

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:

Jacqueline Michelle Cutts

Date

Safe Mothers, Safe Babies:

**Incorporating community-based and facility-based approaches
to improve maternal and perinatal health by reducing the three delays
among rural populations in East Central Region, Uganda**

By

Jacqueline Michelle Cutts
Master of Public Health

Global Health

Fauzia Malik, MSc
Committee Chair

Roger Rochat, MD
Committee Member

Safe Mothers, Safe Babies:

**Incorporating community-based and facility-based approaches
to improve maternal and perinatal health by reducing the three delays
among rural populations in East Central Region, Uganda**

By

Jacqueline Michelle Cutts

Bachelor of Arts

Vassar College

2009

Thesis Committee Chair: Fauzia Malik, 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

2014

Abstract

Safe Mothers, Safe Babies:

Incorporating community-based and facility-based approaches to improve maternal and perinatal health by reducing the three delays among rural populations in East Central Region, Uganda

By: Jacqueline Cutts

Background: Too little progress has been made in reducing maternal and perinatal mortality in Uganda since 2000, partly resulting from poor utilization of maternal healthcare services and poor facility infrastructure. Safe Mothers, Safe Babies (SAFE) addresses these deficiencies through an integrated intervention package targeting the three delays [1], including: (1) increasing demand through participatory educational outreach with community groups; (2) improving access through motorcycle ambulances and personal savings programs; and (3) using innovative low-cost technology to improve quality of care through strengthening facility infrastructure, commodities, and medical training.

Objective: To evaluate whether Safe Mothers, Safe Babies' approach has improved utilization of delivery care in target health facilities.

Data and Methods: We conducted a cross-sectional quantitative and qualitative evaluation through: secondary health data from 4 intervention and 3 control facilities assessing change in the number of monthly health center deliveries and distribution of types of obstetric emergency and related maternal referrals; qualitative data from 49 key informant interviews assessing program quality; a photovoice project conducted by program beneficiaries assessing community views; and six months of field notes from observing obstetric care in 14 facilities.

Results: Key findings included: (1) Intervention facilities experienced a 40.63% average increase in health center deliveries 24 months after the intervention package, which three control facilities did not experience ($t(5)=-2.8$, $p=0.038$). This was confirmed by results from key informant interviews, which reported increased utilization of healthcare services in addition to satisfaction with all three delay projects. (2) Third delay projects have program deficiencies, primarily related to poor health facility capacity to provide emergency obstetric care, and community groups need more skills and resources to reach more people.

Discussion and Implications for Public Health: The intervention package has effectively improved the utilization of delivery care in target health facilities by addressing the three delays. This demonstrates a successful way that the three delays model can be united with community-based and facility-based approaches to improve maternal and child health, both in Uganda and potentially elsewhere. To improve the approach, SAFE must focus on increasing third delay projects and community group capacity.

**Safe Mothers, Safe Babies:
Incorporating community-based and facility-based approaches
to improve maternal and perinatal health by reducing the three delays
among rural populations in East Central Region, Uganda**

By

Jacqueline Michelle Cutts

Bachelor of Arts
Vassar College
2009

Thesis Committee Chair: Fauzia Malik, 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
2014

Acknowledgements

My work with Safe Mothers, Safe Babies has shaped who I am as a person and has been both a source of great satisfaction and immense sacrifice. As such, there are many people who I would like to thank, not only for their help in producing this thesis but also for their support in making the work that underlies it possible.

First, to my thesis committee, Fauzia Malik, MSc and Roger Rochat, MD, thank you for your extraordinary investments of time, skills, mentorship, and encouragement. Your guidance and feedback not only helped me produce a work of which I am proud, but also skills that I will use for the rest of my life. I also express my sincere gratitude for those who made this work financially possible. Thank you to the Rollins School of Public Health Dean's Council and Vassar College's Mary Pemberton Nourse Fellowship for their support of my education and fieldwork. Thank you also to the Global Field Experience Fund and the Boozer Noether Fund for facilitating my fieldwork in the summer of 2013. As a wife and a mother whose husband is in medical school, your support truly made a huge impact in my ability to undertake this endeavor.

Next, to my team at Safe Mothers, Safe Babies—thank you for the countless hours you put into serving with SAFE. I would like to thank the SAFE interns who helped in data collection: Serena Rodriguez, Katie Morrison, Corrinne Sanger, Anna Carey, and Caryn Turner. I would also like to thank SAFE's Board of Directors for their years of service to help SAFE grow into the organization it is today. Furthermore, thank you to Stephanie Hackett, MPH, PA-C, MMSc, SAFE's International Operations Director, for your technical knowledge, interpersonal skills, and extraordinary dedication that make a huge difference to the quality of our work and its success. Thank you to Mukalu Mohamed, SAFE's Program Manager, for helping to run SAFE's programs since its inception and for help in collecting data. And thank you to SAFE's partner community groups and their leaders. Your contributions of time and resources are incredible and awe-inspiring; I am grateful to be your partner in the cause of improving maternal and child health in the East Central Region of Uganda.

Last, but not least, I would like to extend my gratitude to my family for their love and support. To my father and mother, Ken and Susan Law, thank you for always encouraging me to follow my dreams no matter how crazy they seemed to anyone else. Thank you for allowing me to go to Uganda in the first place, for supporting my work with Safe Mothers, Safe Babies and my studies at Rollins, and, mom, for helping care for my children for eight months while I worked on my thesis. Finally, to my loving husband, Richard, and children, Jacob and Isabelle, thank you for putting up with all the sacrifice that this work has required of all of us. Thank you for letting me contribute the countless hours, listening to me talk about it every day, and supporting my education in general. I love you with all of my heart, and can't begin to express how being your wife and mother has helped me become the best student, professional, and person I can be.

Table of Contents

Chapter One: Introduction	1
Objective:	2
Aims:	2
Research Question:.....	2
Background	3
History of Safe Mothers, Safe Babies	3
Current Status of Safe Mothers, Safe Babies	6
Context: East Central Region	13
Chapter Two: Literature Review	20
The Three Delays Model.....	20
Engaging Communities: Community-Based Participatory Action Methods	22
CBPAR in Maternal and Child Health	24
The Gap: The Need for an Integrated Approach.....	26
Chapter Three: Methods and Results	32
Methods: Secondary Health Data.....	32
Methods: Key Informant Interviews	35
Methods: Photovoice Project	36
Methods: Maternal Health Facility and Care Observations	38
Results Aim 1: Utilization of Maternal Health Services for Delivery	39
Theme: Utilization of health services is thought to have increased	40
Theme: Utilization would improve further if groups expanded	41
Results Aim 2: Evaluate SAFE’s Impact on each of the Three Delays.	42
Theme: SAFE effectively targets the first delay	43
Theme: SAFE second delay work is effective and well-received	43
Theme: SAFE third delay interventions are biggest success and biggest challenge	45
Observed impact and deficiencies in third delay interventions	47
Results Aim 3: Strengths and Weaknesses of the Approach	60
Theme: Maternal health is personal.....	61
Theme: SAFE’s approach is unique	62

Theme: SAFE work empowers women.....	63
Theme: Involving men is essential for SAFE’s approach to work.....	64
Theme: Definitions of maternal and child health vary widely	65
Theme: Community perceptions of MCH problems vary widely	66
Chapter Four: Discussion, Conclusion and Recommendations	86
Discussion	86
Facilitating Community-Led Change to Impact First Delay Barriers	86
A Sustainable Way to Address Second Delay Barriers	87
An Important and Underemphasized Priority: Third Delay Projects	88
The Need for Increased Capacity of Community Groups	90
Limitations	90
Conclusion and Recommendations	91
References.....	94

List of Figures

Figure 1.1: SAFE's Conceptual Framework.....	7
Figure 1.2: SAFE's Results Framework, 2011-2014.....	8
Figure 1.3: The Safe Mothers, Safe Babies Process	9
Figure 1.4: SAFE Projects by Objective.....	13
Figure 1.5: Map of Uganda showing SAFE intervention areas	14
Figure 2.1: The Three Delays Model.....	20
Figure 3.1: Primary Reason for Referral among Cases of Obstetric Complication that were Referred in East Central Region, Uganda	49

List of Tables

Table 1.1: Summary of Uganda health care system	18
Table 1.2: Allocation of functional health facilities in the East Central Region	19
Table 3.1: Frequencies of key informant interview themes under Aim 1	40
Table 3.2: Frequencies of key informant interview themes under Aim 2	42
Table 3.3: Select sociodemographic and medical history characteristics in cases of complicated pregnancy among seven health facilities in the East Central Region of Uganda over a 16 month period	48
Table 3.4: Percentage of each type of obstetric complication that was referred, overall and by intervention status, among cases of obstetric complication in seven health facilities in the East Central Region of Uganda over a 16 month period.....	50
Table 3.5: Signal Function scores for 12 health facilities located in the East Central Region, September 2012 through July 2013	51
Table 3.6: Frequencies of key informant interview themes under Aim 3	61

Definition of Terms

ANC:	Antenatal Care
CBPAR:	Community-Based Participatory Action Research
DHS:	Demographic and Health Survey
EmOC:	Emergency Obstetric Care
HC:	Health Center
Maternal death:	WHO definition: “Death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes” [2]
Maternal mortality ratio:	DHS definition: “The ratio of the number of maternal deaths per 100,000 live births.” [3]
MCH:	Maternal and Child Health
Perinatal death/mortality:	DHS definition: “Pregnancy losses occurring after seven months completed gestation (stillbirths) plus deaths to live births within the first seven days of life (early neonatal deaths).” [4]
Perinatal mortality ratio:	The ratio of the number of perinatal deaths per 1,000 live births.
SAFE:	Safe Mothers, Safe Babies
TBA:	Traditional Birth Attendant
UN:	United Nations
VHT:	Village Health Team
WHO:	World Health Organization

Chapter One: Introduction

Maternal and perinatal health in Uganda is in urgent need of improvement. At the national level, the maternal mortality ratio of 438 maternal deaths/100,000 live births [4] has seen little change since 2000 when it was estimated at 504 deaths/100,000 live births [5]¹. For every woman who dies during childbirth, an additional 20-30 are gravely injured in the process [6] [7]. Moreover, the perinatal mortality rate, which is a direct function of maternal health, was 42.6 deaths/1,000 pregnancies of 7 months of more gestation in 2000 [5], and was 40 deaths/1,000 pregnancies in 2011 [4]. These statistics correspond to between 4,800 and 6,000 maternal deaths, more than 39,000 neonatal deaths, and between 96,000 and 180,000 maternal injuries annually. Women face a lifetime risk of maternal mortality of 1 in 35². This reality persists despite almost 90% of these conditions being preventable [8]. Two primary causes are poor utilization of maternal healthcare services, and poor healthcare infrastructure. Only 58% of births take place with a skilled provider [4], and that care is often lacking in quality [9].

One nonprofit organization, Safe Mothers, Safe Babies (SAFE)—which this thesis' author founded and has been leading for five years—has been addressing these conditions in the East Central Region of Uganda by addressing the “three delays.” The three delays model was developed in 1994 by Thaddeus and Maine as a way to conceptualize underlying contributors to maternal mortality [1]. The delays include: (1) a delay in recognizing the need to seek care and making the decision to seek care, (2) a delay in physically accessing a health facility, and (3) a delay in receiving appropriate care once in a health facility.

In 2011, SAFE refined its model to address all three delays in four health facilities and their catchment areas in the East Central Region. The approach focuses on pairing community-based participatory methods with health facility strengthening to improve access to, and utilization of, delivery services. The intervention package includes: (1) increasing demand through community-led participatory educational outreach; (2) improving access to health facilities through motorcycle ambulances and personal savings programs; and (3) improving

¹ There is one very recent notable exception to this lack of improvement in maternal and perinatal mortality. A study called “Saving Mothers, Giving Life”, funded by the CDC, USAID, and other partners utilized an integrated model incorporating facility improvements, maternal referral, and an improved supply chain to reduce maternal mortality by 30% in one year among 4 districts of Southwestern Uganda [50].

