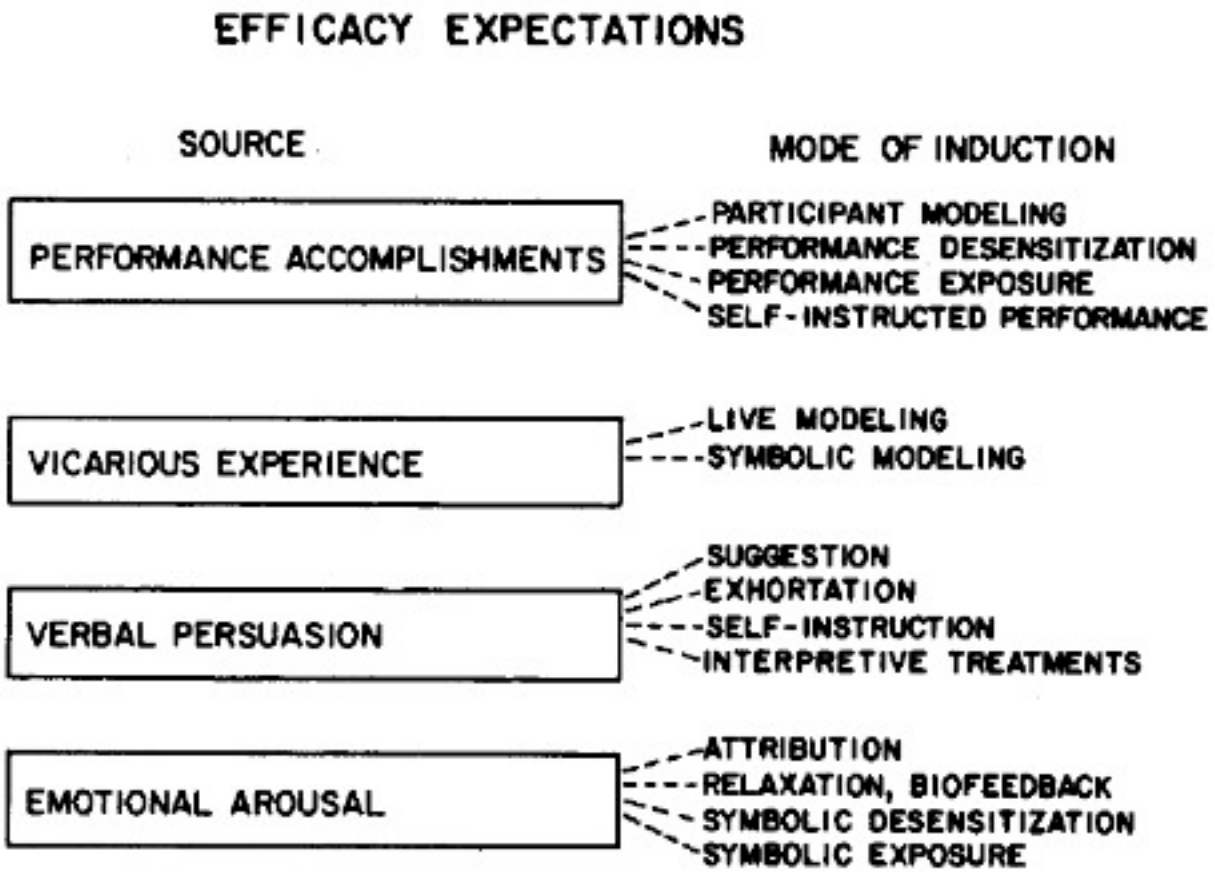
To date there are numerous theoretical frameworks applicable to the demand for community-based services with prominent examples including the diffusion of innovations (Rogers 1995) and the stages of change framework (Prochaska 1983). However, few theories have been applied to explain variation in the supply of community-based services. This section will explore Albert Bandura's theory of self-efficacy to determine possible applications of the theory for community health worker training programs. Bandura defines self-efficacy as "the belief in one's capabilities to organize and execute the courses of action required to manage prospective situations" (Bandura 1995, p.2). In other words, health workers with self-efficacy believe their ability will allow them to succeed in a particular situation. Bandura differentiates between self-efficacy and confidence by noting that confidence is "nondescript term that refers to strength of belief but does not necessarily specify what the certainty is about," while self-efficacy includes "both an affirmation of capability and the strength of that belief" (1997, p. 382). In other words, a health worker may be confident that they cannot attend a delivery, but a health worker with self-efficacy believes in his or her ability to attend delivery successfully.

Bandura's Theory of Self-Efficacy

Section Summary: Bandura theorizes four sources of efficacy expectations, the strongest of which is performance accomplishments or successfully completing an action. Vicarious experience and verbal persuasion are weaker sources of efficacy. Emotional arousal (like fear and anxiety), which detracts from efficacy, can be combated through performance accomplishments and modeling behaviors.

Bandura's seminal paper on self-efficacy (1977) illustrates four components that shape efficacy expectations including: performance accomplishments, vicarious experience, verbal persuasion, and emotional arousal (See **Figure 2.3**). Performance accomplishments are very influential in the development of self-efficacy, as they are mastery experiences in which the individual attempts to complete and action (for example, delivering a baby). Successful performance (healthy delivery) raises mastery expectations, while repeated failures particularly early in the process, greatly detract from mastery expectations (Bandura 1977). Importantly, after strong efficacy expectations develop, the impact of a negative performance decreases and a negative outcome may serve to further motivate the individual. Applying this component of efficacy to health worker training illustrates that attending delivery successfully early in the learning process is important as it provides a mastery experience which builds a strong sense of efficacy expectations for providing delivery care in the future.

Figure 2.3 Bandura's theory of self-efficacy (1977)



Bandura argues that individuals to not rely on personal experiences as the sole source of efficacy expectations, but also consider the experiences of others, which Bandura terms vicarious experience (1977). For example, if community health workers observe a delivery without adverse effects, they may realize that they too can attend a delivery without adverse effects if they continue in their attempts. This source of efficacy relies on an individual's ability to make inferences and comparisons between him or herself and the observed actor, and because of this assumption, it is a weaker source of efficacy expectations than performance accomplishments (where the individual actually performs the action).

Verbal persuasion is commonly used to promote efficacy expectations because it is often free and readily available. In verbal persuasion, individuals are verbally convinced that they can surmount challenges that they could not overcome in the past. In this sense, theoretical community health worker training largely relies on verbal persuasion to convince health workers they are now (post-training) prepared to attend delivery alone . Bandura suggests that this source of self-efficacy is significantly weaker than the other sources, and will not overcome unsuccessful mastery experiences.

Finally, emotional arousal plays a role in perceived efficacy. Bandura explains that stressful situations create an emotional state that can inform personal competency (1977). Individuals, who experience fear and anxiety when faced with a particular situation, are likely to doubt personal ability to manage the situation effectively. Negative emotional arousal can be combated through modeling experience and even more so through frequent mastery experiences which serve to desensitize the individual emotionally. However, community health workers have little exposure to or experience with delivery, which suggests that they are likely to have negative emotional arousal if finally faced with a delivery situation.

Impact of Self-efficacy on Health Service Provision

It is highly plausible that self-efficacy plays a role in the prioritization of tasks among community-health workers. In fact, community level health workers often have limited supervision and are responsible for setting a schedule and determining personal objectives day-to-day, which suggests that beliefs in personal competence may greatly impact service provision. For example, health

workers who have low self-efficacy in attending delivery may decide not to deliver babies and may instead pursue other activities where they anticipate greater success (like vaccination or family planning). Though this is an area ripe for exploration, studies have not examined the association between self-efficacy and health service provision among community health workers. For example, a meta-analysis of 68 studies of CHW interventions found that few studies described the characteristics of CHW training, making it challenging to the deduce impact of efficacy building on service provision. Furthermore, the researchers could not assess which training techniques are most associated with the provision of consistent and quality health services (Viswanathan, Kraschnewski et al. 2009). This represents a significant gap in the literature, where the most effective ways to train CHWs are unknown.

One synthesis of randomized control trials relying on community health workers to deliver child health interventions found that health worker self-efficacy and enactive mastery experiences were related to the success of the intervention (Kane, Gerretsen et al. 2010). Specifically, interventions that combined community health worker training, skill building, and on-going field mentorship were able to improve health worker performance when the following mechanisms were triggered:

- a sense of self efficacy and enactive mastery of the tasks
- an increase in self esteem
- assurance that there is a system for back-up support

This review suggests that building self-efficacy, in addition to enhancing self-esteem and providing back up support, creates an enabling environment for

health workers to enhance performance. Training that does not address these factors may have diminished results. The review also confirms Bandura's hypothesis that performance accomplishments or mastery experiences are the strongest source of efficacy expectations, and highlights the imminent need to investigate methods for providing community health workers experiential training.

3 - METHODS

Program Background

From June to July 2011, qualitative and quantitative data was collected for this study in collaboration with the Maternal and Newborn Health in Ethiopia Partnership (MaNHEP) and Bahir Dar University. MaNHEP is a two and a half year Bill and Melinda Gates funded project, which seeks to strengthen the existing community health infrastructure to provide essential maternal and newborn health services. At the core of MaNHEP is a set of evidence-based life-saving services provided at the community level by frontline health workers. Training, called Community-Based Maternal and Newborn Health Training, is provided to HEWs, vCHWs, TBAs, and family members in the intervention areas, and is situated within a broader project framework consisting of formative and baseline research, quality improvement activities, and behavior change communication aimed at increasing demand for services during labor and immediately following birth. Collectively these components work to improve maternal and newborn survival rates in rural Ethiopia.

MaNHEP's overall goal is to demonstrate the effectiveness of this community-oriented model to improve maternal and newborn health care in rural Ethiopia and position it for scale up nationally. To achieve this goal, a set three objectives and critical milestones for measuring objective completion (See **Figure 3.1**) were determined.

Figure 3.1 MaNHEP Intervention Objectives and Critical Milestones

Objective #1: To improve the capability and performance of the frontline worker team to provide targeted MNH services around the time of birth.

- All targeted staff and frontline team members will be trained and certified competent to provide birth-to-48-hour care and counseling by tenth month of the award.
- 60% of HEWs or team members are providing birth-to-48-hour care and counseling using a checklist to improve the completeness of care provided by 20th month of the award.

Objective #2: To increase demand for targeted MNH services and to increase healthy self-care behaviors around the time of birth.

- 80% of HEW in the target woredas and kebeles will report having counseled at least 5 families with pregnant women/family caregivers using the new behavior change materials in the previous month, at 9 months from the time the materials are in the hands of the HEW.
- 50% of pregnant women in the target woredas and kebeles will report having breast-fed their newborn immediately after birth, at 9 months from the time materials are in the hands of the HEW.

Objective #3: Under national leadership, with regional support, demonstrate a lead woreda approach to improve MNH practices and services.

- The Sr. Quality Improvement Advisor will be in place in the FMOH with a designated FMOH counterpart by the fifth month of the award.
- The target lead woreda and kebeles will have achieved 50% on the index of maturity by the 18th month of the award.

Source: MaNHEP Grant Proposal

Study Setting

June of 2010 marked the commencement of the project's field activities and the beginning of baseline and formative data collection. The project will be implemented in six districts, three in Oromia region and three in Amhara region; however, this study focuses only on the Amhara region sites, where a larger sample of qualitative interviews was obtained. **Figure 3.3** below situates Amhara region within Ethiopia.

Figure 3.2 Map of Ethiopia with Regional Boundaries

Qualitative Site Selection

Data collection took place in West Gojam, a rural area outside of Bahir Dar city. To avoid confounding, regional MaNHEP staff selected data collection sites that were near MaNHEP project implementation sites, rather than collecting data in the project sites themselves. Conducting interviews in intervention *kebeles* prior to baseline data collection could alter the results of the baseline study

results by increasing awareness of and exposure to maternal and newborn health issues among health workers. However, it was critical that the data collection sites were in close proximity to intervention sites so that results of the formative research would be representative of the invention areas. When selecting formative research sites, MaNHEP regional staff considered the location of roads and health services and selecting kebeles with varying accessibility to health services.

Quantitative Site Selection

The Ethiopian Federal Ministry of Health selected Mecha, South Achefer, and North Achefer *woredas* as the Amhara Region sites because of high maternal and newborn mortality rates (Olsen 2010). *Kebeles* were selected with the assistance of Regional MaNHEP staff, which attempted to maximize variation in access to health services. Other considerations for intervention site selection included a lack of existing maternal and newborn health interventions, population size, and the presence of trained frontline health workers.

Research Design

Data Overview

A total of 26 in-depth interviews and 162 baseline surveys were conducted in Amhara region. Participants included HEWs, TBAs, and vCHWs. Interviews took place in 6 non-intervetion kebeles, while the baseline survey took place in 24 intervention kebeles. **Table 3.1** illustrates the sample breakdown by type of frontline health worker.

Table 3.1 Sampled Participants in Formative and Baseline Data Collection by Participant Type, Amhara region, Ethiopia

Study Type	Formative Interview	Baseline Survey
HEW sample	9	35
vCHW sample	9	70
TBA sample	8	57
Total sample size	26	162

Qualitative Instrument

The interview guide was developed from March-May 2010. Questions were developed after reviewing relevant literature and assessing interview guides from Save the Children's Saving Newborn Lives project, which was also used in Ethiopia. The interview guide had three primary objectives, which were to 1) to assess factors that enable FLWs to perform their tasks confidently and competently, 2) to determine the extent that FLWs rely on each other to deal with technical challenges, and 3) to evaluate where MaNHEP might intervene to promote confidence, competence, and teamwork?

Once in country, local experts and MaNHEP team members examined the interview guide, which was modified according to their recommendations and translated into Amharic. The interview guide was also modified during round table discussions of each question, although this phase was primarily aimed at changing words and phrases to make sure that frontline health workers would understand the intent of the questions. All data collectors were present during the round table discussion, which provided them with repetitive exposure to the study questions and ensured that all interviewers understood the intent of the interview questions.

Qualitative Participant Recruitment

Participants were primarily selected through self-identification and snowball sampling. Occasionally these methods resulted in misclassification of respondents particularly when TBAs were trained as vCHWs or women who self-identified as mothers also worked as TBAs. Knowing the categorical criteria for group inclusion allowed data collectors to correctly classify participants when it was determined through the interview process that a misclassification had occurred.

Sampling was purposive and data collectors were advised to interview an equal number of each type of respondent. Data collectors began recruitment in the *kebele* health post where they asked if HEWs were present. If HEWs were absent, community members in or near the health post were asked to lead data collectors to HEWs in the community. Snowball sampling proved effective with HEWs often capable of identifying vCHWs and TBAs.

Qualitative Data Collection Procedures

Formative interviews were usually conducted within or nearby the home of the interviewee. Data collectors considered privacy and sound quality when selecting the location for the interview. It was preferable to have minimal background noise so that the audio recording of the interview would be clear. Interviews varied significantly in length from 16 minutes to 1 hour and 27 minutes. The data collection team was comprised primarily of nurses from Bahir Dar city and also included two masters of public health students from Gondar University.

Before field activities, all data collectors received a weeklong intensive training course followed by one day of pilot interviewing. Data collectors were trained in interviewing techniques, basic maternal and newborn health concepts, and ethical treatment of participants. The quality of qualitative data greatly depends on the skill of the interviewer so much of training involved practice and role play with the interview guide followed by group discussion around the positive and negative aspects of the interviewer's performance.

Quantitative Instrument

From March through May 2010, the quantitative survey was developed. In addition to basic demographic information, questions mirrored the key objectives of the MaNHEP intervention assessing health worker training, experience, confidence in ability to provide antenatal, intrapartum, and postnatal care, and perceived trust in the abilities of other types of FLWs. Furthermore, for each of the 18 core training competencies, FLWs were asked if they were able to provide the skill, if they had recently provided the skill, and who they thought should be

responsible for providing the skill.

Two local public health students translated the survey into Amharic, and each question was checked for clarity during data collector training, where data collectors had the opportunity to read the question aloud and state the intended meaning.

Quantitative Participant Recruitment

Frontline health workers were sampled purposively with up to 10 surveys conducted per *kebele*. MaNHEP maternal and newborn health specialists conducted needs assessments in each *kebele* prior to data collection, which listed the number of each type of FLW in the *kebele*. These lists were used in the sampling process. A maximum of 2 HEWs were surveyed per *kebele*, and the remaining 8 surveys were conducted with TBAs or vCHWs, depending on their availability.