² The 2011 Uganda Demographic and Health Survey estimated the lifetime risk of maternal death to be 0.029, which translates to 1 in 35. This differs from the Maternal Mortality Estimation Inter-Agency Group (MMEIG) estimate of 1 in 49, but is presented here because it was a function of a nationally representative survey, which MMEIG estimates are not.

quality of care by strengthening facility infrastructure, commodities, and training of healthcare workers with emphasis on using innovative, low-cost technology.

Although the organization (under the direction of the thesis' author) conducted both quantitative and qualitative monitoring and evaluation activities in 2012 and 2013, none of the data has been analyzed and collectively utilized before to evaluate or refine SAFE's model.

Objective:

This thesis aimed to evaluate whether Safe Mothers, Safe Babies' approach has improved the utilization of delivery care in target health facilities in the East Central Region of Uganda.

Aims:

- Evaluate SAFE's impact on the utilization of facility-based maternal health services in its target health facilities in the East Central Region, Uganda.
- Evaluate program beneficiary's satisfaction with the quality of each of the intervention's components.
- Identify strengths and weaknesses of SAFE's approach, and make recommendations to improve the program and potentially facilitate future scale-up.

Research Question:

Can an integrated approach of both community-based and health systems strengthening initiatives address all three types of three delay barriers to improve maternal health care-seeking practices during delivery?

Chapter 1 provides an overview of the history, philosophy, and programs of Safe Mothers, Safe Babies. Chapter 2 reviews the literature surrounding the three delays model, community-based participatory methods, the need for integrated approaches, and the need to apply integrated CBPAR and facility-based interventions to the three delays model. Chapters 3 and 4 report the methods and findings; followed by a discussion of its implications for both the organization and the state of maternal and child health generally.

Background

History of Safe Mothers, Safe Babies

Safe Mothers, Safe Babies was officially founded in 2009 following its evolution from a college-based initiative called the “Vassar Uganda Project.” This evolution came after the thesis author had two distinct but simultaneous experiences in Uganda in January 2009 that conveyed the importance of community-based approaches and the urgent need for improving maternal and child health (MCH). They are detailed below through two excerpts of personal writings, which explain how SAFE originated and how that history influences the organization’s work.

As I entered the Iganga District Hospital Maternity Ward on January 9th, 2009, three women experiencing complicated labors followed me through the door. Shortly thereafter, all three were scheduled for emergency cesarean sections. As a collegiate Emergency Medical Technician from Vassar College, I was leading my third medical volunteer trip to Uganda and was at the hospital to perform an obstetric emergency capacity assessment. I hadn’t intended to be providing medical care, but one woman, only 19, had nobody to support her; so I put down my clipboard and did my best to monitor her condition, hold her hand, and reassure her that the doctor would arrive soon. But more and more time passed. It was 9:30 PM before a doctor finally arrived, at which point the nurses had gone home. I was thus asked to be in the operating room to care for the babies of all three women after they were delivered.

Three times I watched baby boys make their way into the world, and three times the babies that emerged were limp, blue, and lifeless. I performed CPR on each infant, hoping and praying that he would breathe. Never had I worked harder to accomplish anything. Never had I wanted something so badly. And some of the best noises I’ve ever heard were the first cries those three infants wailed.

Given my life-long passion for maternal and child health, I knew before working in Iganga that, world-wide (in 2009), 530,000 women and 4,000,000 babies died annually from complications of pregnancy and childbirth. But that night at the Iganga District Hospital, I saw the human faces of statistics. In addition to what I experienced in the operating theater, I looked around the hospital and saw thousands of patients lining the beds, floors, and halls. I talked with patients and the very few providers available to care for them. I saw a baby die from pneumonia because he aspirated fluids during a home birth and his parents didn’t recognize that a problem existed for 2 full days. I watched a woman die from blood loss following an 11-day trip to the hospital given her inability to pay \$10 for transport. I watched a woman suffering seizures from eclampsia be turned away from the hospital because her family couldn’t afford the gloves the physician

needed to perform a cesarean section. With each death, injury, and story, my heart broke. I realized then that the lack of a viable healthcare system—and its combination with unhealthy behaviors—isn't about statistics. It is about the people who suffer and die from preventable conditions, and the families, communities, and nations those deaths affect.

*It was through this experience that I came to evolve the “Vassar Uganda Project” (the college vacation-based initiative I had founded as a college junior) into a nonprofit organization called Safe Mothers, Safe Babies. At the time, my primary goal was to fill what I saw as a deadly gap in maternal healthcare—to work **with** people, not for them, to understand and solve maternal and child health problems in community-sustainable ways that engaged the communities the programs were designed to serve as partners, not just passive participants.*

--Jacqueline Cutts, personal essay, 2011

On September 6-8, 2000, 192 nations and numerous non-governmental, bilateral, and multilateral organizations gathered at the UN Headquarters in New York for the Millennium Summit. For these 3 days, we were inspired to action—leading to the development of the eight Millennium Development Goals, and a commitment by all in attendance to end poverty by 2015. It seemed like the world was finally calling for a true end to depravity and suffering, for the improvement of the human condition, and the empowerment of all people. The developed world vowed to write policy, designate resources, and implement programs that would counteract misogyny and inequality, and champion the cause for all people to enjoy health and well-being, respect and dignity. Yet, 11 years and billions of dollars later, poverty and ill health persist. Why—and what can be done to really bring about the “end of poverty”?

As expressed by Reverend John Patrick Kairu Kalamba, a community leader and personal friend living in rural Uganda, “When [development agents] come to “help”, they don't ask us. They think they know our problems from their books and internet and what-what, but they don't! They don't live here. They don't know us. So why would we listen to them?!”

“Reverend” went on to recount numerous examples of aid workers making the “big push” to end poverty in his community without consulting himself or other community members whose lives were to be affected. In one instance, an NGO built a water well—a “sustainable” solution which allowed a quick exit-strategy. Yet, community members didn't know the people who constructed the well, and assumed it was cursed. The well remained unused while dysentery and giardia continued to plague the local population.

In another example, UNICEF had distributed mosquito nets and provided some brief education about malaria prevention. The education was translated into the native language, and the nets were free, which eliminated the economic burden to the “poor villagers”. It was termed as a “sustainable” solution to address the leading cause of death in the developing world at the time. Yet, the villagers had their own beliefs about malaria and its origin, so the 30 minute lecture accompanying the net distribution, which included no discussion of local beliefs, did little to dispel cultural myths. The nets were soon being used for fishing, and becoming protectant fabric for crop nurseries.

In yet another example, a reproductive health organization promoted the use of family planning to reduce the high fertility rate and related level of maternal mortality. They embarked on an education campaign which included work with the women of Reverend’s village, teaching them how to use condoms and about the availability of NGO-provided contraceptives. They even had “a local” conduct the education to ensure that it was best received. Yet, Uganda is a patriarchal society, and without educating or consulting the women’s husbands, many women who utilized the contraceptives were later beaten for it or at a minimum forced to stop using the birth control. Having many children was a signal of wealth and power. Family planning education was useless without consulting the major stakeholders and decision-makers, i.e. the men, not just the women.

Examples like these abounded in my discussions with Reverend and others like him. It highlights what I feel to be one of the most significant problems contributing to the failures of the aid industry: that many development projects and priorities are created in a non-participatory process in which people living in poverty aren’t involved in creating, employing, and monitoring the policies and projects designed to benefit them. Initiatives often rely on Western conceptions of health and development that alienate intended recipients and disregard cultural perceptions. These interventions are underutilized, and sometimes make life worse. This contributes to further underutilization of other development projects in the future. Moreover, such programs frequently fail to address some of the key contributors to poor health and development, especially those that are rooted in local culture. Without being addressed, these issues continue being at odds with development priorities. This is particularly true for issues related to fertility, pregnancy, childbirth, and early child-rearing, as they are some of the most personal decisions that anyone will ever make or experience.

--Jacqueline Cutts, Personal Essay to HLF-4 Competition, December 1, 2011

As portrayed in these early writings, Safe Mothers, Safe Babies was initially founded with the purpose to improve maternal and newborn health in the Iganga District of Uganda. In its first two years, SAFE identified and addressed maternal health problems through an unstructured process of participatory discussion and decision-making with community members (community

being defined as a group of people living in a bounded geographical unit). Although fruitful in creating good relationships, this process would not permit easy replication and did not facilitate easy evaluations. As such, SAFE leadership refined the approach to be more systematic and inclusive of evidence-based, health systems based, and community-based methodologies.

Current Status of Safe Mothers, Safe Babies

Part of the process to become more integrated and systematic included the development and operationalizing of a strategic approach best summarized by SAFE's conceptual and results frameworks. As evidenced by Figure 1.1 on the following page, SAFE's conceptual framework incorporates three types of barriers:

- Those related to demand;
- Those related to access; and
- Those related to the infrastructure of health facilities.

The organization developed this framework after carefully considering diverse perspectives from partner community members and healthcare workers, and health system perspectives from the Uganda Demographic and Health Survey and other maternal/perinatal health research in the region. SAFE organized these perspectives under the tradition of the “three delays model,” which was developed by Thaddeus and Maine to conceptualize root causes of maternal mortality [1] (further explained in Chapter 2).

This conceptual framework is directly related to SAFE's results framework (Figure 1.2), which is used to guide problem exploration, project development and implementation, and monitoring and evaluation activities. The results framework is connected to the conceptual framework through color coding and clear delay connections. First delay barriers in both frameworks are shown in orange, second delay barriers in yellow, and third delays barriers in green. This consistency is meant to permit the organization to think through the marriage of community-based and facility-based interventions to address a multitude of barriers to maternal healthcare service utilization.

Figure 1.1: SAFE's Conceptual Framework of Maternal and Child Morbidity and Mortality Reduction