Quantitative Data Collection Procedures

Surveys were typically administered within the home of participants, or in another nearby private space, and took approximately one hour. Data collectors completed the survey by marking responses on the prepared survey tool. The data collection team was comprised of local nurses, students, and faculty from Bahir Dar University.

Prior to data collection all enumerators received a weeklong training course, which covered interviewing techniques, background on basic maternal and newborn health care, a review of relevant terminology, and informed consent and ethical treatment of participants. All enumerators conducted two days of pilot data collection, giving MaNHEP staff an opportunity to provide feedback on

data collection techniques and address field challenges.

Ethical Considerations

Institutional Review Board approval for this study was obtained by Emory University in Atlanta, Georgia and from Bahir Dar University in Bahir Dar, Ethiopia.

Data Analysis

Qualitative analysis

All interviews were transcribed verbatim in English. For anonymity, all participants received unique identification numbers and identifiable information was removed from transcripts prior to data analysis. Translations were uploaded into MAXQDA, a qualitative software management program. All transcripts were read through rapidly, followed by a careful reading of one-third of the sample. During this secondary reading, detailed memos were written documenting and linking themes, raising questions, and noting possible theoretical explanations for observed phenomena. Inductive, deductive, and in vivo themes were then provided a working definition, which was shaped into a code as it was applied to the text. MaNHEP staff developed five deductive themes related to project objectives including: perceived role, challenges, problems for mother/babies, interaction among health workers, and confidence and competence. By contrast, inductive themes emerged from the readings of the text and were not expected outcomes, including themes like labor notification or competing household responsibilities. Some inductive codes emerged from deductive categories (such as the theme of experience as a source of confidence), while other inductive codes were independent of the prior analysis (like the theme of labor notification).

Finally, in vivo codes were created to reflect local explanations for phenomenon like se*raqian*, a perceived spirit possession causing hemorrhage and unconsciousness. A grounded theory approach was utilized to group themes into conceptual categories and constant comparison was utilized to determine relationships between concepts, which collectively resulted in conceptual frameworks.

Quantitative analysis

Survey data was entered into an Excel spreadsheet and uploaded into STATA data analysis and statistical software program. The analysis explored factors that facilitated the provision of delivery service at the community level. There was considerable variation between the frontline health worker groups with regards to delivery service provision, so respondents were categorized by type of worker (HEW, vCHW, or TBA). Furthermore, respondents were sub-classified as currently providing delivery services or not currently providing delivery services. Thus the analysis focused on factors enabling delivery service provision for each type of frontline health worker. To explore the relationship between self-efficacy and delivery service provision a 10-point confidence scale variable was utilized. In addition to basic descriptive statistics, chi square analysis and odds ratios were employed to determine the significance of enabling factors associated with self-efficacy and delivery service provision.

Reflections on Data Quality

The baseline survey team had multiple quality control mechanisms in place to ensure accurate data collection and entry. These mechanisms included field supervisors reviewing each survey at the end of the day, discussing

challenges with data collectors when applicable (for example, trouble utilizing the skip pattern), discarding low quality surveys, and double entering data for some surveys.

The qualitative data team, largely due to time and budgetary constraints, did not have a systematic quality control strategy for data translation. Though the majority of qualitative transcripts appeared to be verbatim, there was some evidence of translators tidying up the data when the translator was also the interviewer, and moments of poor interview technique may have been omitted. The work of two translators appeared incomplete resulting in a quality inspection, revealing 5 transcriptions with missing or incomplete data. All transcripts of questionable quality were re-transcribed by a professional translation service in Addis Ababa, Ethiopia. It is important to note that all transcripts were not checked for quality; however, the work of the other translators appeared to be verbatim, and MaNHEP staff assisted these translators by typing their verbal translation, which resulted in oversight of the process and allowed for clarification of any confusing translations during the transcription process.

4 – RESULTS (Qualitative)

Descriptive Statistics

Frontline health workers in the Amhara sites reported diverse reproductive and educational experiences. On average TBAs reported 6.1 children, vCHWs 5.1 children, and HEWs (who tended to be much younger than other FLWs) <1 child. TBAs averaged <1 year of schooling, while vCHWs reported an average of 3.5 years of schooling, and HEWs had on average eleven years of schooling. Importantly, mothers in the Amhara study sites closely matched the TBAs and vCHWs in education and reproductive experience, while HEWs report experiences significantly different than the women they serve (Hadley 2010). Eighty percent of the vCHWs interviewed were male, while all HEWs and TBAs were female.

Frontline Health Worker Roles and Responsibilities

Health Extension Worker Role

The Health Extension Workers interviewed in Amhara region described responsibilities consistent with their job description to provide access to promotive, preventative, and specified curative services (Koblinsky 2010), though some services were given greater emphasis than others. Nearly all HEWs mentioned vaccination, family planning, malaria prevention (through bed net distribution), and hygiene promotion as services they provided to the community. Surprisingly, approximately half of HEWs did not mention providing maternal health services in their response, suggesting that overall these services (including

antenatal counseling, normal delivery care, and postpartum counseling and care) may be less prioritized than other responsibilities.

Among those respondents who did mention providing maternal health services, the tasks mentioned most frequently included promotive and preventative tasks: mobilizing pregnant women to get check-ups and providing antenatal and postpartum counseling. Less commonly, HEWs discussed curative tasks such as attending delivery and providing postpartum care to women.
A common response when asked about services provided for mothers and babies from HEWs was the following:

> **HEW Respondent:** *They* [HEWs*] help pregnant women get check ups and follow ups. They tell them how they should eat during pregnancy, how they should sleep, what kind* [of] *work they should do. Both during pregnancy and after delivery, we advise women on how they should live.*

Less common responses included the following:

> **HEW Respondent:** *We recruit pregnant mothers and by giving appointment to come to the service and we follow them and when the time for delivery approaches we tell them to call us during delivery and we tell them that we will come to their home and help the delivery. They tell us when they are in labor and we go to their place and help the delivery of the child.*

As illustrated above, HEWs more commonly reported promotive and preventative counseling to mothers in comparison with curative services like attending normal births and providing postpartum check-ups.

Health Extension Workers who did not mention providing maternal health services spontaneously were prompted. Interestingly, many of these HEWs reiterated tasks listed previously including vaccination, family planning, and hygiene promotion to prevent infectious disease as the services they provide for mothers and children as shown below.

> **HEW Respondent:** *The services we offered to the mothers and children include vaccination for both mothers and children, distribution of family planning tablets, teaching about their housekeeping, and about keeping their hygiene.*

It should be borne in mind that some HEWs (like the one quoted above) may conceptualize vaccination, family planning, and hygiene promotion themselves as the only or as the most important components of the Family Health package.

Figure 4.1 below summarized the HEWs descriptions of services provided to the community, with curative and preventative maternal health services mentioned less commonly or rarely compared to other preventative and promotive tasks.

Figure 4.1 Descriptions of Health Extension Worker tasks in Amhara region, Ethiopia

Common	**Less Common**	**Rare**
• Immunization • Family planning • Bednet distribution • Hygiene and sanitation promotion	• Antenatal care • Antenatal counseling • Postpartum counseling	• Delivery Service • Postpartum Check up

Traditional Birth Attendant Role

Unlike HEWs and vCHWs, the traditional birth attendants interviewed in Amhara region described working outside of the formal health system. Though both vCHWs and TBAs are unpaid workers, vCHWs described contact formal health system through their interaction with HEWs while TBAs often described no or minimal contact with the health system. TBAs identified primarily "farmers" and described themselves as "uneducated" and "illiterate" when asked about their role, revealing most TBAs do not self identify as health providers and many do not mention providing delivery services until prompted.

Unlike HEWs and vCHWs, TBAs exhibit minimal variation in the description of their health duties. When prompted, all TBAs describe attending delivery, catching the baby, cutting the cord, and waiting for the removal of the placenta; and nearly all TBAs provided at least some postpartum care. A recurrent theme throughout the interviews was that TBAs were frequently called to enter women's homes and assist with the labor process; this is entirely consistent with the maternal interviews in Amhara region (Hadley 2010). This community care-seeking practice means that aside from people within the household of the laboring woman, TBAs are the often first people notified of labor. Below TBAs describe the labor notification process.

TBA respondent: *When they call me, I go and I tie my belt and sit down to help.*

TBA respondent: *It is only when neighbors call me to help that I give help in delivery.*

TBAs often described playing a passive role during labor and delivery, with most mentioning waiting to welcome or receive the baby with the help of God or the Virgin Mary. After birth most TBAs mentioned assuming an active role, cutting the umbilical cord and caring for the mother, with a few TBAs providing postpartum care for up to ten days.

Passive roles during labor and delivery were described as follows:

> **TBA respondent:** *When the time for labor comes and with the help of Mary we receive the baby when he is born.*
>
> **TBA respondent:** *There is nothing that I do. It is simply when she comes and God helps her. Otherwise, nothing.*

Regarding the active role of TBAs after birth, one TBA said,

> *When Mary Mother of God comes peacefully, then the mother will give birth, and then we cut the cord, and take the baby, and take care of the mother until ten days.*

Because many TBAs described labor and delivery as a process determined by God or the Virgin Mary, they may feel limited agency to impact the course of labor and delivery.

Voluntary Community Health Worker Role

vCHW respondents often stated that the priorities of HEWs directly impact their own objectives and actions. vCHWs interviewed in Amhara region frequently discussed providing support to HEWs as shared here, “Our work is mobilizing and we (vCHWs and HEWs) are supporting each other; we don’t work separately.” The time vCHWs allotted to health activities varied from 1 day a

week to everyday in a week, depending on the tasks assigned by HEWs during regular meetings. With HEWs determining vCHWs activities, it is not surprising that vCHWs assist HEWs in completing HEW objectives, though the way this materializes varies by sub-district. All vCHWs discussed mobilization or centralizing people to receive messages or services from HEWs (as shown in the example below), while other vCHWs also conducted preventative counseling and provided services to the community much like an HEW.

> **vCHW respondent:** *For mothers, the ones who give [advice] are the HEWs. And they give training for us. We only mobilize the community, but they are the ones who go in and give advice. The one they show and the ones they teach are the HEWs. But we tell them to come, we assemble everyone, we go to the villages, like you, but they get in and give advice. When they tell us to bring somebody, we go and bring them. They come, and give advice.*

Like HEWs, vCHWs emphasized promotive and preventative services through relaying health messages, mobilizing the community for health services, and occasionally doing other active labor such as building mud and wood cabinets and stoves. The data suggests that the health message and mobilization areas emphasized by vCHWs are strongly influenced by the priorities of HEWs, and that areas deemphasized by HEWs (like delivery care and postpartum check-ups) are very rarely addressed by vCHWs during antenatal counseling.

Figure 4.2 Description of vCHW tasks Amhara region, Ethiopia

Common	Less Common	Rare
• Mobilize for vaccination • Mobilize for family planning • Hygiene and sanitation promotion • General mobilization for HEW visits to area	• Antenatal counseling • Bednet distribution	• Drainage work for malaria prevention • Child growth monitoring • Breastfeeding counseling • Distribute medicines • Build stoves • Dress wounds • Promote the completion of medicine regimen • Lead discussion on community problems

Though a few vCHWs reported providing antenatal counseling only one vCHW advised women to go to the health station for deliveries during antenatal counseling. Like HEWs, vCHWs are regularly interacting with pregnant women in the community and are missing a key opportunity to connect these women with the health system.

Competing Responsibilities among Frontline Health Workers

It is simplistic to believe that providing maternal health services is the only role of frontline health workers. As described above, HEWs and vCHWs have many health service responsibilities and maternal health service provision is only one part of their role. While HEWs describe competing health priorities, TBAs and vCHWs described household and income-generating activities which competed with their health service provision.

These findings are not surprising because all HEW participants were salaried workers and most had no children, and as a result, HEWs did not face

the same financial and personal pressures as TBAs and vCHWs. Balancing health duties and personal duties was more challenging for vCHWs, who have weekly tasks delegated by an HEW, compared to TBAs whose services were sought less frequently (approximately a few times a month for labor and delivery care).

Determinants and Implications of FLW Team Identity

Training and formal education

In Amhara region, group identity among TBAs differed considerably from other FLWs, with TBAs consistently reporting little training and often no education compared to other community health workers. In one tale of transformation, a TBA becomes "like us" (like an HEW) by undergoing formal training, after which the TBA is considered a valuable member of the health worker team. Often, as a result of identity perception, TBAs believed they were unwelcome to participate in discussions and training with HEWs and vCHWs because they were not part of the health system. This resulted in a situation where TBA identity perception hinders TBAs from engaging with other health workers, which perpetuates their current identity as a marginalized birth attendant who works isolation from other workers. One TBA explained this process below, describing how entering the health system alongside HEWs and vCHWs was made difficult by discriminatory interactions between herself and health workers.

> **TBA Respondent:** *Instead of discriminating against us, it would be better if they taught us. And a lot of things would be improved. And I can also learn a lot. I think that they [have been] taught, they are educated. But they are not educated if they don't teach others. They should tell for*

> *me, and for others also, that this is the case, and this is what you are missing, and if you apply this, you can help the delivery… But they don't teach us. And that is the case. But they didn't provide us with this education.* ***They don't allow us to get into the system***. [Emphasis added.]

In the Amhara region group identity among HEWs and vCHWs was considerably different than among TBAs. Unlike vCHWs and HEWs who readily interacted and shared tasks, TBAs did not self-identify as part of the health worker group and occasionally perceived direct discrimination from health workers, resulting in an environment that promotes teamwork between vCHWs and HEWs, while maintaining TBAs as peripheral components of the MNH service delivery team.

Interaction

There is a strong relationship between group identity and the nature and frequency of interaction among FLWs; however, the nature of the relationship is unclear. The perception of team identity among HEWs and vCHWs may lead to limited interactions with TBAs or the limited interaction may lead to a team identity that excludes TBAs. Regardless, the relationship inhibits the provision of MNH services, as TBAs are often the first person outside the household notified of labor and their exclusion from the health worker team limits TBAs' ability to connect mothers with HEWs, vCHWs, and the health system.

HEWs and vCHWs described holding weekly to monthly meetings, but TBAs were rarely present at these meetings. Although TBAs in Amhara region

often said that HEWs do not think of including them in meetings, a few HEWs and vCHWs did describe having regular (though not necessarily systematic) interaction with specific TBAs who were typically identified because of good past performance as shown in this example.

> **HEW Respondent**: *With TBAs, we have interaction with only one. There is a TBA here and we mostly meet with her.*

More commonly we heard the following:

> **TBA Respondent**: *They [HEW] don't have meetings with us. They don't call our name. They never say that, "There are TBAs here -- Oh, let us discuss with them." They never say those things.*

As in the example below, vCHWs often expressed confusion with asked about interaction with TBAs, showing that the very idea of interaction between these groups may be unexpected or strange.

> **Interviewer**: *How often do you interact with TBAs?*
>
> **vCHW Respondent***: Is that with the HEWs?*
>
> **Interviewer**: *These are the mothers who are helping delivery, starting from earlier times.*
>
> **vCHW Respondent**: *Oh! Those farmers that are helping each other during delivery?*
>
> **Interviewer**: *Don't you have interaction with these people because of your work?*
>
> **vCHW Respondent**: We *don't have interaction with them.* [There is] *no interaction with TBAs.*

Task-sharing

A key component of the MaNHEP intervention program is to increase teamwork among FLWs. All FLWs were asked questions about task sharing with other FLWs. Typically FLWs talked of doing their work alone. In Amhara Region specifically, TBAs stated that their work is based entirely on community demand, while HEWs often assigned specific tasks to vCHWs. HEWs discussed determining their own responsibilities and occasionally receiving assignments from nurses. One vCHW explained the process of task allocation:

> **vCHW Respondent:** *She* [the HEW] *makes us meet and gives us training at the church. Then she divides us, and says, "Somebody will be here; somebody will be here." Then we make a plan, and we set a punishment for somebody not working*.

Typical responses to the question "How to you share your responsibilities with other health workers?" In Amhara region, TBAs were very rarely mentioned when vCHWs and HEWs replied, which supports the conclusion that vCHWs and HEWs conceptualize each other, though not TBAs, as part of the same team.

A common response about responsibility sharing was the following:

> **HEW Respondent***: For instance we have 20 volunteers [vCHWs]. … We have given them different localities to cover. We have allocated the number of people one household head should cover*.

More rarely FLWs spoke of frequent, positive, and smooth working relationships, as in the following testimonies:

> **HEW Respondent*:*** *We are working not alone but with vCHWs and TBAs, now we have them almost in all gotts* [sub-kebele level of the administrative system].
>
> **Interviewer**: *There are the traditional birth attendants, voluntary health workers or health messengers and extension health workers. How do you help one another?*
> **vCHW Respondent***: We work with TBAs and others smoothly and with understanding. For example, currently every Thursday we have maternity service. If we are absent from the center, another health worker will handle or treat them. They also administer vaccination for the children when some of us are not around. So we work in collaboration and coordination. So far there is no crack or gap among us.*

Referral of women with complications

One specific type of task-sharing is referring women to other FLWs when pregnancy-related complications arise. TBAs who recognized complications, described advising women to go "to higher," (Amharic, kefetegna) meaning an unspecified higher-level health facility. This could mean the *kebele* health post, the *woreda* health center, or the city hospital. Occasionally, TBAs stated that the key person deciding to take the woman "to higher" is her husband, as in the following example.

> **TBA Respondent:** *I will tell the husband to take the woman to higher* [kefetegna]. *The person who believes me and lets me help his wife will ask him to send her to higher. I will tell him to find money and then to take her to higher.*

Rarely, HEWs and TBAs referenced TBAs calling HEWs for assistance during a complicated delivery, showing underutilized potential for this referral strategy at the community level. Respondents who mentioned this referral relationship were likely to report having regular interactions with each other, revealing the importance of regular and meaningful interaction in facilitating teamwork and appropriate referral.

HEWs and vCHWs also advised women to go "to higher," though some vCHWs mentioned referring women directly to HEWs.

> **vCHW Respondent:** *If there is a problem in my village, I'll go and tell the HEW that a woman is sick. If this is the time for this woman to give birth,* [she says] *please bring her here. Then she'll see her, and then she may say, 'this is not your day.' But she'll help if there's anything* [that needs it*].*

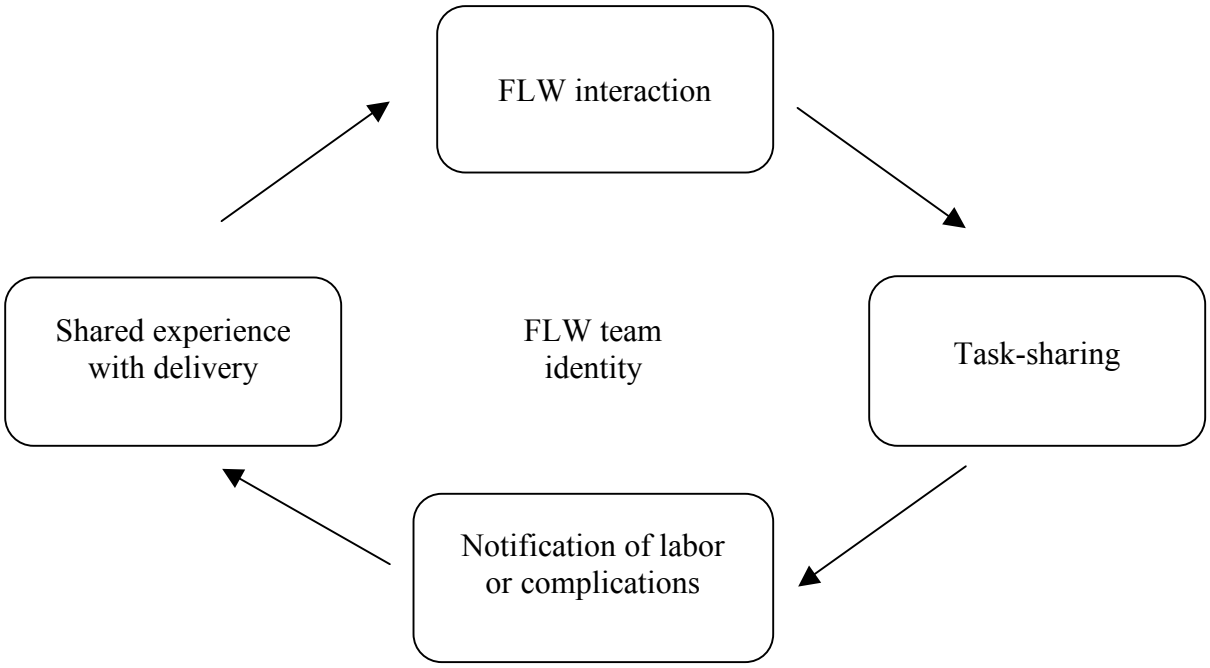
Because HEWs are located at the kebele health post, it can be safely assumed that when they refer "to higher," they are sending women either to the woreda health center or the city hospital (in the Amhara study site, meaning Bahir Dar). Some HEWs specifically mentioned sending women to see Health Officers at the woreda health center. Implicit in these discussions was the idea that women come to the health center or health post, not that HEWs go to women.

In summary, referral patterns among FLWs (particularly TBAs) are inconsistent, though the evidence suggests that some vCHWs have referred women directly to HEWs, while HEWs have referred women to the health center or hospital. However, there is great potential to facilitate appropriate referral through regular interaction between FLWs.

Implications of team identity

Conceptual framework 4.3 highlights the process of team identity formation, illustrating the conceptual factors that enable appropriate delivery care provision and referral for complications. This cyclical process – including interaction, task-sharing, and experience with delivery – shapes identity perception among FLWs and can promote a sense of team among the different types of FLWs. Another component of identity, training and formal education is addressed through FLW interaction. TBAs who interacted regularly with HEWs and vCHWs expressed shifts in self-perception, no longer categorizing themselves as "uneducated" or "just a farmer."

Figure 4.3 The positive cycle of teamwork and delivery service provision among frontline health workers in Amhara region, Ethiopia



Determinants of Delivery Care Among CHWs

Self-efficacy

Though HEW respondents occasionally described pressure from a supervisor to perform particular activities associated with seasonal trends in infectious diseases, most HEWs reported determining their own activities day-to-day. Not surprisingly, HEWs described completing tasks that they felt comfortable doing; and one HEW explains this recurrent theme well stating, "All the works that I do, I do with confidence." HEWs repeatedly issued statements like this stating that all works are done confidently. This suggests that when HEWs are trained in a service, but the service is not provided, it may be because of a lack of perceived self-efficacy for the skill, such as providing delivery services. The quote exchange below is representative of how several HEWs interviewed in Amhara region feel about managing the delivery process - unprepared.

> **HEW Respondent**: *Regarding child delivery, we have been doing practical things during our training. But delivery is a very complicated thing. You need deeper knowledge. Such training is given at college level. We have not been well training in child delivery. They have given us occasional training.*
>
> **Interviewer**: *Would you like to work in this area? We want to know about such things.*
>
> **HEW respondent**: *Yes, for this reason you may not be fully qualified to intervene in child delivery. I lack the knowledge to do it. But had I been well trained I could have done it with confidence.*

The lack of self-effifacy attending delivery described above, leads many

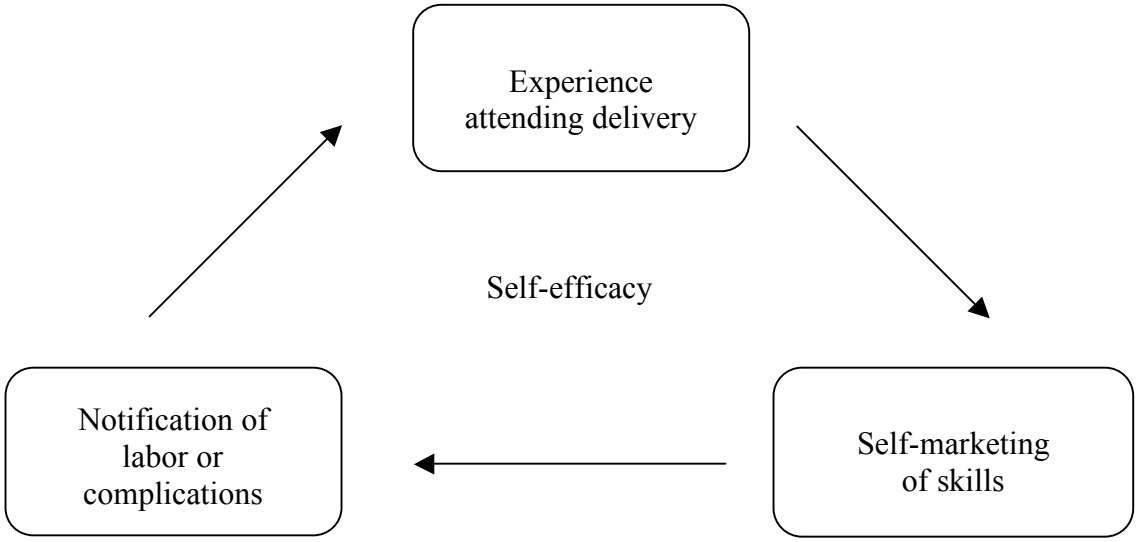
This lack of self-efficacy causes HEWs to prioritize providing other community-based health services and furthermore, shifts vCHW focus away from delivery care provision. Clearly, the family health package alone is not enough to promote self-efficacy in attending delivery among most HEWs. HEWs who expressed greater self-efficacy in attending delivery typically described some sort of additional experience to supplement the family health package, with one HEW specifically citing training on clean and safe delivery from UNICEF. Additionally, nearly all HEWs who did not have practical experience with delivery expressed decreased self-efficacy in their ability to attend a delivery. Clearly self-efficacy plays role HEWs deciding to provide delivery services as part of their role in the community. Furthermore, the interviews show that self-efficacy can be generated through supplemental training in clean and safe delivery and primarily, through experience with delivery itself.

Self-marketing

Regardless of self-efficacy in delivery service provision, all CHWs (vCHWs and HEWs) reported spending time in the community providing health promotion and as a result interacted with pregnant women frequently. Several CHWs described providing antenatal counseling, and all HEWs mentioned providing vaccination to pregnant women. This daily community interaction with pregnant women, provides an opportunity for CHWs to self-market (to say that they are trained birth attendants and can be called during labor or for complications); however very few CHWs described telling pregnant women to call or visit during labor. Notably, the CHWs who expressed low self-efficacy in providing delivery services did not tell pregnant women to notify them of labor.

As a result, these CHWs reported discovering women in labor primarily by chance as described by one HEW here, “We find them (laboring women) accidentally when we are going house to house, we help delivery together with TBAs.” **Figure 4.4** below illustrates the positive cyclical of self-efficacy formation including experience with delivery service provision, self-marketing of skills, and appropriate notification of labor or complications.

Figure 4.4 The positive cycle of self-efficacy among community health workers in Amhara region, Ethiopia



The analysis of maternal interviews from the same sites in Amhara region confirms this theory of limited self-marketing among many CHWs, as no mothers reported that CHWs were birth attendants despite the regular presence of CHWs in the community (Hadley 2010). In fact, CHWs are not reported to be part of most mothers’ cultural model of pregnancy and delivery. Dr. Craig Hadley explains, “When asked about why they did not deliver with the assistance of

HEWs, these respondents replied, 'I have no idea [why they weren't there],' or, as in the following dialog, 'It did not occur to me to call them in'" (Hadley 2011)

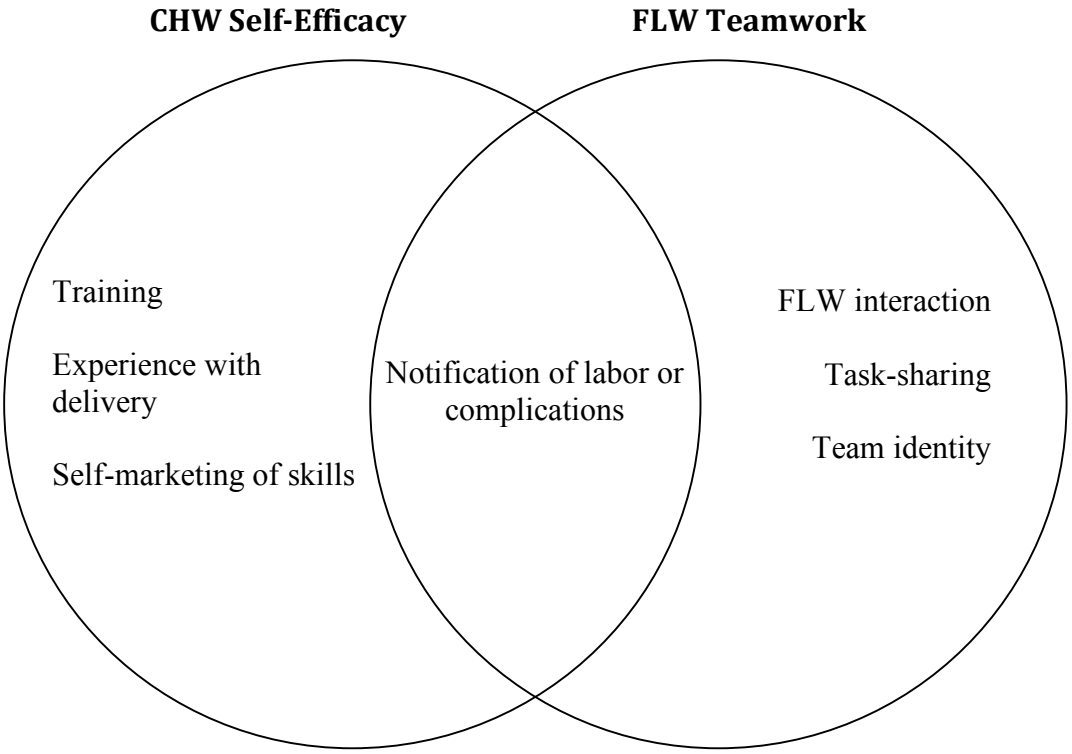
> **Interviewer**: *Did you notify HEWs?*
> **Mother:** *No.*
> **Interviewer**: *Why not?*
> **Mother:** *I don't know. It did not occur to me to call them in.*

This is an unfortunate situation where a lack of self-efficacy among CHWs results in a missed opportunity to connect pregnant women with the health system for delivery during their antenatal period.

The relationship between self-efficacy and teamwork

As illustrated in **Figure 4.3** and **Figure 4.4**, self-efficacy and team identity are important concepts that facilitate the provision of appropriate delivery care and care for complications at the community level. **Figure 4.5** links these concepts, illustrating that the point of overlap is where appropriate notification and service provision is most likely to occur. The strongest components of self-efficacy among CHWs (HEWs and vCHWs) were training, experience, and self-marketing, and when self-efficacy is combined with FLW (HEWs, vCHWs, and TBAs) teamwork, it increases the probability that appropriate notification of labor or complications will occur.