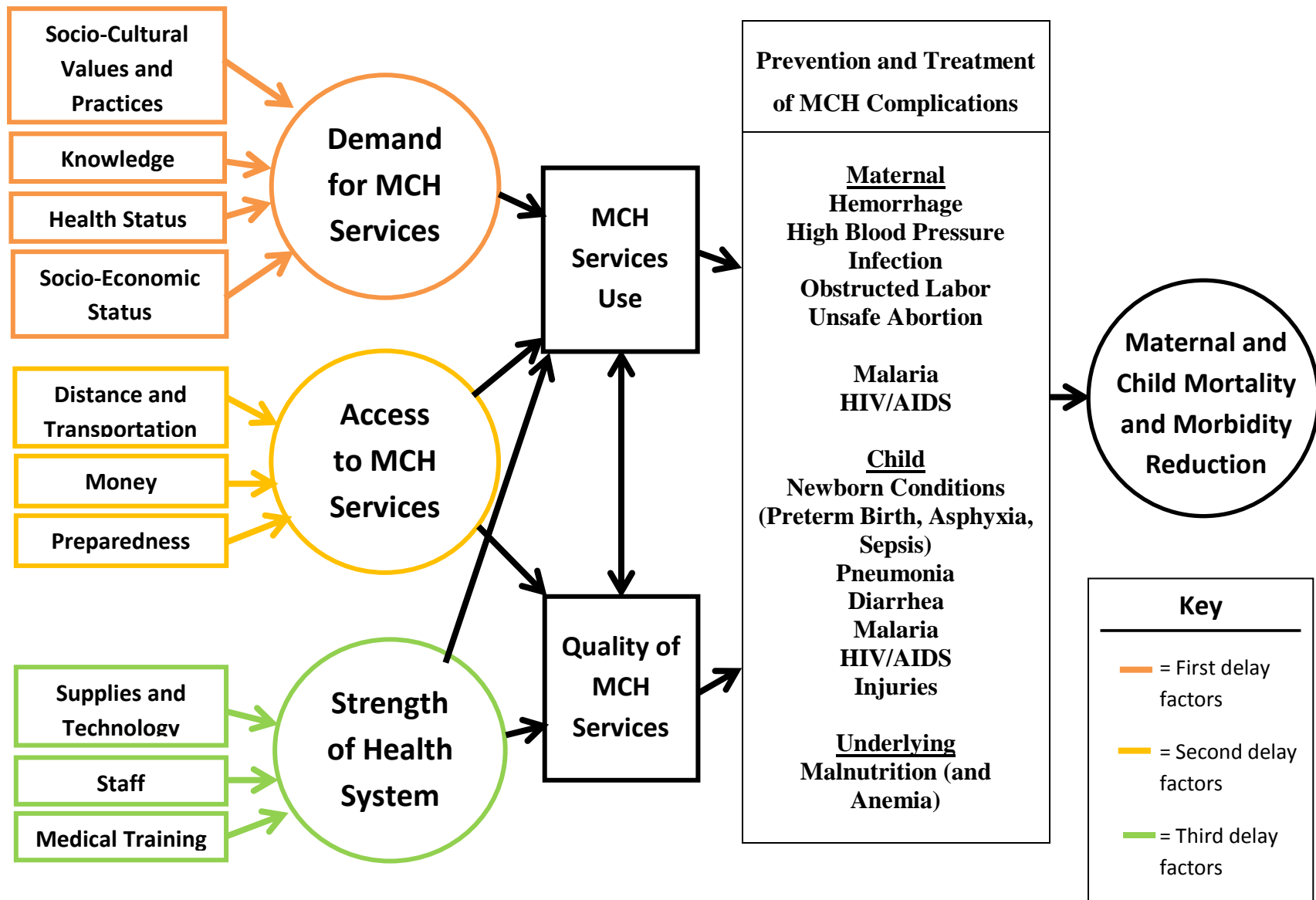
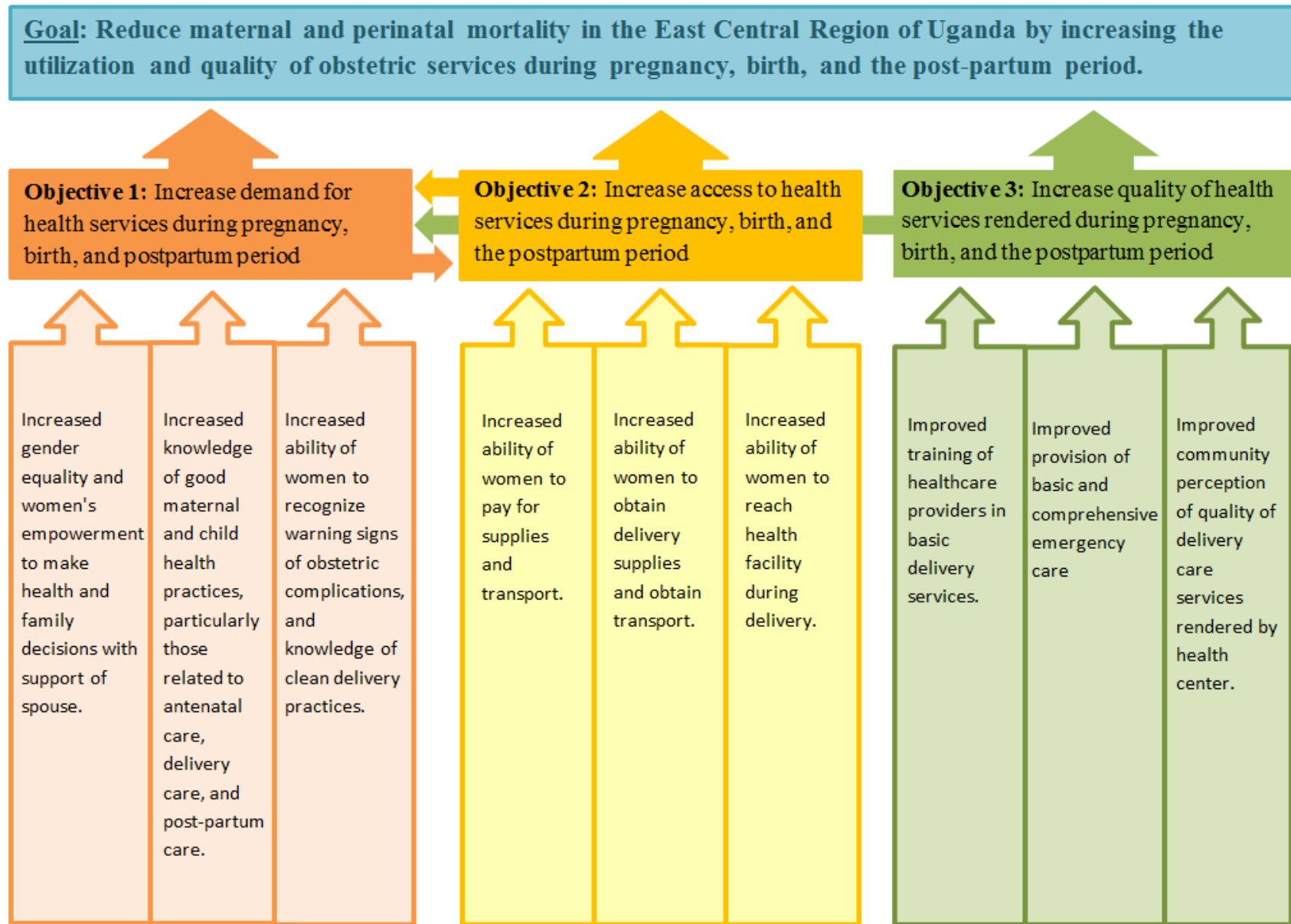
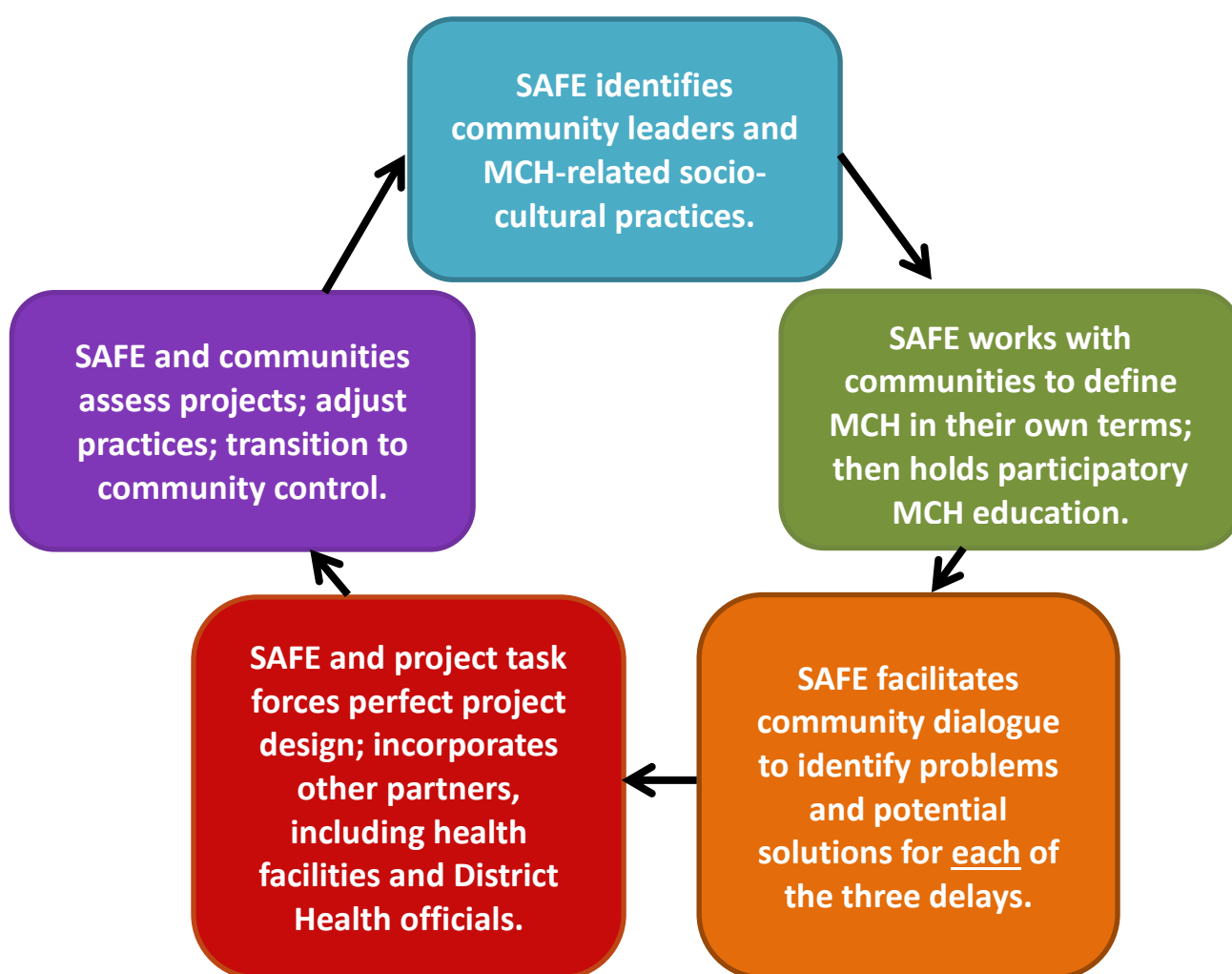


Figure 1.2: SAFE's Results Framework, 2011-2014



To operationalize the results framework, SAFE utilizes a semi-structured approach focused on community-driven change at both the community and health facility levels (Figure 1.3). SAFE staff identifies and engages with community leaders to understand the status of MCH from a community perspective, then researches related socio-cultural practices and beliefs. Afterwards, SAFE works with communities to define good maternal and child health; facilitate community discussions about barriers to good MCH in the context of the three delays; identify and develop solutions that the community partners can implement and maintain; monitor and evaluate progress; and transfer projects to community control.

Figure 1.3: The Safe Mothers, Safe Babies Process



SAFE Projects

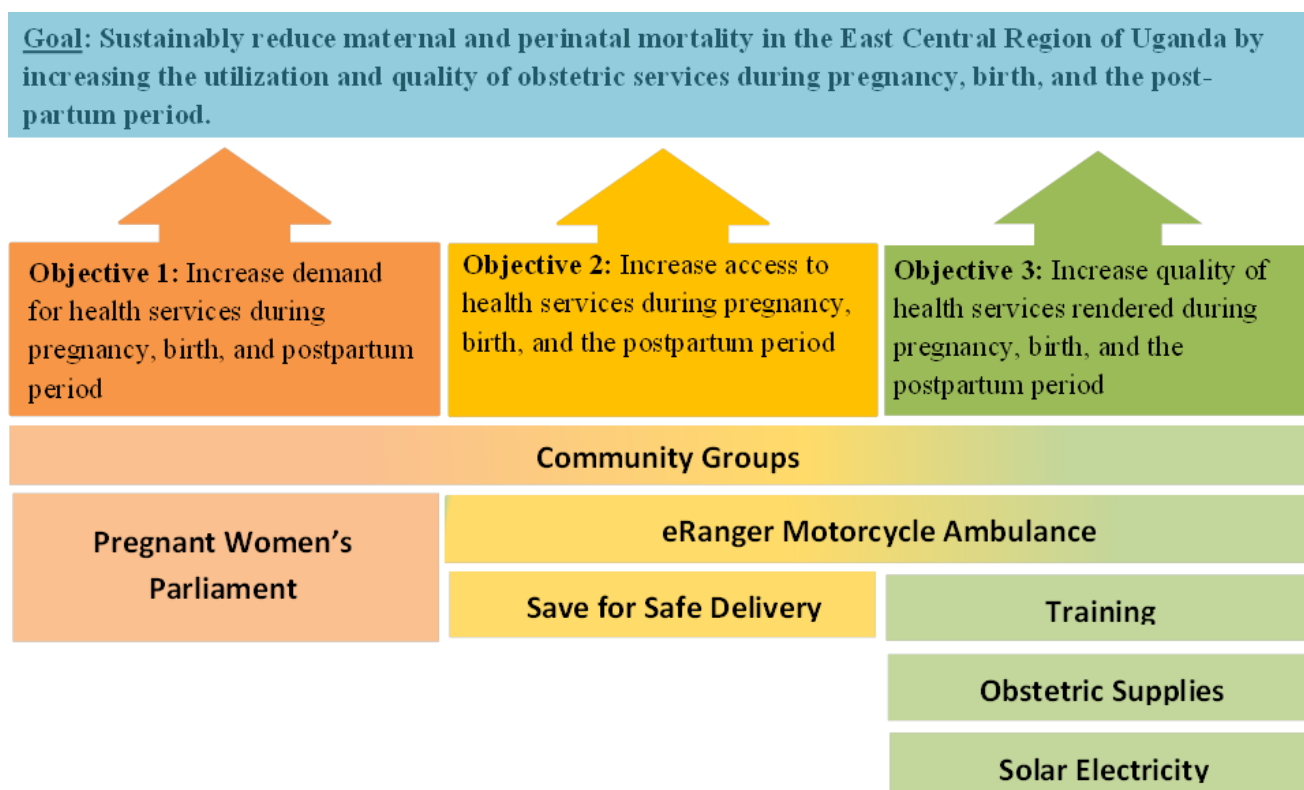
This process has resulted in an intervention package focused on three main points: (1) increasing demand for delivery services through community-led participatory educational outreach; (2) improving access to health facilities through motorcycle ambulances and personal savings programs; and (3) improving quality of care by strengthening health facility infrastructure, commodities, and training of healthcare workers, often by incorporating innovative, low-cost technologies. Not all projects are utilized in all communities or health facilities, and each project is adapted to the population it serves. General project descriptions are provided below followed by Figure 1.4 showing how the projects address SAFE's strategic objectives.