Figure 4.5 The relationship between self-efficacy and teamwork in the context of community-oriented delivery service provision



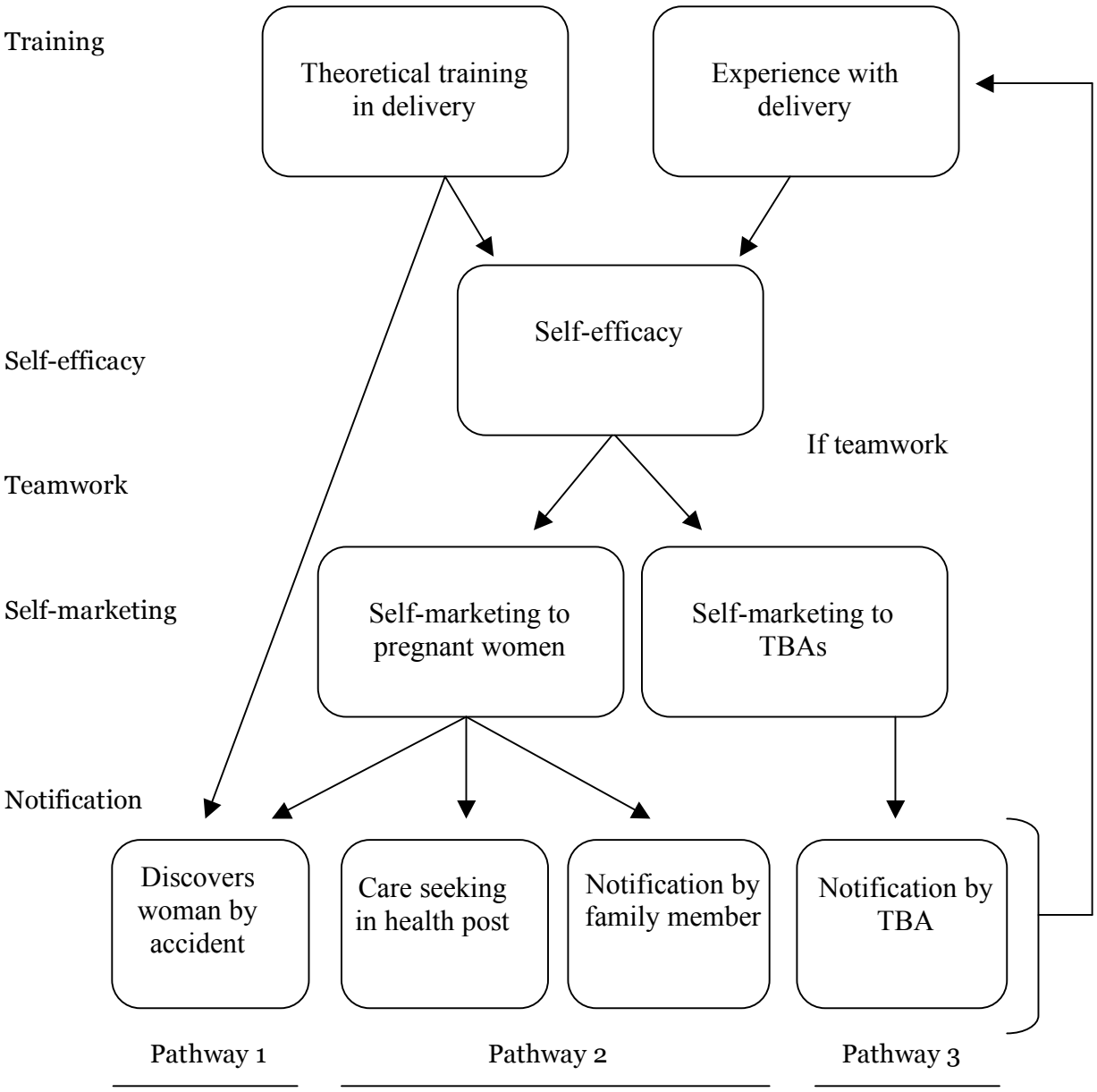
Notification pathways for labor or complications

The flow chart **(Figure 4.6)** further explores notification mechanisms and way that teamwork and self-efficacy facilitate notification of labor or complications by different community sources. The qualitative interviews reveal three pathways that result in CHWs providing care for women in labor or women with pregnancy-related complications: 1) accidently finding a woman in her home, 2) the woman seeking care at the health post or notification by a family member, and 3) notification by a TBA.

The conceptual framework is comprised of these three pathways. In the first pathway, CHWs with theoretical training in delivery alone are

predominantly finding laboring women by accident (or not providing delivery care at all). Pathway two illustrates that CHWs who have both theoretical training and experience with delivery, often express self-efficacy and self-marketing their to the community women they serve, which results in care seeking for labor or notification of labor or complications by a family member. Likewise in the third labor notification pathway, CHWs have both theoretical training and experience with delivery, however this time, TBAs notify the CHW of labor or complications. A necessary precondition for labor notification or notification of complications by TBAs is regular and meaningful FLW interactions to promote a sense of team and facilitate task sharing. Unfortunately, interviews indicate that this type of meaningful interaction is not occurring consistently across *kebeles*, which may hinder the notification process if not addressed.

Figure 4.6 Training, self-efficacy, and labor notification mechanisms among CHWs in Amhara region, Ethiopia



As illustrated above, experience with delivery promotes self-efficacy and self-marketing among CHWs which leads to an increase in the number of community notification mechanisms. Self-efficacy, coupled with regular

interaction among FLWs results in a fourth method of notification by TBAs. Making use of the multiple notification pathways is important because it increases the probability that CHWs will be in the right place at the right time to utilize their life-saving knowledge and skills.

Additional considerations

Demand for CHW services

The analysis of the maternal interviews shows that mothers blur the distinction between community health workers, and often describe HEWs working at the health station rather than in the community where they spend most of their time (Hadley 2010). The argument could be made that because mothers cannot recognize CHWs, CHWs cannot generate demand for specific services. This may well be the case; however, individual CHWs can market themselves as trained birth attendants during the antenatal period. CHWs who reported being called during labor were not called because the mother comprehended their role; rather they were called because the mother perceived the individual as skilled provider. This method of reputational care seeking is not surprising because it mirrors the current pattern of care seeking with TBAs. This finding is important because it means that each CHW must generate demand for his or her services as an individual, and the actions of one CHW will not necessarily benefit the other CWHs in the kebele because to the community, the identity of the CHWs is not linked.

Deviant cases

One HEW, despite inexperience with delivery, exhibited extreme self-efficacy in her ability to attend births, and stated that this was her most

important role in the community. She regularly encouraged pregnant women to call her during labor, and she would go and attend the delivery in their homes. It is possible that the woman is a deviant case because she served as a TBA before she was enrolled in the HEW training program, her mother may have been a TBA, or she may have had children herself (unlike most HEWs) making her more comfortable and confident with the birth process. This deviant case provides a direction for further research that explores additional factors that enable the provision delivery services, factors which could inform the selection criteria for HEWs or vCHWs.

Limitations

Figure 4.6 shows how CHWs are notified of delivery or pregnancy-related complications, however the services provided and the quality of those services is not explored. The model was built under two assumptions 1) that CHWs have the technical ability to attend childbirth without causing harm to mothers and newborns and 2) that of utmost importance is shifting norms so that CHWs are present at the time of delivery. If CHWs are truly unprepared to provide delivery services from a technical perspective, and their presence results in the harm of mothers and newborns, then the conceptual framework must add an additional level to address health worker competency.

5 – RESULTS (Quantitative)

Introduction and Data Quality

The population assessed in this analysis includes frontline health workers (HEWs, vCHWs, and TBAs) age 19-67 (N=162) located in Amhara region, Ethiopia. All respondents were providing health services at the community level at the time of the survey. Each respondent self-selected into one category of frontline worker including: Health Extension Worker , voluntary Community Health Worker, or traditional birth attendant. Frontline health workers may fear repercussions for acknowledging challenges or areas where they lack competence and self-efficacy. Furthermore, full privacy was often difficult to obtain at the health post where most surveys were administered. Therefore data quality issues likely involve an over reporting of skills and self-efficacy and an underreporting of challenges and areas of incompetence.

Population Characteristics

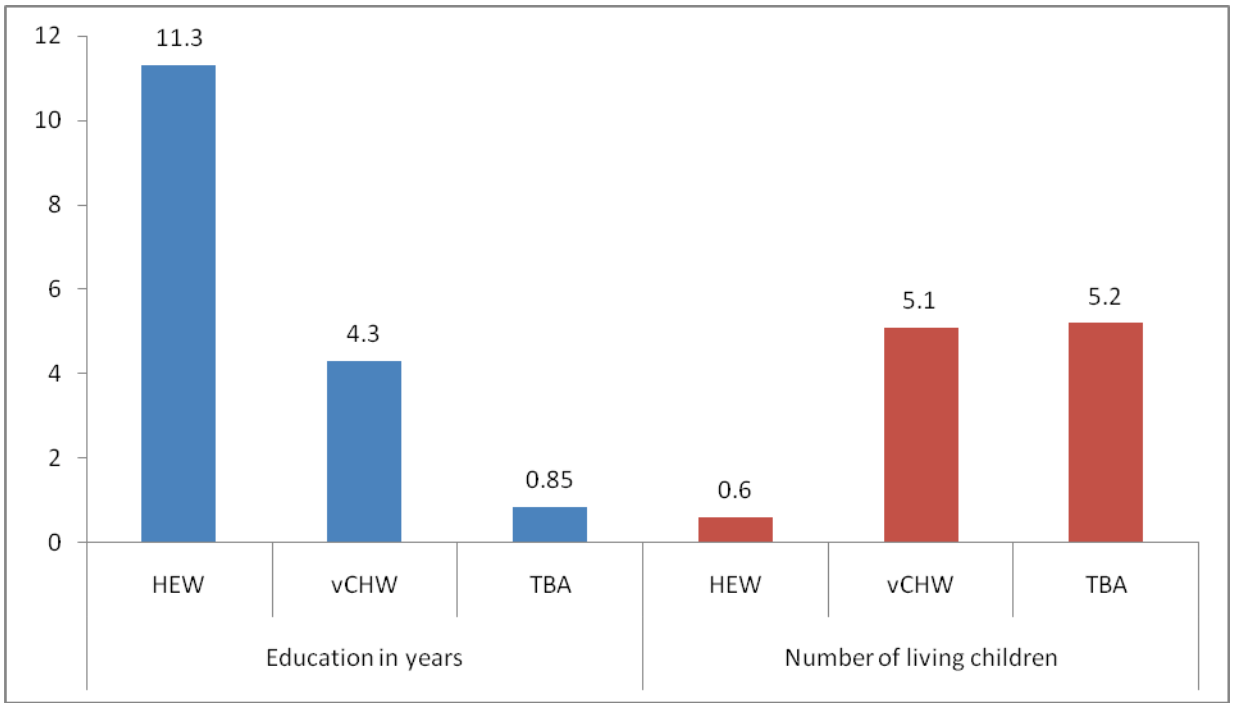
Respondents exhibited significant variation in demographic characteristics, training, and experience as shown in **Table 5.1**. HEWs were on average significantly younger (23.2 years) than other respondents (vCHW 39.2 and TBA 42) and reported more education (11.3 years), less experience (3.2 years), fewer children (<1), and were much more likely to be single (51%) than other health workers. In contrast vCHWs and TBAs had less education (4.3 years and <1 year), more experience (6 and 15 years), and more children (5.1 and 5.2). vCHWs were also most likely to be married (84%) while TBAs were most likely to be widowed or divorced (65%). All HEWs and TBAs were female while 89% of vCHWs were male.

Table 5.1 Characteristics of sampled FLWs in Amhara region, Ethiopia by type of FLW (N=162)

	All	HEW	vCHW	TBA
Number of respondents	162	35	70	57
Proportion of respondents (%)	100	21.6	43.2	35.2
Sex (%)				
Male	62 (38.3)	0	8 (11.43)	0
Female	100 (61.7)	35 (100)	62 (88.6)	57 (100)
Mean age in years (range, STD)	36.1 (19-67, 10.9)	23.2 (19-38, 3.6)	39.2 (19-60, 9.3)	42 (25-67, 8.3)
Marital status (%)				
Single	16.7	51.4	8.6	5.3
Married	56.2	42.9	84.3	29.8
Widowed/Divorced	27.1	5.7	7.1	64.9
Mean number of living children (range, STD)	4.1 (0-12, 2.8)	0.6 (0-3, 0.88)	5.1 (0-10, 2.3)	5.2 (0-12, 2.3)
Mean school in years (range, STD)	4.7 (0-13, 4.7)	11.3 (10-13, 0.87)	4.3 (0-12, 3.3)	0.85 (0-9, 2.5)
Health training (%)				
Informal	38.5	2.9	45.7	51.8
Formal	31.1	94.3	22.9	1.8
Both informal & formal	10.6	2.9	21.4	1.8
None	19.9	0	10	44.6
Training in clean and safe birth (%)	28	54.3	24.6	15.8
Experience in years (range, STD)	8.2 (1-50, 8.6)	3.2 (1-5, 1.4)	6 (1-34, 6.9)	15 (2-50, 9.7)
Delivers babies (%)	54	71.4	7.3	100

Graph 5.1 below illustrates the variation in education and number of children by health worker type. HEWs likely exhibit higher educational attainment than other health workers because of the governmental requirement of a minimum 10 years education, and HEWs have fewer children because of their young age and for many, non-married status. Though these criteria may enable HEWs to provide health services effectively as they are literate and have limited familial responsibilities, the criteria also means that HEWs differ significantly from the women they serve (low education and high parity), which may create challenges in building rapport and trust. As a result, community women may exhibit preferential care seeking with other providers like TBAs who are most similar to them.

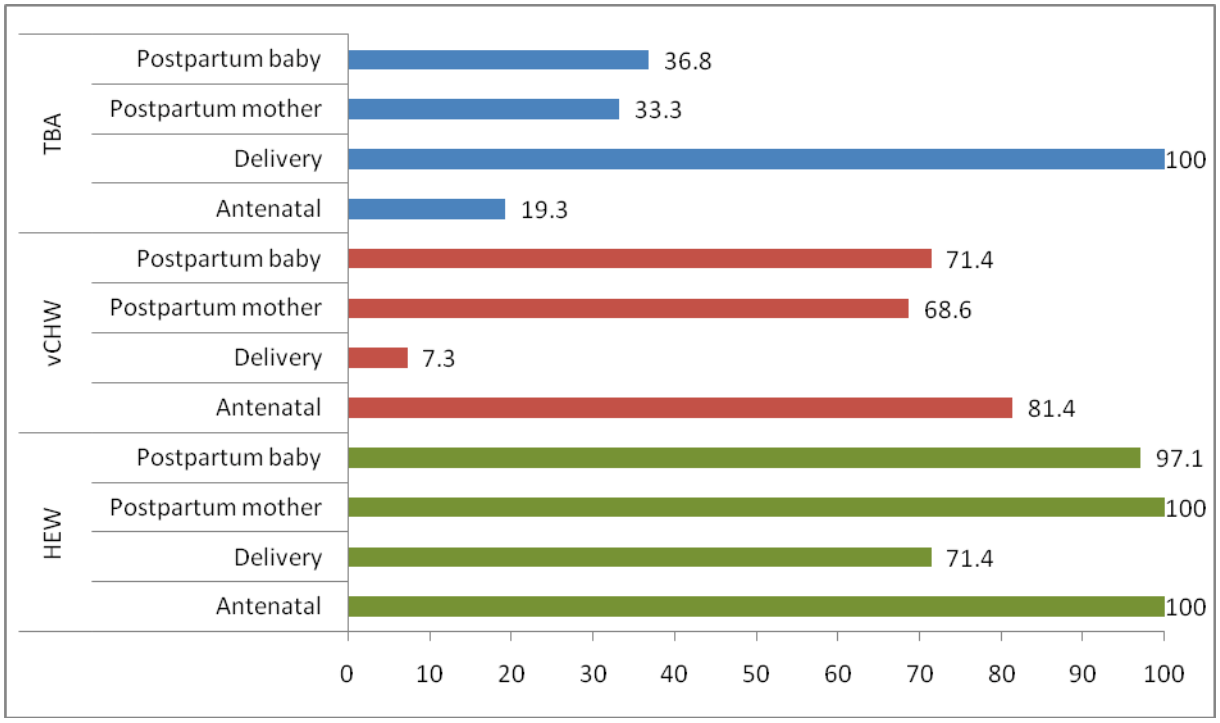
Graph 5.1 Mean educational attainment and mean number of living children in Amhara region, Ethiopia by type of FLW (N=162)



Patterns and Prioritization of Community-based MNH Service Provision

Respondents were asked if they provide each of the following services to the community: antenatal care, delivery care, postpartum care for mothers, and postpartum care for babies. Preceding survey questions emphasized maternal and newborn health, and health workers may be reluctant to deny that they are providing services which are part of their job description. These factors may result in over-reporting of service provision, particularly among HEWs and vCHWs. Additionally, the quality or components of care cannot be determined and no standard of care can be assumed. **Graph 5.2** illustrates that all HEWs and most vCHWs (81%) reported providing antenatal care to community women while TBAS rarely (19%) provided antenatal care, which is associated with TBA's reported community role of delivery attendant. All TBAs reported attending delivery though fewer HEWs (71%) and very few vCHWs (7%) provided delivery services. Associations with delivery service provision will be further explored in the following sections. Interestingly, though all TBAs provide delivery services and as a result are present during the postpartum period, less than half of TBAs provided postpartum care for mothers (33%) or babies (37%). HEWs are most likely to provide postpartum care to mothers (100%) and newborns (97%), followed by vCHWs (69% and 71%, respectively).

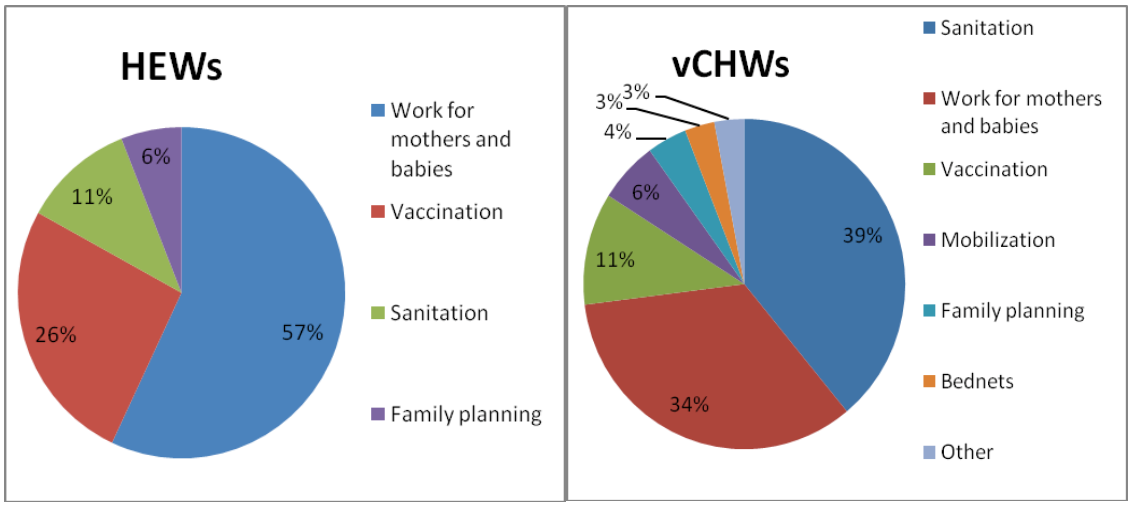
Graph 5.2 Proportion of respondents providing the following services in Amhara region, Ethiopia by FLW type (N=162)



All respondents had many responsibilities in addition to MNH service provision. In fact, 80% of respondents felt that they had too many health activities to complete. To better understand how MNH responsibilities are perceived in relation to other responsibilities, respondents were each asked to name the most important service they provide. Not surprisingly nearly all TBAs (95%) stated that providing care for mothers and babies was their top priority. Caring for mothers and babies was also the top priority for more than half of the HEWs (57%) followed by vaccination (26%), while vCHWs most frequently mentioned sanitation (39%) followed by their work for mothers and babies (34%) and vaccination (11%). The prioritization questions are at the end of the survey, which may lead to over-reporting the prioritization of care for mothers and

babies compared to other activities. **Chart 5.3** below shows the breakdown of service prioritization among HEWs and vCHWs.

Chart 5.3 Most important service provided among HEWs and vCHWs in Amhara region, Ethiopia (N=162)

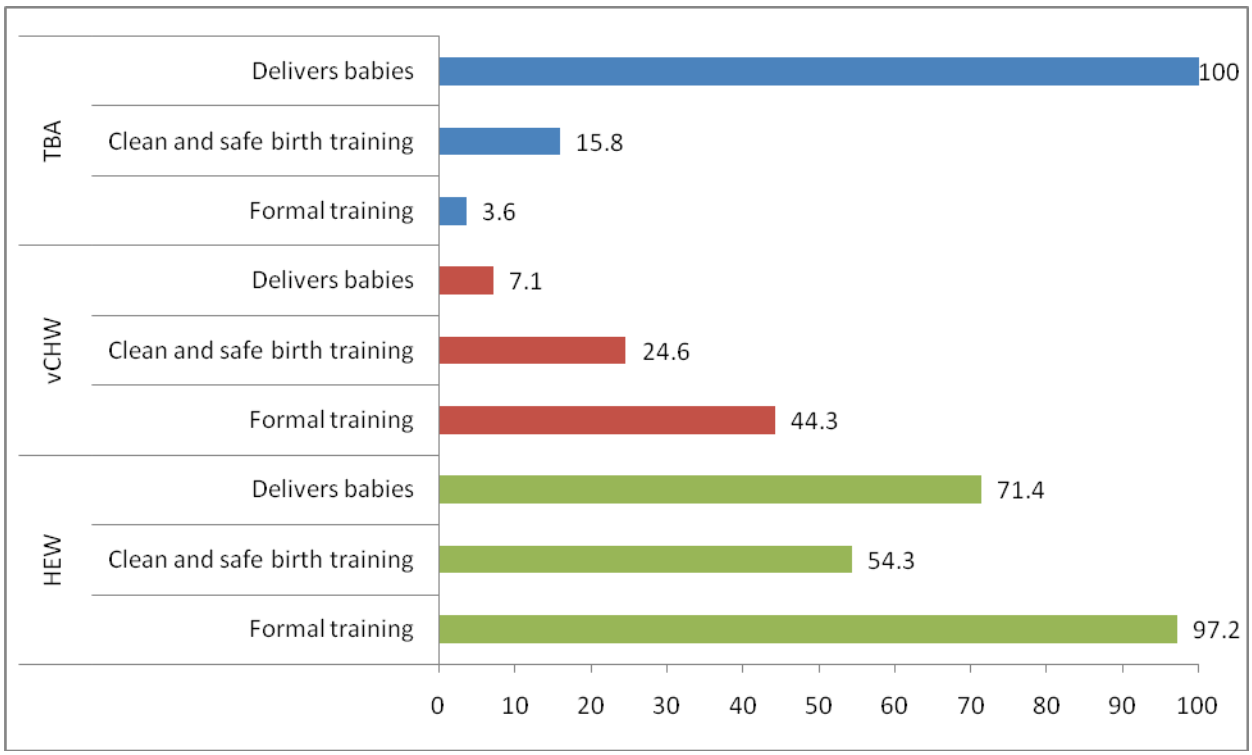


Patterns of Community-based Delivery Service Provision

Pregnancy-related complications are most likely to occur during delivery, and having a trained health worker present at the time of delivery can reduce the risk of maternal and newborn morbidity and mortality. The vast majority of respondents (90%) agreed with this strategy, stating that a health worker should be called to the home when labor begins, however this was not common practice. Though nearly all HEWs (97%) and one third of vCHWs (33.8%) reported that they had the knowledge and skills necessary to attend delivery, significantly fewer HEWs (71%) and vCHWs (7%) reported actually providing delivery services. TBAs were much more likely to attend delivery though most have only informal training (52%) or no training at all (45%). **Graph 5.4** illustrates this pattern showing that despite their formal training as health workers, HEWs and vCHWs

were much less likely to attend delivery than TBAs, suggesting that factors besides training play a role in delivery service provision. As no definitions of formal or informal training were given to respondents, there is a possibility of misclassification bias.

Graph 5.4 Proportion of respondents reporting formal training, training in clean and safe birth, and delivering babies in Amhara region, Ethiopia by type of FLW (N=162)



The Association between Confidence and Delivery Service Provision[1]

As shown above, there is a gap between training and service provision. TBAs, typically without formal training often provide delivery services while

[1] The baseline survey utilized the Amharic would for confidence to ask questions on self-efficacy. Confidence and self-efficacy are not perfect synonyms as pointed out by Bandura, however asking FLWs about self-efficacy directly seemed unnecessarily obtuse and confidence was the most appropriate cultural substitute.

many health workers with formal training do not. Confidence in abilities will be explored as a possible mediating factor between training and service provision. Confidence level in service provision was assessed for all MNH services including delivery service provision. Respondents were asked to illustrate their level of confidence in providing each service on a 10-rung ladder (**Figure 5.1**), with the top of the ladder representing high confidence and the bottom representing very low confidence. The ladder method has been documented in Ethiopia as a culturally appropriate tool for assessing a respondent's perceived location on a spectrum, and should be an appropriate measure of perceived confidence. **Table 5.2** shows that for all MNH service areas, confidence in abilities differed significantly (p=0.0000) among FLWs who provided the service compared to FLWs who did not provide the service. For example, the FLWs who provided delivery services reported a mean confidence level of 6.9 in delivery care compared to a confidence level of 4.2 among FLWs who did not provide delivery service. This suggests that confidence may mediate the relationship between training and service provision as those with who provided the service reported higher levels of confidence than those who did not provide the service.

Figure 5.1 Ladder image used to assess confidence level among FLWs in Amhara region, Ethiopia

Table 5.2 The association between service provision and mean confidence score in service among FLWs in Amhara region, Ethiopia (n=162)

Service	Provided	n	Mean Confidence Score	95% CI	t-statistic	p-value
Antenatal care	Yes	103	6.6	(6.2-7.0)	-8.27	0.0000
	No	58	3.7	(3.1-4.3)		
Delivery care	Yes	87	6.9	(6.4-7.3)	-7.41	0.0000
	No	73	4.2	(3.6-4.8)		
Postpartum care, mothers	Yes	101	6.6	(5.2-6.3)	-6.39	0.0000
	No	60	4.1	(3.4-4.8)		
Postpartum care, babies	Yes	104	7.1	(6.7-7.6)	-8.59	0.0000
	No	55	3.6	(2.9-4.3)		

Graph 5.5 Mean confidence score on 10-point scale and proportion of FLWs providing service in Amhara region, Ethiopia by FLW type and service type (N=162)

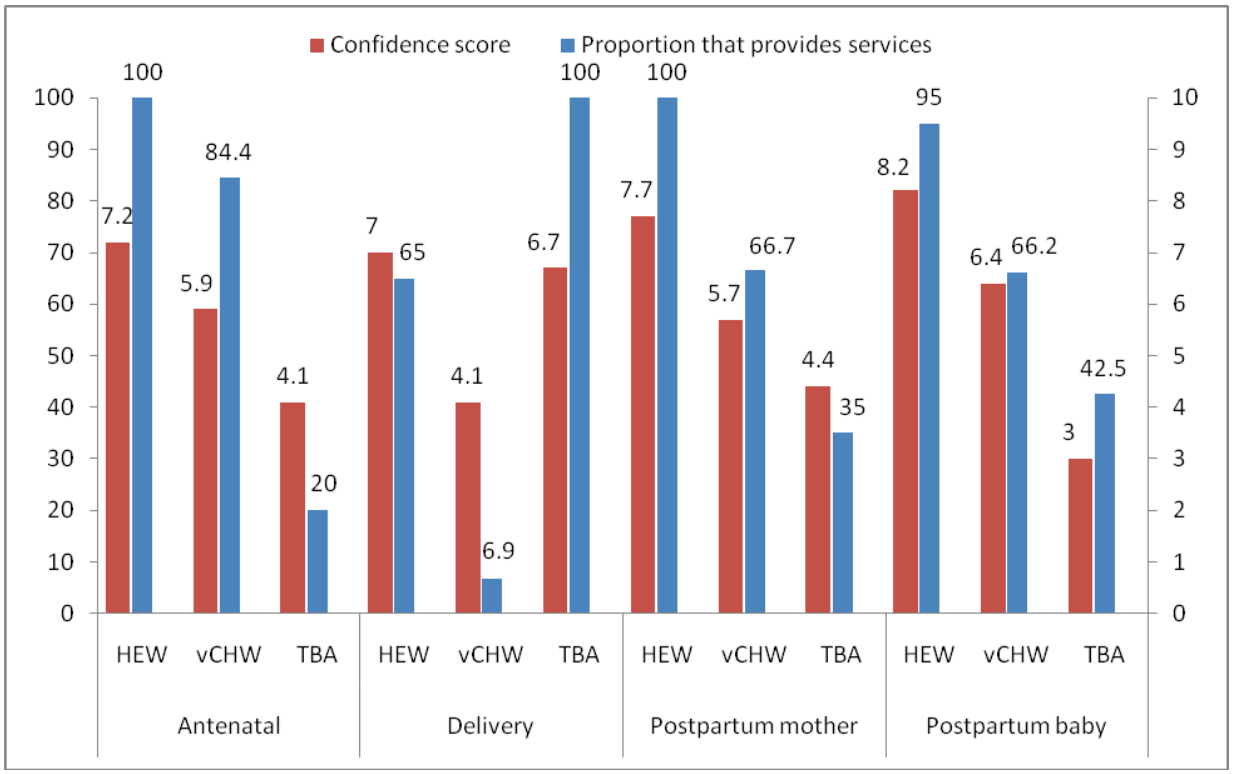


Table 5.2 explored the difference in confidence level among FLWs who provided a service compared to FLWs who did not provide the service. There is also an association between the mean group confidence score and the proportion of the group that provides the service, which is illustrated in **Graph 5.5**. For example, TBAs reported higher confidence in delivery care (6.7) compared to services that few TBAs provided including antenatal care (20%, 4.1 score) and postpartum care for mothers (35%, 4.4 score) or babies (43%, 3 score). In contrast, vCHWs reported the lowest confidence levels in delivery (4.1), which very few vCHWs provided (7%). vCHWs had significantly higher levels of confidence in antenatal care (5.9 score), postpartum care for mothers (5.7 score) and babies (6.4 score); which was associated with a higher proportion of the

group providing the services (84%, 67%, and 66%, respectively). The association between confidence and service provision is less apparent among HEWs who exhibited little variation in confidence score regardless of reported service provision. The mean confidence score among HEWs ranges from 7-8.2 and may be associated with fear of reporting lower levels of confidence in services that are part of their job description. In summary, higher confidence levels are significantly associated with service provision (p=0.0000), and a higher confidence score among a group may be associated with a larger proportion of the group providing the service.

Associations with Confidence in and Provision of Delivery Care

Higher confidence levels are associated with service provision for all MNH services areas including antenatal care, delivery care, postpartum care for mothers, and postpartum care for babies. However, findings from the MaNHEP formative research identify confidence as a particularly salient issue in the provision of delivery care services. The remainder of this analysis will further explore this relationship, identifying FLW characteristics and experiences that are associated with higher levels of confidence in delivery services.

Table 5.3 below shows that association between confidence and delivery service provision is significant among vCHWs (p=0.0001) but is not significant among HEW respondents (p=0.8770). Only one HEW reported a confidence score lower than 5, which suggests that HEWs may over-report levels of confidence in delivery services because attending delivery is part of their job as

determine by the Federal Ministry of Health. The association could not be assessed for TBAs because 100% of TBAs provided delivery care services.

Table 5.3 The association between delivery service provision and mean confidence score in delivery service among FLWs in Amhara region, Ethiopia by type of FLW (n=162)

Delivery Care Service	Provided	n	Mean Confidence Score	95% CI	t-statistic	p-value
HEW	Yes	25	6.9	(6.2-7.8)	-0.15	0.8770
	No	10	7	(5.9-7.9)		
vCHW	Yes	5	8.4	(6.1-10.7)	-4.26	0.0001
	No	63	3.7	(3.2-4.4)		
TBA	Yes	57	6.7		N/A	N/A
	No	0				

Table 5.4 The association between demographic and experiential factors with confidence in delivery service among HEWs in Amhara region, Ethiopia (N=35)

Characteristic	Classification	n	Mean Confidence Score	95% CI	t-statistic	p-value
Marital Status	Non-married	20	7.0	(6.1-7.9)	0.11	0.9100
	Married	15	6.9	(6.3-7.6)		
Living children	Any	14	6.8	(6.0-7.5)	0.53	0.6027
	None	21	7.1	(6.2-8.0)		
Clean and safe birth training	Yes	19	6.9	(6.3-7.5)	0.29	0.7745
	No	16	7.1	(5.9-8.2)		
Experience	2 years or less	11	7.5	(6.6-8.5)	1.38	0.1771
	>2 years	24	6.7	(6.0-7.5)		
Interaction with TBA in last month	None	12	6.3	(5.0-7.5)	-1.89	0.0671
	Any	23	7.3	(6.7-8.0)		

Table 5.4 above shows that HEW's reported confidence level in delivery service provision is higher among HEWs with more than 2 years experience and among HEWs who reported interaction with TBAs; however the differences in confidence levels are not significant. Furthermore, confidence levels do not differ by any other demographic or experiential characteristics.