- **Increasing Demand through Community-Led Outreach:** This component focuses on increasing demand for maternal health services. The goals are to increase knowledge and practice of good MCH behaviors and to overcome socio-cultural barriers. Interventions include:
 - SAFE trained 10 community groups in MCH topics, primarily related to delivery and seeking skilled help. They write original songs, dances, and dramas that they perform in their communities to address group-identified barriers to healthy behaviors. The groups also have a myriad of home-to-home visitation and outreach programs. These programs encourage pregnant women and their spouses to practice good health behaviors and plan for safe deliveries in a healthcare facility. Please see the photos on the following page for examples of community group dramas, songs, and outreaches.
 - Two “Pregnant Women’s Parliaments” bring women together during weekly antenatal care clinics at local health facilities to learn about maternal health topics. Each meeting is loosely moderated by a SAFE employee or trained Village Health Team member, and allows the women to increase knowledge and encourage each other to “have a SAFE health center delivery.”



- **Improving Physical and Financial Access to Health Facilities:** This component focuses on increasing women's abilities to physically access a health facility:
 - Two eRanger motorcycle ambulances transport laboring or ill pregnant women between homes, health centers, and the district hospital. These motorcycle ambulances use less fuel than large ambulances and handle the pot-hole-filled dirt roads better than car ambulances. A joint community-SAFE task force runs the program. Volunteer community members drive the eRanger and their only compensation is a chicken that other community members provide for every 10-15 rides they complete.
 - Savings boxes are used to increase pregnant women's ability to pay for necessary delivery supplies and services. Community group members counsel pregnant women and their families one-on-one about expected expenses and why health center delivery (as opposed to home birth) is safer. They sell small wooden savings boxes at cost (about \$0.40 each), in which pregnant women and their spouses save about \$0.04/day throughout pregnancy.
- **Improving Quality of Care in Health Facilities:** This component focuses on increasing obstetric care quality in health facilities serving target communities:
 - SAFE works with community groups, health facilities, and the District Health Office to assess and address deficiencies in health commodities. For example, SAFE has provided blood pressure cuffs, stethoscopes, neonatal bag-valve masks, bulb suction syringes, and occasional shipments of sterile gloves, emergency obstetric medications, gauze, needles, and IV solution.
 - In partnership with the District Health Office, SAFE brings professional Ugandan midwife trainers to provide on-site training in basic emergency obstetric care to providers in partner health facilities 2-3 times/year.
 - A Solar Suitcase is a solar electric system that provides low-energy-consumption electricity for lighting and powering small medical devices. SAFE installed 22 Solar Suitcases in the maternity wards and operating theaters of 15 health centers and 3 hospitals. The electricity helps providers conduct deliveries and operations, identify and treat complications, start IVs, resuscitate newborns, and charge cellphones for emergency communication.

Figure 1.4: SAFE Projects by Objective

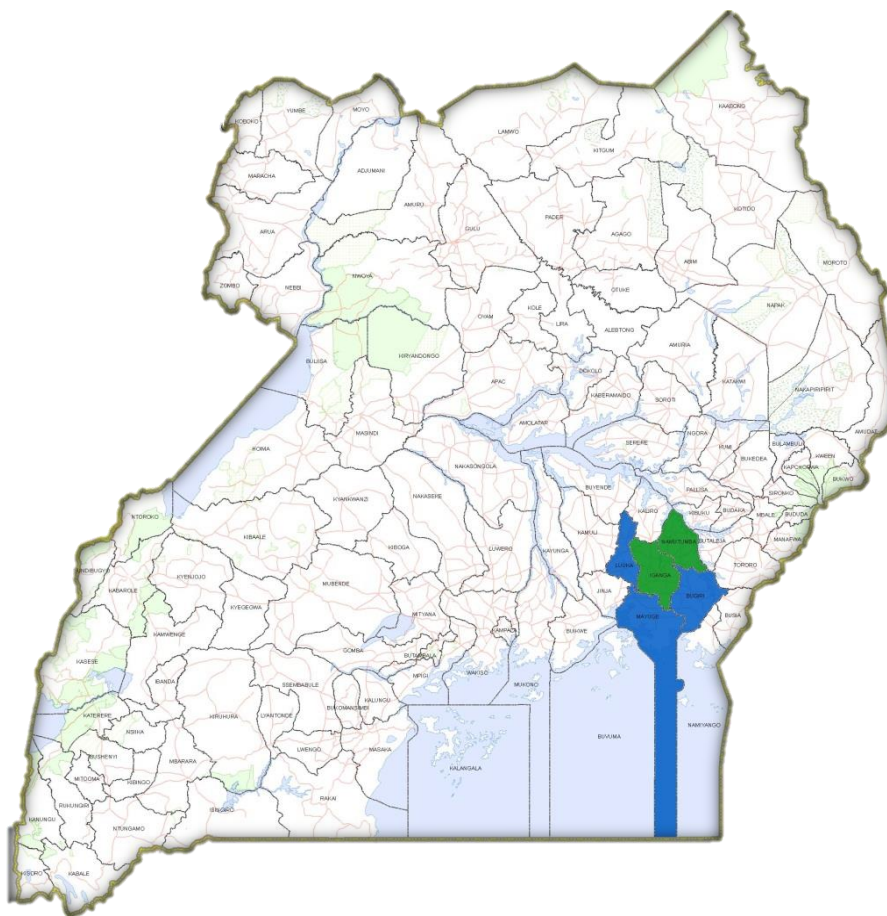


Context: East Central Region

Safe Mothers, Safe Babies works in the East Central Region of Uganda. This region has 11 districts and SAFE works in five: Iganga, Namutumba, Mayuge, Luuka, and Bugiri (see Figure 1.5 on the following page). SAFE community-based work is concentrated in Iganga and Namutumba Districts (called primary intervention areas, shown in blue) and SAFE facility-based work operates in all five districts. Areas with only facility-based work are called secondary intervention areas and are shown on the map in blue.

Per the 2011 Uganda Demographic and Health Survey (DHS), the East Central Region has poor maternal and early childhood health indicators that often worse than national averages. Although most women (91.2%) received at least some antenatal care (ANC) from a skilled provider, the region had the second worst performance for this indicator. Of the women who received ANC, less than 1/3 (30.4%) received iron tablets or syrup and less than 2/3 (62.4%) received intestinal parasite drugs. Only 32.2% were informed of signs of pregnancy complications and only 48.6% had their blood pressure measured, substantially lower than

Figure 1.5: Map of Uganda showing SAFE intervention areas.



the national averages of 50.7% and 59.1%. Only 28.6% of post-partum women in the region received any postnatal care within two days of birth in comparison to 35.9% nationally [4].

The region's 2011 perinatal mortality rate was 28 deaths/1,000 pregnancies of 7+ months gestation. Approximately 8.4% of babies were reported as being very small at birth, in comparison to 5.4% nationally. Furthermore, 54.8% of babies received a pre-lacteal feed (usually a substance like honey or water, even though they should only receive breast milk) versus 41.1% nationally. On average, children born in the past three years were exclusively breastfed for only 3 months in comparison to 4.6 months nationally [4]. This snapshot further elucidates that maternal and child health in the region is poor, and needs attention towards improving the health and vitality of women, children, and the region as a whole.

Demographics and Environment

These health indicators are inextricably linked with the region's demographic composition and environment. With a total fertility rate of 6.9, fertility in the East Central Region is among the highest of any in the country. The 2011 mid-year population was estimated to be just over 3,749,000, and it is likely to have grown around 3.5% per year since then, giving a current population of around 4,000,000 [10]. The region is primarily rural, with 85-95% of the population living in rural areas and relying on subsistence agriculture.

More men (72.1%) are literate than women (57.7%), but both of these regional statistics are lower than their corresponding national averages (77.4% for men and 64.2% for women). Additionally, only 40.7% of women and 44.5% of men in the region completed primary school [4]. As of 2010, approximately 25% of the population in this area lived at or below the poverty line [11]. This is related to occupational status; 64.1% of women and 54.3% of men are employed as skilled agriculturalists, forestry, or fishery workers [4]. In short, people in the region are poor and isolated by low education and rural geography.

The area has between 15 and 20 ethnicities, although most people are of the Busoga tribe (and speak the Lusoga language). Different tribal groups have different beliefs and practices surrounding pregnancy, childbirth, and neonatal care. For example, Waiswa et al reports the following cultural beliefs related to maternal and neonatal health in the region [12]:

- The term in Lusoga for antenatal care (*okunwa obulezi*) literally translates to “drinking medicine.” This is related to a cultural belief that ANC is only for those who are “ill”, and an expectation that if you seek ANC you should receive a lot of medication (which could be related to perceptions of quality of care).
- Traditional birth attendants (TBAs) are believed to be effective healthcare providers, and even to have special powers. For example, consider the following quote from a focus group discussion participant: "Yes, she (TBA) delivers and also changes the position of the baby if it is not laying right. She can also change the sex of the baby if you want. For instance if you have been giving birth to only boys and you want a girl, she can change the sex for you so that you deliver a girl"
- Babies are believed to be born “dirty.” Consider the following quote from a focus group discussion among older mothers: “My babies are usually born dirty, so it is a

must for me to bathe the baby immediately I am discharged on the same day of giving birth. You people are your babies born clean.”

- Women believe that they should put substances on the umbilical cord to facilitate “early cord healing.”
- Most women believe that they cannot care for premature babies at home, and that they must be cared for by a health facility.
- There is a deep-rooted belief in the use of herbs as part of pregnancy care, some of which induce contractions but not dilation resulting in obstructed labor and fistula.
- Culture does not allow women to make their own decisions. Males make most of the choices about whether or not to seek care and what type of care to seek. Additionally, mothers-in-law contribute to making decisions for their daughters-in-law.

The East Central Region has a tropical climate, is located along Lake Victoria (in the South), and has abundant swamp lands. These environmental conditions combined with the aforementioned demographic and cultural factors have led to problems with malnutrition, malaria, water-borne diseases, and other health conditions that impact maternal health. As such, women are often sub-optimally healthy when they become pregnant, which can compound complications of pregnancy and childbirth.

Complications can often turn deadly without ready access to medical care. Thus, the aforementioned conditions make the composition, accessibility, and efficacy of the healthcare system an important discussion to understanding the status of maternal health.

Health System and Health Care Services

The healthcare system in the East Central Region is based on the national tiered system. The system begins with a health center (HC) II at the bottom and progresses upwards to a health center III, health center IV, local district hospital, regional referral hospital, and national hospital. The most basic health centers (HC IIs) are both the most abundant and have the fewest providers and services available. They serve as a referral facility to higher levels of care. Health center IIs are not meant to have overnight services, or to provide delivery care. These services are supposed to be provided by health center IIIs, IVs, and hospitals. Yet, despite their limited scope in *intended* service provision, health center IIs often provide these services anyways given that

they are more accessible to the population [13]. Staffing levels, service capacity, and intended size of service population vary by health facility level (see Table 1.1).