Table 5.5 Crude odds ratios of reporting ever delivering a baby by demographic and experiential characteristics among HEWs in Amhara region, Ethiopia (N=35)

Characteristic	Classification	Ever delivered babies (%)	Total number of respondents	Crude Odds Ratio	95% C.I.
Sex	Male		0		N/A
	Female	70	35	N/A	
Marital Status	Non-married	65	20	1.00	0.45-10.29
	Married	80	15	2.15	
Living children	None	66.67	21	1.00	0.38-8.87
	Any	78.57	14	1.83	
Clean and safe birth training	Yes	63.16	19	0.40	0.083-1.89
	No	81.25	16	1.00	
Experience	2 years or less	63.64	11	1.00	0.37-7.97
	>2 years	75	24	1.71	
Interaction with TBA in last month	None	50	12	1.00	1.0001-22.67
	Any	82.6	13	4.75	

Only one finding in **Table 5.5** was significant, though the insignificance is likely a result of the small sample size. HEWs reporting interaction with TBAs in the last month were nearly 5 times as likely to report delivering babies that HEWs who did not interact with TBAs (95% CI 1.0001-22.67), which suggests TBAs serve as a liaison between community women and HEWs and may be a key gatekeeper to the home of delivering women. Though the other findings were not statistically significant, they may have implications for further research and are reported below. HEWs who were married (OR 2.15), had children (OR 1.83), or had more than two years experience (OR 1.71) were more likely to attend delivery than unmarried, nulliparous, or less experienced HEWs. Interestingly, HEWs who are married, have children, or have lived in the community for more than 2 years are more like the community women they serve, which may increase acceptance of the HEWs and facilitate attending deliveries. HEWs with the clean and safe birth training were less likely to attend births (OR=0.40) than HEWs without the training. HEWs exhibiting particular talent may have been selected for the clean and safe birth training; however these HEWs likely have numerous responsibilities already and may not be able to prioritize delivery service despite the training.

Table 5.6 The association between demographic and experiential factors with confidence in delivery service among vCHWs in Amhara region, Ethiopia (N=70)

Characteristic	Classification	n	Mean Confidence Score	95% CI	t-statistic	p-value
Sex	Male	61	4.2	(3.5-4.8)	-0.29	0.7700
	Female	8	3.9	(1.7-6.1)		
Marital Status	Non-married	11	2.6	(1.5-3.8)	-2.13	0.0367
	Married	58	4.4	(3.7-5.1)		
Living children	None	3	2.33	(-0.54-5.2)	-1.23	0.2236
	Any	66	4.21	(3.6-4.9)		
Clean and safe birth training	Yes	17	5.9	(4.4-7.4)	-3.51	0.0008
	No	51	3.5	(2.9-4.1)		
Experience	2 years or less	21	3.0	(2.2-3.8)	-2.48	0.0158
	>2 years	48	4.6	(3.8-5.4)		
Interaction with TBA in last month	None	29	4.3	(3.3-5.3)	0.39	0.6955
	Any	40	4.0	(3.2-4.9)		

Table 5.6 above illustrates that confidence levels in delivery service provision differed significantly among vCHWs who were married (4.4 score, p=0.0367), had clean and safe birth training (5.9 score, p=0.0008), and had greater than 2 years of experience (4.6 score, p=0.0158). It makes sense that training and experience would build vCHW confidence level, and because most vCHWs are male, marriage may increase vCHW confidence by exposing them to women during pregnancy and childbirth.

Table 5.7 Crude odds ratios of reporting ever delivering a baby by demographic and experiential characteristics among vCHWs in Amhara region, Ethiopia (N=70)

Characteristic	Classification	Delivers babies (%)	Total number of respondents	Crude Odds Ratio	95% C.I.
Sex	Male	6.6	61	0.49	0.048-5.04
	Female	12.5	6	1.00	
Marital Status	Non-married	9.1	11	1.00	0.075-7.34
	Married	6.9	58	0.74	
	Any	7.6	66	1.00	
Clean and safe birth training	Yes	17.7	17	10.71	1.03-111.17
	No	2.0	51	1.00	
	>2 years	10.6	47	*	
Interaction with TBA in last month	None	10.3	29	1.00	0.071-2.92
	Any	5.0	40	0.46	

Table 5.7 shows that vCHWs with clean and safe birth training are nearly 11 times as likely to attend deliveries than vCHWs without the training (95% CI 1.03-111.17). None of the vCHWs without children or with less than 2 years of experience delivered babies, likely associated with their limited training and limited awareness of childbirth (note that odds ratios could not be calculated because these factors predicted failure to provide delivery services perfectly). No other associations were found to be significant.

Key Components of Confidence

In order to build confidence among FLWs, it is important to assess local definitions and explanations of confidence. During the MaNHEP formative research, FLWs were asked which health services they felt confident performing

and reasons for their confidence. FLWs also discussed services that they lacked confidence in and the reasons for their lack of confidence. All in-depth interviews underwent rapid analysis in order to determine culturally-relevant aspects of confidence building and confidence maintenance. Key elements of confidence identified by FLWs during the in-depth interviews were formulated into 22 agree/disagree questions, which were placed on the MaNHEP baseline survey. **Table 5.8** on the following page details the full question for each of the 22 confidence component questions.

Generally, HEWs reported training to care for mothers and babies more commonly (50%) than vCHWs (30%) or TBAs (11%), though they were also more likely to forget aspects of their training (90%) compared to vCHWs (60%) or TBAs (30%). All HEWs and vCHWs felt that with training they could provide better services compared to 80% of TBAs, which may be associated with lower perceptions of self-efficacy among TBAs. Importantly, approximately half of HEWs and vCHWs and a third of TBAs felt they did not have the practical experience to attend delivery. Practical experience strongly associated with delivery service provision for both HEWs and vCHWs as shown in **Graph 5.6** and **Graph 5.7**.

Nearly all TBAs reported that they can attend delivery alone (90%) compared to 50% of HEWs and 10% of vCHWs. Some TBAs, however, may feel limited ability to impact the outcome of delivery as nearly a quarter of TBAs felt there was nothing to be done to prevent a mother or child from dying during delivery. One quarter of vCHWs also felt there was nothing to be done to prevent a mother or child from dying during delivery. HEWs were more likely to report

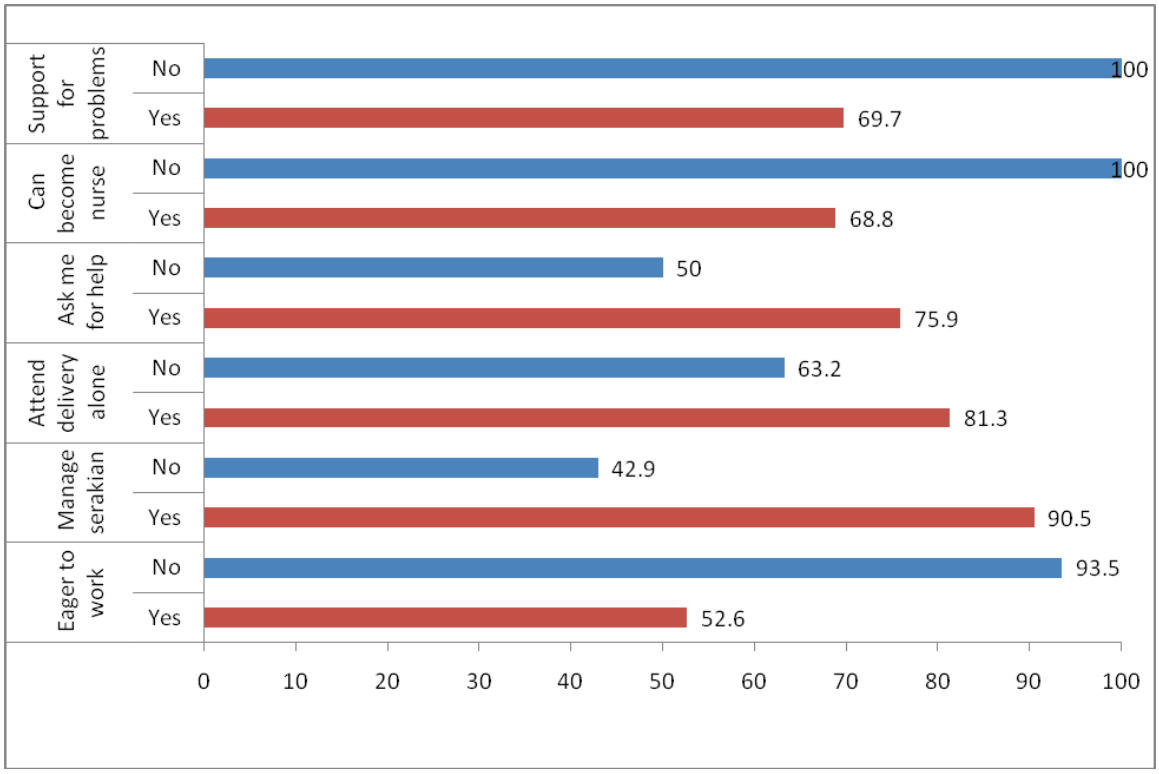
performing health duties with fear in their face (40%) than vCHWs (20%) and TBAs (29%), which may be associated with HEWs having to perform many health activities with only a year-long training curriculum.

Overall levels of perceived formal support were low among all 3 groups of FLWs, though many FLWs felt they had someone to ask for advice about health duties. vCHWs were most likely to have someone to ask for advice (99%), compared to HEWs (75%), and TBAs (60%); which may be associated with the vCHW-HEW relationship with vCHWs consulting HEWs for advice. TBAs were much less likely to have a role in a health committee or communicate with *kebele* leaders about their work than other FLWs, and were also less likely to report to many activities, likely because their health activities are based on community-demand alone.

Table 5.8 Proportion of respondents reporting confidence component in Amhara region, Ethiopia by type of FLW (N=162)

Question	HEW	vCHW	TBA
Training and knowledge			
1. Training to care for mother/babies	50	30	11
2. I have sufficient knowledge to manage serakian	16	13	25
3. If I have the training I can provide services better than what I am providing now	100	100	80
4. I forget things from my training because it was long ago	90	60	30
Experience			
5. I have the knowledge, but not the practical experience to attend delivery	55	49	33
Efficacy			
6. I know when to say no for services I can't do	100	94	100
7. Sometimes when I perform health duties there is fear in my face	40	20	29
8. I am able to attend a delivery alone	50	10	90
9. If I have the training, I have the capability of becoming a nurse	100	56	33
10. There is nothing that can be done about excessive bleeding after birth because it is caused by serakian	0	21	21
11. There is little to be done to save a mother or child. If one dies during delivery it is a matter of chance.	0	17	26
Support			
12. I do not have enough support from a supervisor	45	56	35
13. When I face a difficult labor, I have someone who will come and help me	35	44	53
14. When I need advice about a health problem, there is someone I can ask	75	99	60
15. I have written materials I can refer to for information	85	67	7
Community acceptance			
16. I have a role in a health committee	100	96	30
17. I communicate with kebele leaders about my work	89	94	32
18. People ask for my help if there is a problem with mothers and babies	100	97	70
19. People in the community tell me that I helped them get better	100	97	74
Duty			
20. I am eager to work my health activities	95	100	86
21. I have too many activities as a health worker	95	86	65
22. My main duty focuses on mothers and babies	85	87	61

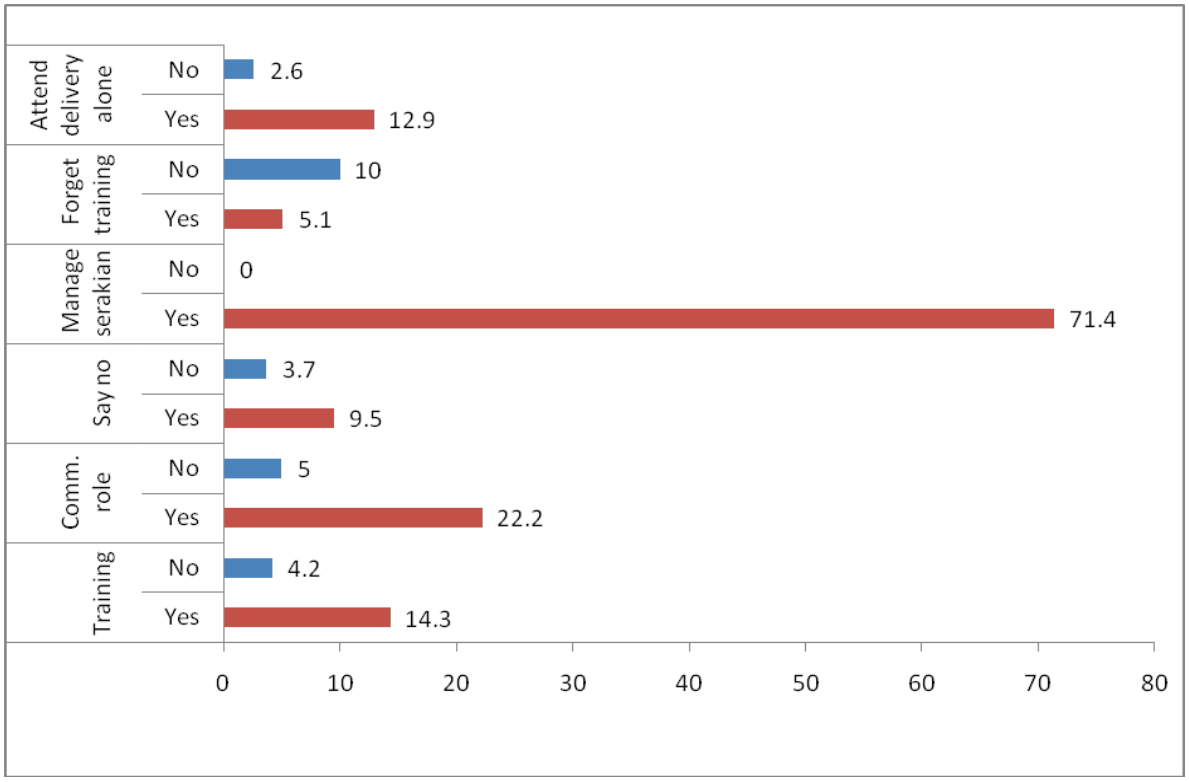
Graph 5.6 Proportion of HEWs who delivers babies in Amhara region, Ethiopia by response to questions 5, 8, 13, 14, 17, and 21 (N=35)



HEW respondents were categorized into two groups, those who answered "yes" and those who answered "no" to each of the 22 questions listed in **Table 5.8.** The proportion of respondents who delivered babies in each group was assessed. Overall, approximately 70% of HEWs reported delivering babies. Questions where the proportion of respondents delivering babies varied by 10% or more from the average (70%) were placed in **Graph 5.6.** Respondents who had practical experience with delivery (question 5) were much more likely to deliver babies (94%) than respondents who did not (53%), showing the importance of practical training in building HEW confidence. Nearly all respondents (91%) who reported the ability to attend delivery alone (question 8) provided delivery services compared to less than half (42.9%) of respondents who

did not report the ability to attend delivery alone. Perceived support also seems to be an important predictor of delivery care as over 80% of respondents who reported someone would assist them with a difficult labor (question 13) provided delivery services compared to 63% of HEWs who did not have someone to assist them with a difficult labor. Furthermore, 76% of respondents who felt they had someone ask for advice attended delivery, compared to 50% of HEWs who did not have a source of health advice. HEWs who communicated with kebele leaders about their work were less likely to provide delivery services (69%) than HEWs who did not (100%), which may be associated with increased autonomy and experience of these HEWs. Additionally, HEWs with too many health activities were less likely to attend delivery (70%) than HEWs with a manageable amount of activities (100%). These findings highlight key components of confidence that are most associated with increasing the provision of delivery services among HEWs including: experiential training, supportive supervision for questions and assistance during labor, and manageable workloads. The statement “I am able to attend delivery alone” seems to be a very strong predictor of service provision among HEWs and should be considered as a question for HEW training post-tests.

Graph 5.7 Proportion of vCHWs who delivers babies in Amhara region, Ethiopia by response to questions 1, 2, 4, 8, 12, and 13 (N=70)



Much like HEWs, perceived support was important to vCHWs, and vCHWs who felt they had someone to assist them with a difficult labor (question 13) were much more likely to attend delivery (13%) than vCHWs who did not have someone to assist them (2.6%). Importantly, HEWs who prioritize delivery service likely play this supportive role for vCHWs who conduct delivery, which illustrates the process of HEW priorities trickling down to other health workers. Ten percent of vCHWs who did not have support from a supervisor attended deliver compared to 5.1% who did have support, which may be associated with lower health resources among vCHWs who lack supervision, resulting in vCHWs completing tasks out of community necessity regardless of perceived abilities. Additionally, vCHWs with formal training (14%) and the ability to manage

hemorrhage (serakian) (22%), were much more likely to attend delivery compared to those who lacked formal training and could not manage hemorrhage (4.2% and 5%, respectively). Those who forgot aspects of their training because it was long ago (question 2), were also more likely to attend delivery (9.5%) compared to those who didn't (3.7%), which may be associated the practical experience of vCHWs who have been working for many years. Finally, like HEWs, vCHWs who reported the ability to attend delivery alone were significantly more likely to provide delivery services (71%) compared to respondents who could not attend delivery alone.