Understanding health facility levels helps to explain the accessibility of emergency obstetric care (EmOC). Emergency obstetric care is an essential component of any maternal and perinatal mortality program [14] and is a key aspect of reducing mortality [15]. It can be divided into two major categories: basic and comprehensive. Basic emergency obstetric care activities are referred to as “Signal Functions.” They include the administration of parenteral antibiotics, oxytocic drugs and anticonvulsants; manual removal of the placenta and retained products; and assisted vaginal delivery. Comprehensive emergency obstetric care includes all basic Signal Functions as well as cesarean sections and blood transfusions [15].

World Health Organization’s Safe Motherhood Program promotes two strategies to improving maternal and perinatal health: emergency obstetric care and delivery with a skilled attendant. In many ways, these two strategies are intimately related. If a skilled attendant, such a midwife or doctor, does not have access to emergency obstetric care services, he/she will not be able to provide the life-saving care that is necessary. Likewise, if there is not a skilled attendant to provide the EmOC services, the supplies and technology will not be utilized to save lives as intended. As such, these two strategies have become increasingly linked [15].

A 2008 situational analysis of newborn health by the Uganda Ministry of Health found that almost no health center IIs were equipped to provide any basic or emergency delivery services. They also found that both HC IIIs and HC IVs often experienced stock-outs and shortages that impact their ability to provide EmOC services. For example, 54.5% of HC IIIs and 20% of HC IVs lacked ergometrine for treatment of post-partum hemorrhage. Furthermore, it notes that many HC IVs were upgraded from HC IIIs in response to a national EmOC needs assessment years prior, but that they were not provided with operating theaters or appropriate staff to provide comprehensive emergency obstetric care as intended. This was even true for hospitals, as 20% lacked functional operating theater or supplies for blood transfusion [13].

These results are echoed by a 2006 study by Mbonye et al that evaluated 359 Ugandan health facilities. The study found that only 2.8% of facilities could provide all EmOC services, and that only 7.5% of HC IVs and 52.9% of hospitals could provide comprehensive EmOC [16].

Table 1.1. Summary of Uganda health care system organization along with intended staff, service provision, and service population.				
Level	Staff	Capabilities	Service Population [17]	
			Intended	Current Regional
Village Health Teams	<ul style="list-style-type: none"> • 5 Village Health Teams (VHTs)/village 	<ul style="list-style-type: none"> • Links health facility with community • Identifies community's health needs • Mobilizes community resources, monitors utilization of all resources for their health, and mobilizes communities for health interventions • Maintains register of households members and health status • Serves as the first link between community and health providers • Community based management of common childhood illnesses 	1,000	N/A
HC II	<ul style="list-style-type: none"> • 1 enrolled nurse • 1 enrolled midwife • 2 nursing assistants 	<ul style="list-style-type: none"> • Outpatient care • Antenatal care • Immunization • Outreach services 	5,000	11,730
HC III	<ul style="list-style-type: none"> • 1 clinical officer, • 1 enrolled nurse, • 2 enrolled midwives, • 1 nursing assistant, • 1 health assistant, • 1 laboratory assistant • 1 records officer 	<ul style="list-style-type: none"> • All the health services of HC II • In-patient care • Environmental health 	20,000	46,512
HC IV	<ul style="list-style-type: none"> • 1 medical officer • 2 clinical officers • 1 registered midwife • 1 enrolled nurse • 1 enrolled midwife • 1 comprehensive nurse • 2 nursing assistants • 1 laboratory technician • 1 laboratory assistant • 1 health inspector • 1 dispenser • 1 public health dental assistant • 1 anesthesia officer • 1 assistant health educator • 1 records assistant • 1 accounts assistant • 2 support staff 	<ul style="list-style-type: none"> • All the services of HC III • Surgery • Supervision of lower level units • Data collection and analysis • Planning for the health sub-district 	100,000	210,526

As of 2010, the East Central Region had 456 functional³ HCII, IIIs, IVs, and hospitals [18]. As shown in Table 1.2, 341 of these health facilities (74.8%) are health center IIs, which as discussed are not intended to provide any delivery services. Thus, more than 4 million people rely on 81 health center IIIs (which may or may not be able to provide only *basic* emergency obstetric care), 18 health center IVs, and 10 hospitals. Moreover, shortages of staff, supplies, and equipment are common in all health facilities. In short, the region has a shortage of obstetric services. Combined, all of these demographic, environmental, and health systems factors combine to form the context in which SAFE is operating and influences the status of maternal and perinatal health in the region.

District	HC IIs	HC IIIs	HC IVs	Hospitals	Total Health Facilities
Bugiri	32	8	1	1	42
Busia	16	8	2	1	27
Buyende	14	4	1	0	19
Iganga	36	13	2	1	52
Jinja	89	15	5	4	113
Kaliro	12	5	1	0	18
Kamuli	38	10	2	2	52
Luuka	20	7	1	0	28
Mayuge	33	6	2	1	42
Namayingo	22	5	1	0	28
Namutumba	29	5	1	0	35
TOTAL	341	86	19	10	456

³ UNFPA published on their website an excel sheet labeled “Uganda 2010 Facility Inventory” with information about all functional and non-functional health facilities in all districts of Uganda broken down by sub-county, parish, health unit name, owner, authority, and facility level. Author checked the information contained in the regions in which SAFE works against SAFE’s own records, and verified their accuracy. However, UNFPA does not define the meaning of “functional.” Author exhausted search capabilities to find an associated definition or explanative document but could find none..

Chapter Two: Literature Review

As portrayed in Chapter 1, Safe Mothers, Safe Babies' approach is centered on the three delays model, and incorporates community-based participatory methods with facility-based interventions to address all three delays. As such, Chapter 2 provides an overview of the literature pertaining to the three delays model, community-based participatory action research (CBPAR), and the need for an integrated approach inclusive of CBPAR methods and health facility improvements to address three delay problems.

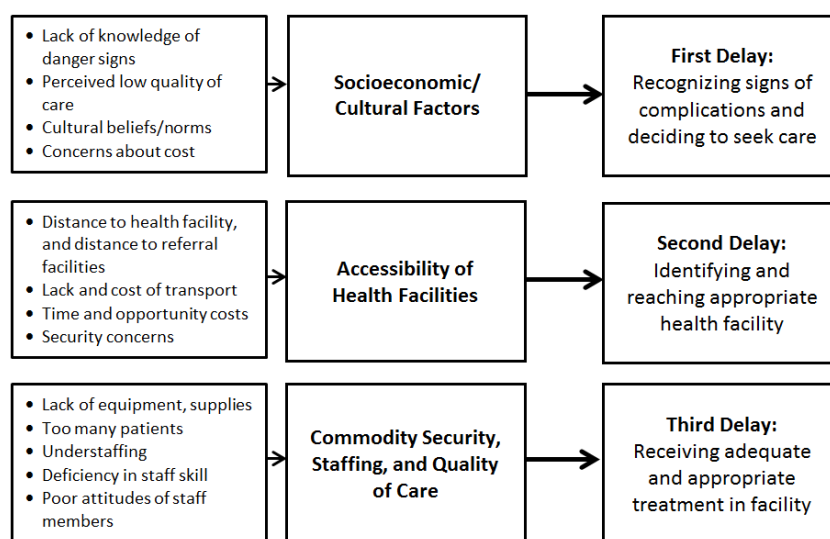
The Three Delays Model

Although the primary clinical causes of maternal and perinatal mortality and morbidity are well known, what is needed is a way to understand the *underlying* causes. In other words, we know that the leading causes of maternal mortality in Africa include hemorrhage, sepsis/infections, hypertensive disorders, and obstructed labor (amongst others); but *why* are these conditions more common in sub-Saharan African countries than elsewhere? Does it have to do with biology? Behavior? Resources? What is driving the trends behind poor birth outcomes?

One model that has been widely used to answer some of these questions is the three delays model [1], which posits that maternal mortality can largely be explained by: (1) a delay in recognizing signs of complications and making the decision to seek care, (2) a delay in physically reaching an appropriate place of care, and (3) a delay in receiving adequate and appropriate care once in a health facility (see Figure 2.1).

As an example of how the three delays model can be employed to understand the underlying contributors

Figure 2.1: The Three Delays Model



to maternal death, consider a case study offered by Barnes-Josiah et al from a maternal death audit in Haiti. It is included here verbatim because of the way it exemplifies how each of the three delays can be experienced in the same case, and how they each individually and collectively contribute to maternal death:

Sarah, 35-yr-old, parity>0. Respondents: husband, neighbors, traditional birth attendant (TBA). Sarah did not go to prenatal care, although her husband stated that occasionally she had the money to do so. She experienced occasional headaches during pregnancy; her abdomen appeared abnormally large. There were no other symptoms during this pregnancy. Sarah reportedly had been diagnosed with hypertension in the past, but was not currently taking medication. The TBA was called on a Thursday or Friday late in pregnancy because of abdominal pains. The TBA later reported that the baby was "like a rock", and hadn't moved in a long time. At that point, Sarah was passing water that had a bad odor. The TBA referred her to a doctor. Sarah's husband agreed that she should go to the nearest hospital, but they couldn't find the money. Some time was apparently spent hoping the problem would go away; her husband stated that she was afraid of the hospital. Sunday she agreed to go but they didn't find the money until Monday. The neighbor stated that Sarah was in labor for 3 days before leaving for the hospital. On Monday at 3:00 p.m. (possibly earlier) Sarah left home, carried on a litter by her husband and a neighbor. Halfway to town, they encountered a vehicle that charged them 50 gourdes for transport. At the hospital, whether because there was no electricity (according to the TBA), because the doctor was in Port-au-Prince (according to her husband), or because she didn't have any money (according to the neighbor), the nurse sent her on to a regional hospital (about 2 hr away on paved roads) for a caesarean.

The ambulance did not arrive until around 5:30 p.m. Sarah's husband had to find money for gasoline (25 gourdes). It was dark when they arrived at the regional hospital. Sarah apparently began passing blood (lightly?) during this trip. The nurse on duty telephoned the doctor, who arrived immediately. There was no electricity so they connected a generator. The doctor performed the operation; Sarah died in the operating room. Her husband paid 15 gourdes for two people to return home afterwards [p. 986-987] [19].

In this example, each of the three delays played an important part in Sarah's (and most likely her baby's) death. First, Sarah chose not to seek skilled care during her pregnancy and her complication. Moreover, she, her husband, and the TBA all failed to immediately recognize the warning signs of complications (headaches and swelling with a history of high blood pressure, which could have been a warning sign of pregnancy-induced hypertension and/or pre-eclampsia).

Even after recognizing a potential problem, they delayed further care-seeking “hoping the problem would go away.” These are all first delay barriers.

Once the decision to seek care had finally been made, it took time to mobilize the money for transport and to physically find transportation. This happened not only once but twice, the first time during their trip to the nearest hospital and the second on their trip to the regional hospital when ambulance transport was delayed until Sarah’s husband could pay for fuel. These are second delay barriers.

Finally, for whatever reason we accept as being the truth (lack of electricity, lack of staff, or lack of money), Sarah experienced a third delay barrier when she failed to receive appropriate care upon arrival at the first hospital. She experienced another third delay barrier when the nurse at the regional hospital had to phone for a doctor.

As we consider these types of experiences, it becomes easy to understand how socio-cultural, economic, infrastructure, and health systems problems intersect to precipitate cases of preventable maternal and perinatal mortality and morbidity. If Sarah had utilized care preventively during her pregnancy; if she, her husband, and/or the TBA had recognized complications earlier; if she had been able to immediately access a health facility once a complication was identified or once a referral had been made; if she had received appropriate care when she reached the first health facility, or immediate emergency care once she reached the referral site; if any combination of these had been realized, perhaps Sarah and her baby would have survived.

As is evidenced by this example, the three delays model is useful in understanding underlying factors contributing to maternal mortality. Studies have utilized the model in many countries [20] [21] [22] [19] [23] [24] [25] and have extended it to explain other types of mortality, including neonatal mortality [26] [27] [28], child mortality [29], and poor obstetrical outcomes among immigrant populations in developed countries [30].

Engaging Communities: Community-Based Participatory Action Methods

SAFE utilizes an integrated approach centered on the importance of community-led change. This approach is rooted in a methodology called “community-based participatory action research (CBPAR)”. CBPAR refers to an increasingly popular research paradigm built upon the tenets of community involvement in research and development programs. As coined by Minkler

and Wallerstein, CBPAR is based on the “increasing community demands for research that is *community-based*, not *community-placed*” and on the “new focus on translational research to improve intervention outcomes within diverse cultures and contexts” [31]. In other words, CBPAR is a framework one can utilize to engage intended beneficiaries not as recipients to be acted upon, but as vital partners in the development process.