Summary

This analysis has illustrated that HEWs differ in terms of characteristics and experiences from vCHWs, TBAs, and the women they serve. Despite formal training, HEWs and vCHWs are less likely to attend deliveries than TBAs suggesting that other factors besides training influence the provision of delivery care by FLWs. Confidence levels differed significantly among FLWs who provided a service compared to FLWs who did not provide the service, suggesting that confidence may mediate the relationship between training and service provision. Among HEWs, interaction with TBAs greatly increased the odds of attending a delivery; however no other associations with confidence level or odds of attending delivery were found to be significant. Parity, marriage, and experience were associated with greater odds of attending delivery (though not significantly). Among vCHWs, having a clean and safe birth training and more than 2 years experience were significantly associated with higher confidence levels and with

increased odds of attending delivery. Furthermore, vCHWs with children were also significantly more likely to attend delivery. The confidence component analysis illustrated that practical experience and perceived support were associated with delivery service provision for both HEWs and vCHWs. Finally, the statement “I can attend delivery alone” is a very strong predictor of service provision and should be considered as a post-test question for FLW training.

6 - DISCUSSION

Summary of Results

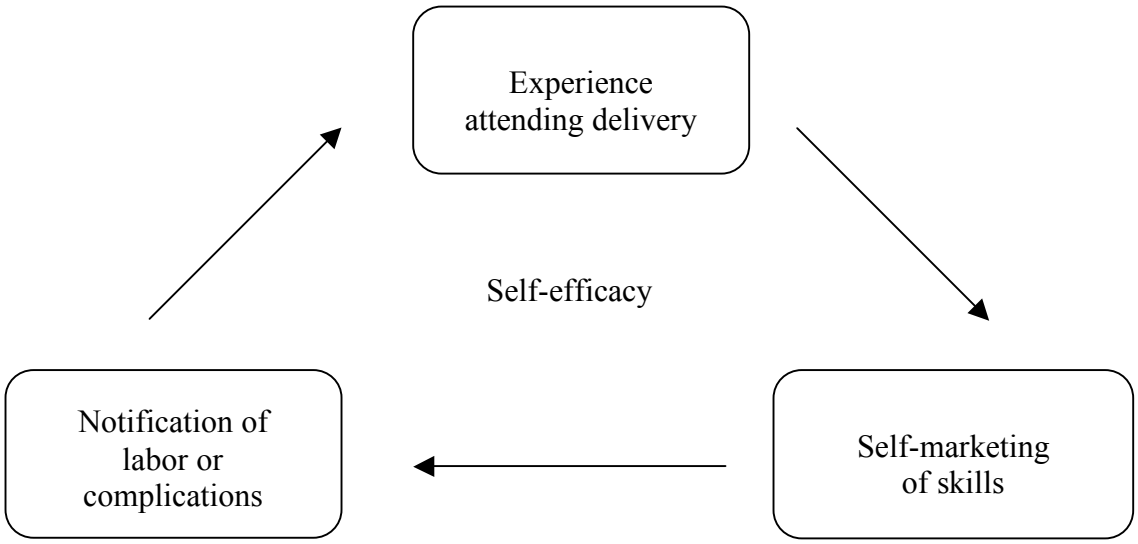
Quantitative analysis of the Amhara region baseline survey illustrates that all TBAs provided delivery care to the community though only 71% of HEWs and 7% of vCHWs reported delivering babies. The relationship between training and attending delivery is opposite what one would hope. Many vCHWs and HEWs have been trained specifically in safe and clean delivery (25% and 54%, respectively), though they are not attending delivery as commonly as TBAs who have little if any training. Some of the gap between training and service provision may be explained by a lack of perceived self-efficacy among HEWs and vCHWs. Training that builds knowledge and skills without promoting efficacy simply may not be enough to motivate HEWs and vCHWs to prioritize attending delivery amidst other competing responsibilities.

Findings illustrate that for each service provision area (antenatal care, delivery care, postpartum care for mothers, and postpartum care for babies), workers who are currently providing the service reported a higher mean confidence score for the area compared to workers who are not providing the service. For example, those who attend delivery reported a 6.9 (on 10pt scale) confidence score for delivery compared to those who were not providing the service (4.2). The association between confidence and providing delivery services was particularly strong among vCHWs. Among HEWs and vCHWs, the component of confidence that most affected delivery service provision were practical experiences attending birth and perceived support for complications. Practical experience with delivery and perceived support were strongly associated

with both higher confidence level and with providing the delivery services to the community.

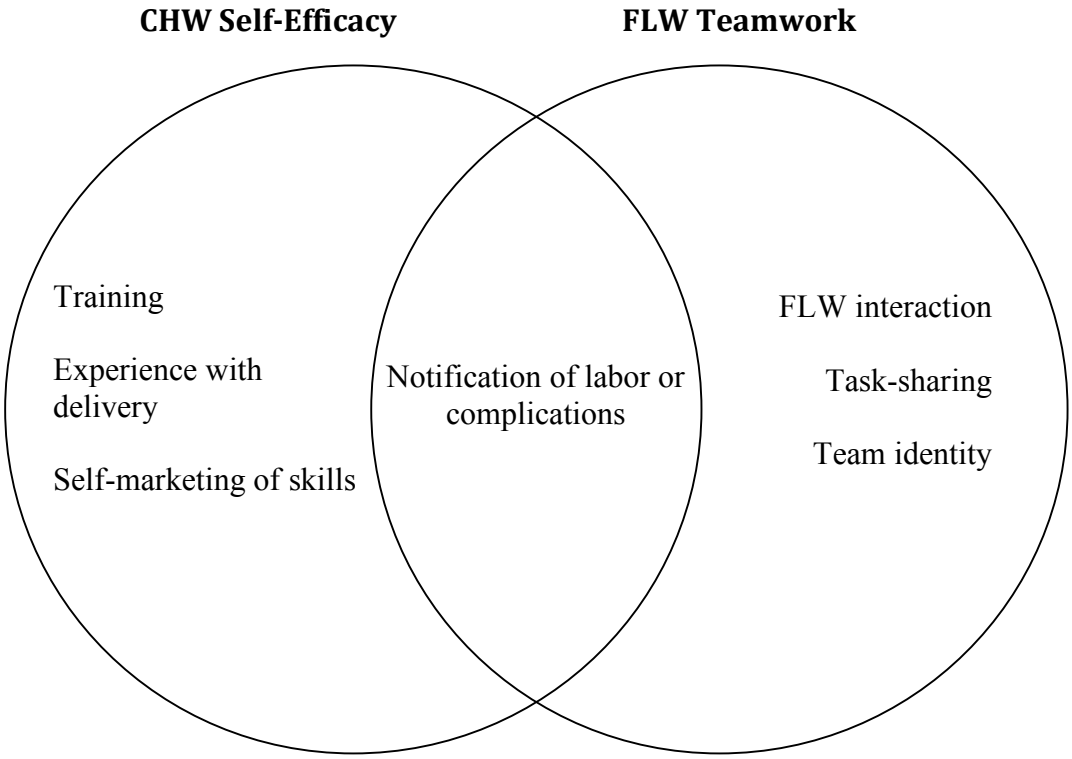
Qualitative analysis of the formative interviews echoed the findings of the baseline survey and provided insight on the relationship between perceived self-efficacy and providing delivery care. CHW respondents illustrated an iterative process of self-efficacy expectations whereby experience with delivery prompted self-marketing of skills, which increased care seeking during labor, and in turn, gave the CHW more experience with delivery (see **Figure 4.4**).

Figure 4.4 The positive cycle of self-efficacy among community health workers in Amhara region, Ethiopia



All HEWs and vCHWs reported training as a source of self-efficacy; however, training in delivery did not always result in HEWs and vCHWs attending births. Though training of any type is important, these findings highlight the need to determine which training methods are *most* effective in promoting health worker efficacy with regards to attending delivery, a very daunting task indeed. Furthermore, these findings illustrate the importance of promoting teamwork among FLWs (including TBAs) so that multiple methods for notification of labor and complications can be utilized. As shown in **Figure 4.5**, the combination of self-efficacy and teamwork yields greater notification of labor and complications.

Figure 4.5 The relationship between self-efficacy and teamwork in the context of community-oriented delivery service provision



Three pathways for notification of labor or complications were discussed by CHWs including 1) finding a woman by accident, 2) care seeking by the woman or notification by a family member, and 3) notification of labor by a TBA. Promoting teamwork among FLWs and self-efficacy among CHWs ensures that all potential methods of notification are being utilized, thus maximizing the chances that CHWs will be in the home to provide life saving care at the right time.

Other factors that limit HEWs and vCHWs from attending birth include numerous competing health and household duties and limited interaction with TBAs. The limited interaction between CHWs and TBAs limits teamwork and task-sharing in many *kebeles* and decreases the chances that CHWs will be notified by TBAs of labor or complications.

Relationship to the Literature

Reviews have demonstrated the impact of community health worker training programs on newborn morbidity and mortality and maternal morbidity. To maximize the health benefits of community health worker training, health workers should be present in homes at the time of birth to utilize their skills or at the bare minimum, health workers should be notified of pregnancy-related complications. To date, evidence-based practice for getting health workers into the home at the time of birth is severely limited. Mechanisms that facilitate notification (for labor or complications) are unclear. This mixed method study builds on the reviews, illustrating specific factors that enable health providers to be present in the home during birth.

Evidence on TBA training programs is mixed, however this study supports the findings of Sibley et al (2004) and Janowitz et al (1998), which suggest that TBA training can increase the uptake of health services among pregnant women and can increase appropriate referral for emergencies. Findings suggest that venues, like training, which encourage relationship development and collaboration between formal health workers and TBAs allow TBAs to serve as liaisons between pregnant women and formal health workers. The interviews suggest that TBAs, when collaborating with formal health workers, are connecting laboring women with the formal health sector for complications rather than providing life-saving care themselves.

Most TBAs interviewed for this study demonstrated a willingness for collaboration with formal health workers; however the collaboration was underutilized, and TBAs often described feeling ostracized as a result of negative or few interactions with formal health workers. But the few TBAs who did work side by side with HEWs and vCHWs described their involvement in the formal health sector as an honor, showing great potential for expanded collaboration in other *kebeles*. Quantitative findings reveal that all TBA respondents were called into laboring women's homes, illustrating established and consistent labor notification mechanisms, and formative interviews confirm the TBAs' community reputation as trusted "neighbors and friends" (Hadley et al 2011). As a reputable source with established labor notification mechanisms, TBAs are ideal candidates to facilitate the introduction of new birth attendants (such as HEWs and vCHWs). Indeed, a TBA recommendation may assist HEWs and vCHWs in developing status as a birth attendant more so than self-marketing.

Trials (Mobeen, Durocher et al. 2011) and the mathematical model of Pagel et al (2009) illustrate the robust effect of community-based drug provision (of misoprostol and oral antibiotics) on maternal survival; however, the results of this study point out practical barriers to community-based drug distribution, which would likely decrease the efficiency of such a program in Amhara region. HEWs will have access to misoprostol though the MaNHEP intervention and access to oral antibiotics through the policies of the Federal Ministry of Health, however the qualitative interviews illustrate that HEWs are rarely in the right place at the right time to capitalize on the availability of these medications. Without efforts to get HEWs into the home at the time of birth and after birth for an immediate postpartum visit, the health effects from community drug distribution will be diminished.

Study findings reinforce evidence on the use of public sector workers for community-based maternal and newborn health programs. Both qualitative and quantitative evidence illustrates that HEWS and vCHWs, as public sector workers, are consistently providing numerous community-level services. Though presently, delivery care is under-provided and under-prioritized by HEWs and vCHWs, findings show a strong human resource infrastructure in rural Amhara region (including 2 HEWs and many vCHWs in the sampled *kebeles*) that can be built upon to advance maternal and newborn health. The examples of Nepal (Hodgins 2009) and Pakistan (Bhutta 2011) illustrate promising results for maternal and newborn health by relying solely on the country's public health sector, and it is likely that Ethiopia would show similar results. Furthermore, like Nepal and Pakistan, using public sector workers would allow national scalability

of a community-oriented maternal and newborn health package, as HEWs and vCHWs are present in many rural areas throughout the country.

Few studies have documented the use of a quality improvement framework for community-oriented services. The Fives Alive Project in Ghana demonstrates promising early results in maternal and newborn health, which are buttressed by the findings of this study. The Fives Alive Project assisted community-level workers in brainstorming, implementing, and measuring solutions to implementation challenges, which allowed for community-driven, locally-appropriate solutions to problems like labor notification (PFA 2010). In Ethiopia, variation in delivery care provision across vCHWs and HEWs highlights the importance of using a quality improvement strategy, like the framework used by the Fives Alive Project. Some HEWs and vCHWs are having greater success in reaching homes for labor and delivery, and the local knowledge of these positive deviants should considered when developing solutions for other HEWs and vCHWs. Furthermore, Ethiopia is incredibly diverse culturally, and formative research reveals variation in birth practices between regions (Hadley 2010). This variation suggests that scaling up one particular intervention package nationwide would not be effective. However, using of a quality improvement framework so that *kebeles* can tailor strategies (for labor notification, referral, etc.) to insure community acceptability and uptake of services will likely result in significant and sustainable improvements in maternal and newborn health.

New Findings

Publications on the Health Extension Program have largely focused on program implementation indicators (i.e. number of workers trained, number of health posts built) rather than service implementation (i.e. deliveries attended). As most HEWs have been trained and most health posts have been built, now is the appropriate time to focus monitoring efforts on the coverage and quality of services provided by HEWs so that challenges related to service implementation can be addressed. This is one of the first studies to examine service provision within the HEP, and reveals that HEWs and vCHWs in Amhara region, Ethiopia face numerous challenges in meeting their job requirements with regards to maternal and newborn health. These challenges include competing health and household responsibilities, limited interaction with TBAs, and importantly, a severe lack of perceived self-efficacy with regards to attending childbirth. Childbirth is a complicated endeavor, and it is not surprising that individuals with predominantly theoretical health training for one year (HEWs) or less (vCHWs) do not feel equipped to attend delivery.

The job description of HEWs includes a family health package comprised of maternal and child health, family planning, immunization, adolescent reproductive health, and nutrition. All HEWs interviewed for this study discussed providing immunization and family planning services, while some HEWs mentioned nutritional counseling as part of antenatal care provision. **Figure 4.1** from the qualitative results section illustrates that key services in the maternal and child health package (antenatal care, antenatal counseling, and postpartum counseling) were mentioned by HEWs less frequently than other

responsibilities. Additionally, this study reveals one particularly unsettling discovery: the services that most directly impact maternal health, providing delivery service and immediate postpartum check-up (where misoprostol would be administered), were rarely mentioned by HEWs at all. Furthermore, HEW priorities directly impact the priorities of vCHWs further deemphasizing maternal and newborn care.

Figure 4.1 Descriptions of Health Extension Worker tasks, Amhara region, Ethiopia

Common	**Less Common**	**Rare**
• Immunization • Family planning • Bednet distribution • Hygiene and sanitation promotion	• Antenatal care • Antenatal counseling • Postpartum counseling	• Delivery Service • Postpartum Check up

All CHWs described a strong desire to improve maternal and newborn health in their communities, yet, both qualitative and quantitative findings confirm that many HEWs and some vCHWs were not meeting their job requirements with regards to maternal and child health. Delivery in particular was described as a very daunting task by CHWs, and very few interviewed CHWs felt competent to attend a delivery as part of their health role. It is vital to support HEWs and vCHWs in their desire to improve maternal and newborn health by determining strategies that make it possible for CHWs to meet their job requirements.

Bandura's theory of self-efficacy and the words of the CHWs themselves provide insight on how to better prepare CHWs to attend delivery. Experience as a source of efficacy was a strikingly common theme from the qualitative analysis. Particularly among HEWs, reported experience with delivery was associated with reporting delivery as part of their day-to-day responsibilities. The inverse (HEWs without experience were unlikely to attend delivery) was also true. CHWs who did not provide delivery often expressed concern for their practical skill set with statements like the following, "I have the knowledge but not the practical experience to attend delivery."

Bandura provides a theoretical explanation for what many CHWs described: that experiential learning is critical to perceived efficacy. Bandura's theory of self-efficacy (1977) demonstrates that performance accomplishments, in which the individual attempts to complete an action (for example, delivering a baby), are the strongest source of efficacy expectations. With theoretical training alone, few CHWs have the opportunity to attempt delivery, which negatively impacts their self-efficacy with regards to providing delivery service. Indeed, it is hard to imagine talent in a skill that is never practiced. Furthermore, as men and young women who rarely interact with TBAs, some CHWs have little experience observing delivery, which further limits their ability to produce efficacy expectations through vicarious experience. When CHWs do encounter a laboring woman by accident, they are likely to have heightened emotional arousal (due to the unfamiliarity of the situation), which will negatively impact self-efficacy. **Figure 5.1** breaks down sources of efficacy expectations and applies them to the Family Health Package within the HEP training program. This shows that of the

four sources of efficacy, most HEWs were exposed only to verbal persuasion, which is the weakest form of efficacy expectations.

Figure 5.1: Bandura's Theory of Self Efficacy applied to Family Health Package

Source	**Modes of Induction**	**HEP Training**
Performance accomplishments	• Participant modeling • Performance desensitization • Performance exposure • Self-instructed performance	No No No No
Vicarious experience	• Live modeling • Symbolic modeling	No No
Verbal persuasion	• Suggestion • Exhortation • Self-instruction • Interpretive treatments	Yes Yes No Yes
Emotional arousal	• Attribution • Relaxation, biofeedback • Symbolic desensitization • Symbolic exposure	No No No No

Notably, both qualitative and quantitative findings reveal self-efficacy to be strongly associated with delivery service provision. Health workers who reported "being able to attend a delivery alone" in the baseline survey were very

likely to report providing delivery services in the community. Unfortunately, the established year long training curriculum is not cutting it; it is not building the self-efficacy many HEWs need in order to prioritize attending delivery amidst other responsibilities. This study sheds light on alternative strategies that may increase self-efficacy for delivery service provision among HEWs and also among vCHWs, maximizing the potential benefits of the HEP for mothers and newborns.

Public Health Recommendations

Training

This study reveals a gap in evidence-based training for community health workers. Though undeniably community health worker training (even theoretical training alone) results in health benefits for mothers and newborns, little is known about how maximize these health benefits mothers and newborns. There is an incredible buzz around the health benefits of CHW training programs, yet methods to increase the efficiency of training are unknown. Given the strong association between practical experience, self-efficacy, and delivery service provision, this study highlights the need to investigate practical methods for giving community health workers practical experience with delivery as part of their training before they are expected to attend delivery alone. In the Ethiopia-specific context, HEWs have already undergone basic training, so it is too late to change the training requirements for this cohort, however, expanding opportunities to attend and observe delivery for new rounds of HEW recruits should be prioritized by the Federal Ministry of Health. Furthermore, agencies that provide supplemental HEW training including MaNHEP, UNICEF, JSI and

the FMOH (who provides integrated refresher trainings) should investigate and test methods to give HEWs delivery experience as part of their ongoing training.

Post-training strategies

Given that the basic foundation of the HEP, and the foundation of many other community health worker programs around the world, is already in place, investigation into innovative strategies (besides formal training) to provide experience with delivery is advisable. Such strategies could include coupling CHWs with specific pregnant women during the antenatal period, or having CHWs escort laboring women who want an institutional delivery to the health center (so CHWs can observe and assist with the delivery). The maternity hospital teaching system in Ethiopia is heavily overburdened with nurses and medical students, making it advisable to develop community strategies to expose CHWs to delivery (Sibley 2010, personal communication). Additionally, community experience with delivery mirrors the delivery conditions CHWs will face, which will further promote efficacy.

The Fives Alive Project in Ghana promotes experience with delivery by increasing demand for delivery services; however such strategy is unlikely to be effective in the Ethiopian context. Community health workers in Ghana are typically nurses and midwives who possess higher levels of training than HEWs, and as a result are these workers are more likely to attend delivery successfully. Increasing demand for delivery services in an Ethiopian context before building the practical skill set of community level health workers is risky. As Bandura warns, self-efficacy will be greatly harmed if health workers to have a negative

birth outcome early in learning process. Furthermore, the community perception of health workers as birth attendants will be severely damaged by early failures. The skill level of community-based human resources in Ethiopia merits an approach that builds experience with delivery in a low risk environment (where back up support is available). Only when community health workers are competent and confident in their abilities should demand for community delivery services be generated.

Involvement of TBAs

While the MaNHEP intervention readily incorporates TBAs into project dialogue and training, there has been minimal focus on behalf of the Federal Ministry of Health on incorporating TBAs into the Health Extension Program. vCHWs, on the other hand, are systematically incorporated into the HEP. In fact, vCHWs are commonly cited as the right hands of HEWs, with vCHWs working side-by-side HEWs and assisting HEWs in meeting *kebele* objectives. It is important that protocol (like the protocol for working with vCHWs) is developed, citing systematic ways HEWs should include TBAs in community dialogue and service provision. Working with TBAs is invaluable in restructuring normative delivery practices and building the credibility of HEWs and vCHWs as trusted providers, as the beliefs of TBAs shape the beliefs and practices of mothers in the community.

Quality improvement frameworks

Health workers can most directly impact maternal and newborn health by being preset at the time of delivery or the immediate postpartum period; however getting health workers into the home for delivery or after birth for a

postpartum check up is undeniably challenging. HEWs and vCHWs are often mobile, traveling from house-to-house, which makes their location unreliable. Furthermore, the lack of interaction between TBAs and other health workers means that HEW and vCHWs are not learning from the established labor notification mechanism used by TBAs. As illustrated by the Fives Alive Project in Ghana, a quality improvement framework is extremely successful for resolving such service delivery challenges by relying on local knowledge and the successes of positive deviants. In addition to labor and birth notification, a quality improvement framework can be utilized to address strategies for increasing HEW and vCHW experience with delivery and for determining methods for incorporating TBAs into the Health Extension Program. In rural Ethiopia, the ingenuity of local health workers is a largely underutilized problem-solving resource, a resource that must be employed in order to improve the delivery of key maternal and newborn health services.

Conclusion

Though the Health Extension Program has been widely implemented throughout Ethiopia, qualitative and quantitative data from Amhara region reveal that HEWs and vCHWs are not maximizing the potential health benefits for mothers and newborns. Community health workers are not consistently present during delivery and the immediate postpartum period, when the risk of negative outcomes for mothers and newborns is highest. Inexperience with delivery was the foremost factor detracting from health workers' self-efficacy and their prioritization of delivery services. As the momentum surrounding community health worker programs continues to grow, it is vital to document evidence-based training practices that build self-efficacy, as well as innovative methods for service provision. By applying a quality improvement framework to the Health Extension Program, evidence will emerge on successful strategies for preparing community health workers to attend delivery and for overcoming barriers to service provision. These lessons can be shared with a broader audience, building the evidence base for the wider implementation of community-based maternal and newborn health programs.

Works Cited

AbouZahr, C. (2003). "Safe motherhood: a brief history of the global movement 1947-2002." Br Med Bull **67**: 13-25.

Afework, M. (2010). "Achieving the Maternal Health Millenium Development Goals in Ethiopia: Where are we and what needs to be done?" Ethiopian Journal of Health and Development **24**(Special Issue 1): 87-88.

Ahmed, Y., P. Mwaba, et al. (2010). "Community-based interventions to reduce maternal mortality." Lancet **375**(9713): 457-458; author reply 458-459.

Argaw, H. (2007). The Health Extension Program (HEP of Ethiopia): Summary of Concepts, Progress, Achievments and Challenges. Addis Ababa, WHO Ethiopia Country Office**:** 1-16.

Bandura, A. (1977). "Self-efficacy: toward a unifying theory of behavioral change." Psychol Rev **84**(2): 191-215.

Bandura, A. (1995). "Self-Efficacy in Changing Societies." Cambridge University Press Cambridge, UK.

Bandura, A. (1997). "Self-Efficacy: The Excercise in Control." Worth Publishers; 1st edition.

Bhutta, Z. A., M. Chopra, et al. (2010). "Countdown to 2015 decade report (2000-10): taking stock of maternal, newborn, and child survival." Lancet **375**(9730): 2032-2044.

Bhutta, Z. A., S. Soofi, et al. (2011). "Improvement of perinatal and newborn care in rural Pakistan through community-based strategies: a cluster-randomised effectiveness trial." Lancet **377**(9763): 403-412.

CIA. (2010). "The World Factbook." Retrieved January 5, 2011, from https://www.cia.gov/library/publications/the-world-factbook/geos/et.html.

Darmstadt, G. L., Z. A. Bhutta, et al. (2005). "Evidence-based, cost-effective interventions: how many newborn babies can we save?" Lancet **365**(9463): 977-988.

Darmstadt, G. L., A. C. Lee, et al. (2009). "60 Million non-facility births: who can deliver in community settings to reduce intrapartum-related deaths?" Int J Gynaecol Obstet **107 Suppl 1**: S89-112.

FMOH (2006). Report on the Safe Motherhood Community-Based Survey. Addis Ababa, Ethiopia, Family Health Department.

Girma, S., A. Yohannes, et al. (2007). "Human Resource Development for Health in Ethiopia: Challenges of Achieving the Millennium Development Goals." Ethiopian Journal of Health and Development **21**(3): 216-231.

Gogia, S. and H. S. Sachdev (2010). "Home visits by community health workers to prevent neonatal deaths in developing countries: a systematic review." Bull World Health Organ **88**(9): 658-666B.

Hadley, C., Handley A, Stevenson J. (2010). Report on Maternal and Newborn Health in Ethiopia Partnership (MaNHEP) Formative Research. Atlanta, GA, Emory University**:** 1-27.

Haines, A., D. Sanders, et al. (2007). "Achieving child survival goals: potential contribution of community health workers." Lancet **369**(9579): 2121-2131.

Health, E. F. M. o. (2006). Report on the Safe Motherhood Community-Based Survey. Addis Ababa, Ethiopia, Family Health Department.

Hodgins, S., R. McPherson, et al. (2010). "Testing a scalable community-based approach to improve maternal and neonatal health in rural Nepal." J Perinatol **30**(6): 388-395.

IHI (2010). "Dramatic improvemetn in provision of neonatal health care in Ghana increase the prospects for reducing child mortality ".

Janowitz, B., Bailey P, Dominik RC, Araujo L. (1988). "TBAs in Northeast Brazil: referral patterns and perinatal mortality." Health Policy Plan **3**(1): 27-41.

Jokhio, A. H., H. R. Winter, et al. (2005). "An intervention involving traditional birth attendants and perinatal and maternal mortality in Pakistan." N Engl J Med **352**(20): 2091-2099.

Kane, S. S., B. Gerretsen, et al. (2010). "A realist synthesis of randomised control trials involving use of community health workers for delivering child health interventions in low and middle income countries." BMC Health Serv Res **10**: 286.

Khan, K. S., D. Wojdyla, et al. (2006). "WHO analysis of causes of maternal death: a systematic review." Lancet **367**(9516): 1066-1074.

Koblinsky, M., Frances Tain, Asheber Gaym, Ali Karim, Mary Carnell, Solomon Tesfaye (2010). "Responding to the maternal health care challenge: The Ethiopian Health Extension Program." Ethiopian Journal of Health and Development **24**(Special Issue 1): 105-109.

L10K (2009). The Last Ten Kilometers Project Baseline Household Health Survey: Amhara, Oromiya, SNNP, and TIgray. Addis Ababa, Ethiopia.

Lassi, Z. S., B. A. Haider, et al. (2010). "Community-based intervention packages for reducing maternal and neonatal morbidity and mortality and improving neonatal outcomes." Cochrane Database Syst Rev **11**: CD007754.

Lawn, J. E., M. Kinney, et al. (2009). "Reducing intrapartum-related deaths and disability: can the health system deliver?" Int J Gynaecol Obstet **107 Suppl 1**: S123-140, S140-122.

Macro, C. S. A. E. a. O. (2001). Ethiopian Demographic and Health Survey 2000. Addis Ababa, Ethiopia and Calverton, Maryland, USA, Central Stastical Authority and ORC Macro.

Macro, C. S. A. E. a. O. (2006). Ethiopia Demographic and Health Survey 2005. Addis Ababa, Ethiopia and Calverton, Maryland USA, Central Statistical Agency and ORC Macro.

Maine, D. and A. Rosenfield (1999). "The Safe Motherhood Initiative: why has it stalled?" Am J Public Health **89**(4): 480-482.

MaNHEP. (2010). "Maternal and Newborn Health in Ethiopia Partnership." Retrieved November 14, 2010, from http://www.nursing.emory.edu/manhep/index.html.

Messelech, A. (2009). All Roads Lead to Healh Extension Program. National Workshop on Addressing Community Maternal & Neonatal Health in Ethiopia. Addis Ababa, Ethiopia.

Mobeen, N., J. Durocher, et al. (2011). "Administration of misoprostol by trained traditional birth attendants to prevent postpartum haemorrhage in homebirths in Pakistan: a randomised placebo-controlled trial." BJOG **118**(3): 353-361.

Montagu, D., G. Yamey, et al. (2011). "Where do poor women in developing countries give birth? A multi-country analysis of demographic and health survey data." PLoS One **6**(2): e17155.

Olsen, P. (2010). "Maternal and Newborn Health in Ethiopia Partnership." Retrieved November 14, 2010, from http://www.nursing.emory.edu/manhep/index.html.

Pagel, C., S. Lewycka, et al. (2009). "Estimation of potential effects of improved community-based drug provision, to augment health-facility strengthening, on maternal mortality due to post-partum haemorrhage and sepsis in sub-Saharan Africa: an equity-effectiveness model." Lancet **374**(9699): 1441-1448.

Paxton, A., D. Maine, et al. (2005). "The evidence for emergency obstetric care." Int J Gynaecol Obstet **88**(2): 181-193.

PFA (2010). "Improvement Collaboration Report: April 1, 2010 to July 31, 2010."

Sibley, L. and T. Ann Sipe (2004). "What can a meta-analysis tell us about traditional birth attendant training and pregnancy outcomes?" Midwifery **20**(1): 51-60.

Sibley, L., S. T. Buffington, et al. (2004). "The American College of Nurse-Midwives' home-based lifesaving skills program: a review of the Ethiopia field test." J Midwifery Womens Health **49**(4): 320-328.

Sibley, L., S. T. Buffington, et al. (2006). "Home-Based Life Saving Skills in Ethiopia: an update on the second phase of field testing." J Midwifery Womens Health **51**(4): 284-291.

Stephenson, R., M. Dynes, et al. (2010). Report on the Baseline Findings on the Maternal and Newborn Health in Ethiopia Partnership. Atlanta, GA, Emory University.

Studies, E. S. o. P. (2008). Gender Inequality and Women's Empowerment. Addis Ababa, Ethiopia, UNFPA.

Sutherland, T., C. Meyer, et al. (2010). "Community-based distribution of misoprostol for treatment or prevention of postpartum hemorrhage: cost-effectiveness, mortality, and morbidity reduction analysis." Int J Gynaecol Obstet **108**(3): 289-294.

Tesfaye, S. (2010). "A National Scoping Exercise adn Strategic Recommendations for Working with Individuals, Families and Communities to improve Maternal and Neonatal Health in Ethiopia." Ethiopian Journal of Health and Development **24**(Special Issue 1): 98-91.

Viswanathan, M., J. Kraschnewski, et al. (2009). "Outcomes of community health worker interventions." Evid Rep Technol Assess (Full Rep)(181): 1-144, A141-142, B141-114, passim.

Wakabi, W. (2008). "Extension workers drive Ethiopia's primary health care." Lancet **372**(9642): 880.

Wamai, R. (2009). "Reviewing Ethiopia's Health System Development." JMAJ **52**(4): 279-286.

WHO (2004). "Beyond the numbers: Reviewing maternal deaths adn complications to make pregnancy safer. Geneva."

Wondwosen, M., B. Amare, et al. (2004). Report of the Baseline Needs Assessment for Performance Improvement, Amhara Region, Essential Services for Health in Ethiopia Project (EHSE II).