A review of CBPAR activities by Israel et al provides the following basic tenets of good CBPAR methodology [32]:

- (1) Recognizing the community as an important unit of identity.
- (2) Building on the strengths and resources of the community itself.
- (3) Facilitating collaborative partnerships in all phases of research.
- (4) Integrating knowledge and action of all partners (referring to both the research team and the community itself, and allowing for changes in knowledge based on the iterative learning process) for mutual benefit.
- (5) Promoting a co-learning process that is both empowering and attentive to social inequalities.
- (6) Involving a cyclical and iterative process in which the partnership is developed, nurtured and maintained continuously, along with all facets of the research process (problem definition, research methodology development, data collection, etc.).
- (7) Addressing health from both the positivist and ecological perspective, inclusive of all facets of health and wellbeing.
- (8) Disseminating findings and knowledge gained to all partners, in a way that is understandable to each respective party.

Minkler and Wallerstein add that CBPAR must be particularly attentive “to issues of gender, race, class, and culture... as these issues interlock and influence every aspect of the research enterprise.” This principle requires specific internal reflection on the part of both the researcher(s) and the participants towards each other’s culture. Although no one can claim to be fully “culturally competent”, it is possible and necessary to be cognizant of the biases that one’s personal culture brings to the partnership [31].

The CBPAR paradigm has grown from two different approaches: (1) those that are of the *action oriented* approach, and (2) those that are of the *participatory* approach. Per Minkler and Wallerstein, these two approaches—while increasingly convergent at present—are distinct in

their roots and histories. First, action oriented research originated with Kurt Lewin [33] and his predecessors and was rooted in a process of involving the target beneficiaries who are affected by a particular problem in the process of addressing it “through a cyclical process of fact finding, action, and evaluation” [31].

Conversely, the participatory tradition is more “emancipatory”, growing out of work performed with and by groups of oppressed individuals in Africa, Asia, and Latin America during the 1970s [31]. Budd Hall writes that:

Participatory Research was very largely theorized and disseminated from a social movement or civil society base. Among the original premises was the importance of breaking what we referred to as the monopoly over knowledge production by universities. This was not in the least a form of anti-intellectualism, but was a recognition that the academic mode-of production, was and remains in some fundamental ways linked to different sets of interests and power relations than [those of] women and men in various social movement settings or located in more autonomous community-based non-governmental structures (p.22) [34].

As observed in the summary of CBPAR tenets, these two methodologies begin to converge in contemporary practice. Yet, it is still important to remember these two distinct histories when considering criticisms of certain CBPAR programs that have their roots in one methodological tradition or the other (which will be discussed in a section to follow).

CBPAR in Maternal and Child Health

There are many examples of CBPAR methods being effectively applied to maternal and child health populations. Studies taking place in countries around the world have used it to improve the process of conceptualizing problems, designing solutions, and achieving impact in related maternal and child health indicators.

For example, Castle et al utilized participatory methods to explore indigenous definitions of reproductive health in Mali. They concluded that these local definitions viewed social factors (including beliefs about pre-marital sexual relationships, infidelity, the legitimacy of children, and bodily and spiritual cleanliness) as integral components of reproductive health, not as context or background. They conclude that the definitions underlying reproductive health research need to be locally contextualized to facilitate the best outcomes [35].

Bhutta et al utilized a cluster-randomized community-based approach to address perinatal and neonatal mortality in Pakistan. They utilized community health committees and Lady Health

Workers (LHWs) to improve maternal and neonatal care behaviors during pregnancy, delivery and the immediate post-partum period. Although there was no reduction in the rate of miscarriage, there was a drop in stillbirths (39.1 deaths/1,000 total births in intervention clusters versus 48.7 deaths/1,000 total births in controls; RR=0.79 CI: 0.26-0.92, p=0.006); and in neonatal mortality (43.0 deaths/1,000 live births in intervention clusters versus 49.1 deaths/1,000 live births in controls; RR=0.85, CI: 0.76-0.96, p=0.02) [36].

Manandhar et al utilized female facilitators working with women's groups to address perinatal health practices and birth outcomes in Nepal. In this study, 12 pairs of 42 geopolitically pair-matched clusters were randomly selected, after which one in each pair was randomly assigned to the intervention group and the other to the control group. In the intervention communities, female facilitators who were trained in perinatal health worked with the women's groups to identify and address maternal and neonatal health problems. Over the course of two years, the intervention resulted in a lower neonatal mortality rate in intervention clusters (26.2 deaths/1,000 live births) than in control clusters (36.9 deaths/1,000 live births) (aOR: 0.70, CI: 0.53-0.94). Additionally, women in intervention clusters were significantly more likely to attend antenatal care (55% versus 30%, aOR: 2.82, CI: 1.41-5.62), visit a health facility in the event of an illness (50% versus 22%, aOR: 3.37, CI: 1.78-6.37), and practice clean birth techniques [37].

A similar but even stronger study took place in Jharkhand and Orissa, India. Tripathy et al assigned 36 clusters from Jharkhand and Orissa into intervention and control groups (18 to each group respective). In intervention clusters, a trained facilitator convened 13 women's groups to meet every month to facilitate group participatory action and learning to identify key maternal and perinatal health problems and develop/implement strategies to address those problems. The neonatal mortality rate was monitored annually over the three years of the study; in the intervention clusters, it decreased from 55.6 deaths in year 1 to 37.1 and 36.3 deaths/1,000 live births in years 2 and 3, whereas in control clusters it actually increased over the same period of time from 53.4 to 59.6 to 64.3 deaths/1,000 live births. After adjusting for clustering, stratification and baseline differences, they concluded that the neonatal mortality rate was 32% lower in intervention clusters (OR: 0.68, CI: 0.59-0.78) during all three years, and 45% lower in years 2 and 3 (OR: 0.55, CI: 0.46-0.66) [38].

Community-based approaches and programs have been used to improve maternal and child health outcomes in India [39] [40], Ethiopia [41], Bangladesh [42], Cambodia [43], and many other countries.

The Gap: The Need for an Integrated Approach

From this literature, we can see that community-based participatory action approaches can be successful at improving maternal and perinatal outcomes. Yet, these approaches are not without their problems or criticisms. As noted by Israel et al, there are three types of challenges: first, those related to the partnership between the researcher(s)⁴ and the community; second, methodological issues; and third, those related to broader social, political, economic, institutional and cultural factors [32].

Within the first category—partnership-related challenges—Israel and team discuss a number of issues, each of which is summarized below [32]:

- **Trust:** There may be a lack of trust between the researcher(s) and the community members, especially in communities that have a history with other research from which there was no tangible benefit (which can result in anger and suspicion).
- **Power and Control:** There may be an unequal distribution of power and control, both between the researcher(s) and the community, and within the community unit itself. With regards to this latter point, community members that belong to the group most prominently involved in the research might be of a different (and usually higher) socio-economic class/educational background than other community members.
- **Differences:** Given that researchers and communities are almost always coming from different places, cultures, and contexts, conflicts often arise related to “differences in perspective, priorities, assumptions, values, beliefs, and languages”, particularly within the researching entity or if one partner’s beliefs/statements with regards to the aforementioned categories offends other partners. Moreover, one person’s offense may be taken as reticent of whatever group he/she came from, for example, one researcher’s beliefs being perceived as the beliefs of the entire research team.

⁴ Although CBPAR as a methodology is really discussed in terms of research, it is used in this thesis to refer to the methodology of community-based participatory action. In this instance, the word “researcher” could be replaced with “program” or “foreigner.” It is really just referring to the entity that is entering the community with the intent to engage with community members to solve a specific health problem.

- **Funding and Funding Decisions:** Questions about funding can be a sore subject; questions might include who makes decisions about the ways that money is used, who distributes the funding and how, how budgeting decisions are made, and what to do (really where to cut) when funders cut the budget, among others. This is particularly true when the funding agency has strict guidelines that impact how involved a community can be in financial decision-making.
- **Who Cares About What:** Sometimes researchers may care more about the end-result, whereas a community may care more about the means to reach it (the process). Or vice versa. But in either case, the mismatch between assigned importance of task and process can vary and cause challenges for the partnership.
- **Demands Time:** This is perhaps one of the most important challenges that CBPAR programs encounter. Any community-based work requires significant investments of time, not just in the community-based process, but also in what might be considered to be indirect and seemingly-unrelated activities like providing transportation, giving technical support and instruction, and attending community events. Particularly if researchers think of CBPAR as a means to an end, these extra investments of time and resources can seem overly burdensome, but are often incredibly important to the community and by proxy to the strength of the partnership.
- **Defining the Community:** How a researcher defines “community” and how community members understand community may vary substantially. Essential to a partnership is who is included in ‘community’ and who is excluded; how those who are included in the term relate to those who aren’t; and how those who are included—often because of their membership in a community-based organization—are or are not representative of the rest of the community. It is very possible that members of a particular group have self-selected on the basis of higher socio-economic and/or educational status, meaning that work with that particular group of people may impact them but may or may not reach other facets of the community.

Next, Israel and team present the second category of challenges, Methodological Issues. These challenges pertain more to the methodology underlying the research [32]:

- **Scientific Validity:** Collaborative, participation-based research is questioned on the basis of validity, reliability, and objectivity. This often leads to traditional academics

questioning how much the results of the research can be trusted, and whether the approach is valid or not.

- **Demonstrating Success:** Community-based research does not always have one set of objectives, and the approach (when employed properly) really *should* be a way to empower communities with capacity to take on a range of issues, not just those that are important to the researcher. This means that proving how successful the endeavor was can be challenging, particularly when there are multiple interventions operating (which there often is), and when there are only a few units to analyze.
- **Different from Traditional Research Activities:** Funders like to understand all the facets of a process and the anticipated outcomes of that process before agreeing to allocate funding. Yet, CBPAR is based on the partnership between researcher and community, which means (inherently) that not all components of a project are known at the beginning. If they were, it most likely wouldn't be truly community-based participatory action research. This makes it hard to get funders on board, and can also make it hard to sell the idea to healthcare providers and community members that haven't already engaged in successful CBPAR activities in the past.
- **Reconciling Research and Action:** Coming to an agreement regarding which should receive more devotion—research or action—can be very difficult. Communities are often more invested in how the research results in change for the community and less interested in answering the questions driving the research. Similarly, researchers may want to collect much more data (and by proxy allocate more time and resources to the process) than community members. These issues can lead to conflicts.
- **Time Constraints:** More than just the time required to develop CBPAR partnerships, it also takes time for all partners to develop and agree on the research process. Community members may or may not feel the need to be involved in things that are of principle importance to researchers, for example, developing a sampling frame, a sample size, survey design, etc. Likewise, by nature of the partnership, the community is often comprised of people who do not have technical background in research, which necessitates that researchers spend significant time preparing instruction and feedback in a punctual way that isn't offensive. Analysis and writing

takes even more time. All of this must be weighed against publication and reporting requirements, which are related to funding and academia.

- **Multiple Data Types:** Monitoring and evaluation activities in CBPAR programs most generally require multiple sources of data, and each of them may provide different/conflicting data. Interpreting this information in a way that makes sense without dismissing anyone's viewpoints can be challenging at best.

The final category of challenges discussed by Israel et al is the category of "Broader Social, Political, Economic, Institutional and Cultural Issues," which stem from the inherent differences between two vastly different groups of people:

- **Institutional Requirements:** Researchers who are involved in community-based research are most often part of institutions that place demands on their time that generally compete with the time and energy required for CBPAR programs. For example, the pressure to publish, write grants, provide services, and increase community capacity all represent real responsibilities that researchers cannot shrug off in favor of dedicating more time to the CBPAR process. Conversely, although researchers are usually compensated in some capacity for their involvement in this type of research, community members are not (at least usually). These issues mean that there are real-world institutional competition for the time of all partners, which can take its toll on the partnership.
- **Success in Academia:** Academics who might be involved in CBPAR programs are also fighting for the achievements that will allow them tenure and promotion. These achievements include the volume and timing of publications and winning grant funding (particularly funding from a federal agency). As such, the time required to build and maintain relationships, undertake the joint research process, and feed results back to community members—which can collectively reduce the frequency and volume of publication and make it harder to obtain funding—often limits these would-be researchers and deters them from taking CBPAR approaches.
- **Funding Priorities and Guidelines:** Most funding agencies that fund public health research and practice have defined processes and metrics that researchers must meet. These often included researcher control over the process, an ability to assess health status or illness outcomes, and setting goals related to those outcomes before the

research begins. These components are very different from the underlying tenets of CBPAR, which inherently require a partnership-led process and sometimes less tangible outcomes by which to measure success (or even when they are tangible outcomes, a more flexible and longer process to measure them). This makes it very difficult for researchers to obtain funding with enough flexibility to facilitate community-based participatory action research. Moreover, the time required to conduct CBPAR projects appropriately—as discussed previously, the time to build relationships, conduct an assessment, and involve the community in process of change—can require much longer than a funder is willing to provide funding for.

- **Community Socio-Political Context:** Political and social dynamics in a community can cause many challenges, including but not limited to defining the community, and differing values, language, and culture between both the researchers and the community, and within each partner group.
- **Barriers to Change:** The aforementioned political, economic, and cultural factors can combine to impede institutional, community, and social changes that are supposed to characterize CBPAR approaches. From the Israel article: “Examples include inequitable distribution of power and resources, history of discrimination across culturally diverse groups, expert models of policy decision-making, and the predominance of a positivist scientific paradigm” (p. 192).

To exemplify how some of these factors might play out, recall that two studies in Nepal and India had significant success improving maternal and perinatal health by utilizing women’s groups. Yet, a similar study undertaken in Bangladesh with 18 randomized clusters utilizing women’s groups in similar ways had no meaningful effect. When exploring why the latter intervention failed to achieve target objectives, the authors suggest that first, the coverage of the women’s groups was small (1 group per 1,414 population) in comparison to the other two trials (1 group per 468 population in India and 1 group per 756 population in Nepal); second, the facilitators covered more groups than in the other research projects; and third, adverse gender-based barriers (in particular, husband and in-laws not giving women permission to join a women’s group) affected the facilitators’ ability to effectively facilitate meetings and the groups’ abilities to successfully meet and take on problems. They conclude that “for participatory women’s groups to have significant effect on neonatal mortality in rural Bangladesh, detailed

attention to programme design and contextual factors, enhanced population coverage, and increased enrollment of newly pregnant women might be needed” [44]. This is an example of how the definition of “community” and their specific involvement with institutional processes can impact the success of a CBPAR program.

In addition to these criticisms, some programs that are characterized as “community-based” are not at all participatory in nature with regards to target recipients. In these instances, “community-based” refers only to the fact that the intervention(s) are carried out within a community and not in a health facility; they do not refer to a community’s participation in a project or program, which is a central tenet of CBPAR methods. An example is the MOM Project in Burma which trained local organization volunteers, health care providers, and traditional birth attendants to provide “community-based” maternal health services, but in which community members were not part of the process of developing, promoting, or implementing the interventions [45].

Furthermore, many programs that are based in CBPAR methods aim to improve delivery outcomes by focusing on only *one* type of problem—maybe the demand for health services during delivery *or* increasing access to health facilities, but not both. No literature was found reporting a program that had developed a framework integrating the three delays model with both community-based *and* health facility strengthening approaches to systematically address all three types of delays simultaneously (or even two types of delays). With this in mind, we developed SAFE’s model to contribute to improving maternal and perinatal health work in a developing country context.

Chapter Three: Methods and Results

Chapter 3 describes the methods and findings from a mixed methods quantitative and qualitative evaluation of Safe Mothers, Safe Babies' integrated intervention package. The goal of the mixed methods evaluation was to meet the following specific aims:

- (1) Evaluate SAFE's impact on the utilization of facility-based maternal health services in its target health facilities in the East Central Region, Uganda.
- (2) Evaluate SAFE's impact on each of the three delays.
- (3) Identify strengths and weaknesses of SAFE's approach, and make recommendations to improve the program and potentially facilitate future scale-up.

This evaluation included four types of data. An overview is given below followed by results presented by data type:

- Secondary Health Statistics: Pre/post intervention analysis of the number of monthly health center deliveries in SAFE's four primary intervention facilities and 3 control health facilities (Aim 1);
- Key Informant Interviews: Key theme analysis of cross-sectional key informant interviews with 49 community groups members, program beneficiaries, and individual unaffiliated with the organization exploring program reach and quality (Aims 1-3);
- Photovoice Project: Analysis of the photos and captions of pictures taken by program beneficiaries in a qualitative photovoice evaluation project exploring maternal and child health problems, resources, and solutions (Aims 1-3);
- Maternal Health Facility and Care Observation: Analysis of the field reports from 6 months of observing the provision of obstetric care in 4 SAFE primary, 8 SAFE secondary, and 2 non-SAFE health facilities (Aims 2 and 3).

Methods: Secondary Health Data

To evaluate SAFE's impact on the utilization of facility-base delivery services, we collected and analyzed the monthly number of deliveries for 12 months before and 24 months after the intervention package was implemented. SAFE staff collected the data from four primary intervention facilities and three similarly sized and geographically located control facilities that

were outside of SAFE's intervention areas. We included only three non-SAFE facilities due to resource constraints.

Data collectors collected the data from government-issued HMIS forms in each health center, which they checked against the maternity register in each facility for accuracy. In cases of discrepancies between these two data sources, the data collector asked for clarification from midwives and recorded their response. If the numbers could not be reconciled for a particular month, the HMIS numbers were used for consistency. In one notable exception, HMIS forms started reporting the delivery numbers of two health facilities because a local clinic had no way to report their own data (they "lacked a code" at the district health office). In this instance only, we used the numbers in the maternity register instead of those on the HMIS forms.

SAFE staff collected the pre-intervention statistics before the start of the intervention. After the intervention began, the data collectors returned to collect statistics every 3-4 months. They recorded the statistics on paper-based surveys in the field and sent them to the thesis author, who then entered them into excel. The author checked every data field three times for accuracy, then imported the dataset into SAS and analyzed it with paired t-tests.

Additionally, to explore SAFE's impact on emergency maternal referral from a third delay (health facility capacity) perspective, SAFE staff reviewed all maternity records over a 16 month period in each of the health facilities to identify cases of complication and referral. We selected this time frame based on the availability of data; as such intervention and control facilities were compared but baseline and endline information was not available. We defined "complication" as any entry in the maternity register that was not a full-term, live birth "spontaneous vaginal delivery (SVD)" without excessive bleeding, malaria, HIV or other abnormalities. We also included every referral case, whether or not the reason for referral or any case information was included in the records.

For each case, the data collector recorded the health facility name and level (II, III, or IV), date of admission, referral status, maternal characteristics, and all available information regarding the evaluation, progression, and outcome of the case was recorded. Maternal characteristics included maternal age, parity, past history of abortive outcomes, and HIV status. To assess maternal age, we created eight age categories in 5 year age increments beginning with age 10; and three derivations thereof—young nulliparous, adolescent pregnancy, and advanced maternal age. Young nulliparous included any pregnant woman aged 19 or younger whose

medical record indicated that she had not been pregnant before; adolescent pregnancy included any pregnant woman aged 19 or younger regardless of parity; advanced maternal age included any pregnant woman aged 35 or older. We also looked at all nulliparous women generally and women with high parity, defined as those with 4 or more previous pregnancies. Finally, we used Google Maps to estimate the approximate shortest driving distance in kilometers between the health facility and the referral site for each referral case.

Maternal names, residences, and identifying information were available from the original data in the health facilities and were initially collected by data collectors based on the intention to track referral cases to their intended referral facilities. However, this step was never completed due to resource and logistical constraints. As soon as the dataset was provided to the thesis author, the patient identifiers were immediately removed, the dataset was password protected, and data collectors were asked to delete any remaining copies of the dataset in their possession.

We also sought to analyze the frequency of individual complications and the primary reason for referral. We assigned each complication in a case to an inclusive complication category. Categories included: any abortive outcome, malaria in pregnancy, pregnancy outcome, fetal death, hypertensive disorders, multiple gestation, fetal malpresentation, prolonged labor, obstructed labor, non-abortive hemorrhage, anemia, and low birth weight. Abortion refers to both spontaneous and induced abortions. Failure to descend and “high head” were categorized as prolonged labor; and cephalopelvic disproportion, “big baby”, narrow pelvis, and contracted pelvis were categorized as obstructed labor. We included threatened abortion, molar pregnancy, and ectopic pregnancy under the category of abortive outcomes for pregnancy complications but did not include threatened abortion in fetal outcome unless the outcome of the threatened abortion was given. We only coded an entry as hemorrhage if it was for a non-abortive case. After identifying all instances of complication, we identified a primary reason for referral by isolating the complication most proximal to the referral being made.

All information was entered into excel. The thesis author made a copy of the complete dataset, checked each field twice for accuracy, and cleaned the dataset, then imported it into Stata for analysis through Chi Square tests of significance.

Methods: Key Informant Interviews

SAFE conducted 49 key informant interviews in three sessions between January 2012 and August 2013 by two different groups of interviewers. All SAFE employees were local Ugandan nationals from the East Central Region whose first language was the local language, Lusoga, and who were trained in interviewing techniques. Interviews were conducted with three main types of respondents: (1) people unaffiliated with SAFE projects (3 interviews), (2) program beneficiaries (21 interviews), and (3) community group members (24 interviews). There was also one general discussion conducted with a district health official.

Respondents were selected through a convenient sampling method. The interviewers sought to acquire a diversity of perspectives, including community group leadership and general members, program beneficiaries, and a few lay citizens who may or may not have heard of Safe Mothers, Safe Babies and SAFE programs. The only criteria for non-SAFE affiliated individuals were that they had to have had a child (females to have birthed one, males to have fathered one). Community group members were eligible to be interviewed if they were an active member of a current SAFE community group. Finally, any program beneficiary was eligible to be interviewed if they had personally (themselves or an immediate family member) benefited from one or more specific SAFE programs. The interviewers placed emphasis on identifying respondents of both genders, a diversity of ages, and all types of SAFE programs (including both patients and providers who received SAFE support).

All interviews utilized one of five semi-structured interview guides. Both interviews with individuals unaffiliated with SAFE and community group members explored community views of maternal and child health. Interviews with community group members also explored changes in community perceptions and behaviors since the start of SAFE's programs, and the effectiveness of both individual projects and SAFE's overall approach. Interviews with program beneficiaries sought to evaluate specific projects.

Interviews were conducted privately outdoors, usually on a mat under a tree behind a house and away from household members, after obtaining informed consent. The interviewers recorded each interview with participant permission for transcription purposes. They also translated the interview into English on the same recording due to resource constraints that would not allow later translation. The thesis author trained interviewers to make the translations as close to verbatim as possible. The thesis author then transcribed, reviewed, and de-identified

each interview in the United States. Afterwards, the author reviewed and coded all transcripts to identify key themes falling under each of the thesis' three specific aims.

Methods: Photovoice Project

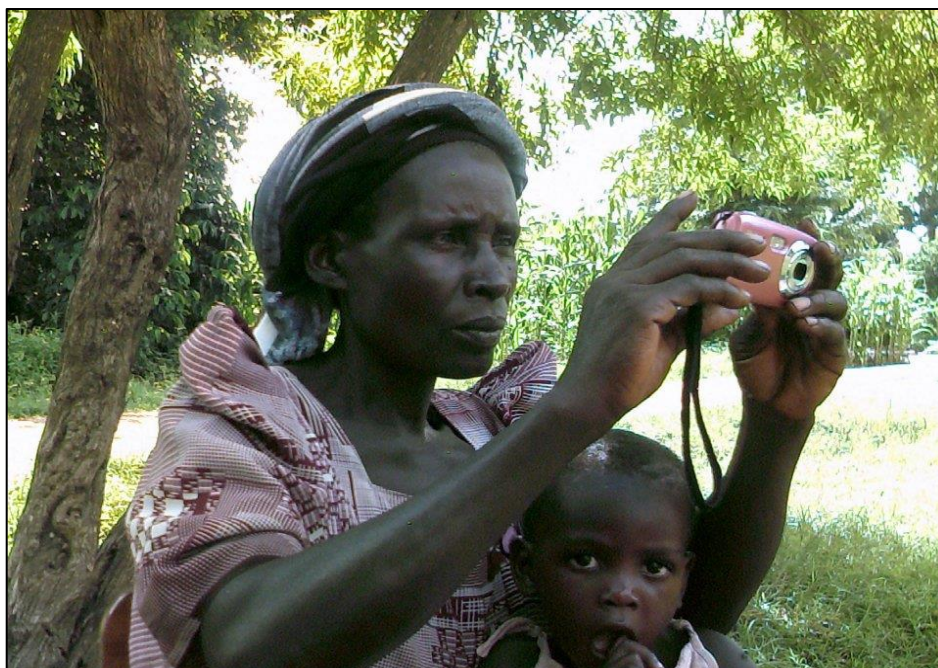
Although key informant interviews and quantitative evaluation of monthly health center deliveries provided good information, SAFE deemed it important to acquire further understanding of barriers, resources, and triumphs from the community perspective. To this end, SAFE conducted a photovoice project with the community groups. Members took photographs, and discussed them in relationships to their experiences with maternal and child health issues in their communities. The project was divided into three phases. In Phase I (summer 2012), SAFE launched the project. In Phase II (summer 2012-ongoing), SAFE and the community groups utilized the photos in community photo exhibitions to prompt discussion about maternal and child health issues. In Phase III, SAFE held photo exhibitions in the U.S. to share the photographers' work and perspectives, and to highlight the differences between indigenous views and international characterizations of Ugandan MCH in the media. This thesis results the methods and results from Phase I.

The aims of the project were to: (1) Enable women, men, and SAFE partner health center staff to reflect on and communicate the barriers, strengths, and triumphs of their communities related to good maternal and child health; and (2) Raise community awareness about those barriers, strengths, and triumphs, and to stimulate discussion around those issues.

SAFE staff presented the idea of the photovoice project to six community groups and healthcare workers from two of SAFE's partner health facilities in two large multi-group meetings. Following this introduction, SAFE held meetings with each community group to answer questions about the project and receive feedback. The meetings also allowed the groups to nominate participants. Each of the six groups nominated two members to act as photographers making a total of 12 participants, including 3 men and 9 women.

After photographers were selected, they received training in one-on-one meetings with SAFE staff. The training included reiterating the aim of the project; discussing the meaning, challenges and strengths of maternal and child health in the community; learning how to use the camera; and taking practice photos. Following the training, participants took the camera for one week to photograph what maternal and child health meant to them and their community; the

challenges their communities faced in achieving good maternal and child health; and the strengths or triumphs of their community to address those challenges.



Above: Participant learning to use camera and taking practice shots.

SAFE and participants then met twice for review sessions. During the first review, SAFE provided the participants with refresher training, reviewed the first set of images, and discussed each photograph in detail. The staff members were trained in probative interviewing, and utilized the review to ask questions about what was happening in the photo and why the participant chose to take that particular shot. Captions were written verbatim in the notes section of iPhoto and later transferred to an excel database for use during analysis.

Following this first review, SAFE gave participants the choice to continue capturing more images for another 1-2 weeks or to end their participation. All but one participant chose to continue their involvement. Following this second assignment period, SAFE met with the participants for another review session to review the new photos, discuss and caption each of them, and review all photos to choose 10-15 to display at community health fairs.

At the conclusion of this process, SAFE conducted semi-structured in-depth interviews with each participant. Interview questions explored the participant's family background, decision to participate in the photovoice project, personal definition of maternal and child health, personal understanding of a "healthy family", perceptions about challenges to good maternal and child health, and perceptions about related community strengths.

At the end of the project, more than 1,300 images had been generated. The photos and captions were all imported into excel. The thesis author made a duplicate of the full dataset, and cleaned it by removing pictures that were exact duplicates, indistinguishable, or uncaptioned. This process resulted in 781 unique, captioned photos. The thesis author reviewed all of these pictures and captions to identify general themes, and then coded them to identify theme frequency; themes were not mutually exclusive (meaning that a photo could belong to more than one category).

Methods: Maternal Health Facility and Care Observations

To better understand the capacity, needs, and strengths of health facilities in the region, SAFE undertook two observational studies of care provided in 14 health facilities, including SAFE primary, secondary, and unaffiliated facilities. In the first study, a fulltime SAFE-employed midwife who was trained in conducting observations conducted observations of care for 6 months. In the second study, the thesis author undertook 12 observations of both daytime and nighttime care in the summer 2013.

The first set of observations were recorded by the employee and submitted to SAFE in report format on a weekly basis. The second set of observations was documented in detailed field notes by the thesis author. Some observations included deliveries, while others were only an observation of labor care, the physical delivery environment, or the availability of drugs and technology. Both the midwife and the thesis author had been trained in the monitoring of Signal Functions and in providing descriptive data regarding birthing environment and quality of care.

For each observation, both the midwife and the thesis author obtained verbal consent from all healthcare providers in the facility along with all patients and their families. The consent process included explaining to all involved the purpose of our observations, that the observations would be kept anonymous, and that they could ask the observers to leave at any time.

The thesis author reviewed all reports and field notes against a pre-defined check list of Signal Functions (see Chapter 1's discussion of basic and comprehensive emergency obstetric care). Signal Functions were evaluated only for SAFE primary and secondary facilities, and not for non-SAFE facilities given the limited number of observations conducted in those facilities. The author rated each of the Signal Functions as 0, 0.5 or 1.0. A rating of 0 corresponded to no capacity to provide the service, 0.5 to a report that the facility could provide the service but was

lacking staff, supplies, or equipment during observation or reported regular shortages, and 1.0 with reported and observed capacity to provide the service at all times.

In addition, the thesis author checked the reports and field notes against the following added criteria as components of quality: labor monitoring; had all basic vaginal delivery supplies; delivery bed was stable, clean and accessible; appropriate sized and functional neonatal bag-valve mask was available; skilled care was available at all night visits; if a delivery was observed, two members (at a health facility) or three members (at a hospital) were available; facility had grid electricity; facility had reliable grid electricity at all visits; and facility had solar in maternity ward. Reliable electricity was defined as whether or not in the prior week there had been continuous electricity in the maternity ward at all times that the provider responding to the question had been present.

Results Aim 1: Utilization of Maternal Health Services for Delivery

Two data sources evaluated the utilization of maternal health services for delivery: secondary health statistics and key informant interviews. Secondary health statistics showed that comparing 12 months before and 24 months after the intervention, SAFE intervention facilities experienced a 40.63% increase in the number of monthly deliveries ($M=40.63$, $SD=20.71$), whereas control facilities experienced no significant change ($M=-2.6$, $SD=19.38$), which was a statistically significant difference ($t(5)=-2.8$, $p=0.038$).

This result was also validated by the key informant interviews, which revealed two main themes falling under Aim 1:

- (1) More families are thought to be utilizing health facilities not only for antenatal and delivery services, but also for treatment of general illness and childhood illness, which community groups attribute to SAFE work; and
- (2) The utilization of services would improve further if there were more people involved in community groups; community groups are asking SAFE to further increase their capacity to go both wider and deeper in addressing maternal and child health.

The frequency of responses for each of these themes is given in Table 3.1, after which each theme is discussed in greater detail.

Table 3.1: Frequencies of key informant interview themes under Aim 1.						
Theme	SAFE Unaffiliated (n=3)	Program Beneficiaries (n=21)*			Community Group (n=24)	Total
		eRanger (n=6)	Savings boxes (n=3)	Solar (n=14)		
Aim 1: Evaluate SAFE's impact on the utilization of facility-based maternal health services in its target health facilities in the East Central Region, Uganda.						
1. Utilization of health services is thought to have increased				11/14	21/24	32/38 (84.2%)
2. Utilization would improve further increase if groups expanded					10/24	10/24 (41.7%)

*Two beneficiaries benefited from two different projects, accounting for discrepancy between total program beneficiary interviews and specific project type interviews.

Theme: Utilization of health services is thought to have increased

Most people that were interviewed and affiliated with SAFE in some capacity specifically (and unsolicitedly) mentioned that more people were preparing to access and physically utilizing health facilities as a result of SAFE programs. They not only mentioned this in terms of women seeking antenatal and delivery care, but also in terms of people seeking treatment of general illnesses and childhood illnesses specifically; and it was emphasized both by community members and health facility workers. Some standout quotes include:

SAFE has helped us because it joined us and started to mobilize us on what we didn't know. Now we can mobilize our fellow women who didn't know the relevance of hospitals. Now women are taking children to hospitals.

(Female, SAFE women's group, leadership)

I can't forget to thank SAFE because of all the ideas have initiated in our communities and mostly in our groups. Because right now we are going out to teach pregnant women and now they have started going to health centers. When they are pregnant, they are running to health centers, they are no longer sitting in their villages.

(Female, SAFE women's group, leadership)

And on my last born I did everything I was told, because I was told to save, told to call the eRanger when I reached the time to go to the health center to deliver, and then I did everything I was told. I felt so happy because before I wasn't comfortable, I was moving on a boda boda [motorcycle taxi]. But now I get my baby well, I take good care, and I get

good care because I follow all what I was told to do. I've been driven in an eRanger, I don't walk. I had money to get home and eat something because I saved my money.

(Female, SAFE eRanger/Outreach/Savings Box Programs Beneficiary)

In the past there used to be few mothers but right now there are many mothers who coming in and it is easy for me to attend to those mothers. Because in the past it was hard because I had no light, but now it is easy to attend to the mothers with the solar [suitcase]. So easy to monitor all stages and I'm happy to do that.

(Midwife, SAFE Secondary Health Facility)

Theme: Utilization would improve further if groups expanded

Although community members and health workers felt that utilization of health services had increased, community groups also reported feeling that there would be further increases if they had greater capacity to do more and reach more people. For example:

We request that SAFE promotes us through our dramas. Because right now there are only two subcounties who are benefiting but we would love the whole country, all the mothers in the country, to know the importance of seeking health facility, seeking health help, seeking health advice. If we are empowered to do that, it will help that every mother knows the importance of going to the health center when they are pregnant and going to ANC at the right time and feeding their children well.

(Male, SAFE development association, leadership)

The community has appreciated our services and they are asking us to do more.

(Female, SAFE women's group, leadership)

We want to not just be known in [location] as a village. We want to move beyond [location], beyond [location] District, so that the whole country comes to know that we are [group name] and that they come to know what we are doing.

(Female, SAFE women's group, leadership)

...when they are pregnant, they are running to health centers they are no longer sitting in their villages. Though there are still some. So what we are trying to say, we are requesting SAFE to add more skills so that we can do it more and more perfectly.

(Female, SAFE women's group, leadership)

Results Aim 2: Evaluate SAFE's Impact on each of the Three Delays.

Each of SAFE's three delay components was assessed through two mechanisms: key informant interviews and observations of health facilities. Additionally, third delay barriers were also evaluated through the collection of secondary health statistics related to cases of emergency maternal referral. Collectively, they convey the idea that SAFE effectively targets each of the three delays, but that third delay work is both the most effective at directly improving birth outcomes and the area in which SAFE needs to do the most amount of work to achieve greater impact.

The key informant interviews provide the following insight:

- (1) SAFE is effectively targeting the first delay, but impact is greatest among community group members.
- (2) SAFE's second delay work is effective and well-perceived by community members.
- (3) SAFE's third delay work has the biggest tangible impact, but does not yet respond to all of health facility needs that it ideally should.

The frequency of responses for each of these themes is given in Table 3.2, after which each theme is discussed in greater detail.

Table 3.2: Frequencies of key informant interview themes under Aim 2.						
Theme	SAFE Unaffiliated (n=3)	Program Beneficiaries (n=21)*			Community Group (n=24)	Total
		eRanger (n=6)	Savings boxes (n=3)	Solar (n=14)		
Specific Aim 2: Evaluate SAFE's impact on each of the three delays.						
1. SAFE effectively targets the first delay					23/24	23/24 (95.8%)
2. SAFE second delay work is effective and well-received		6/6	2/2		14/24	22/32 (68.8%)
3. SAFE third delay interventions are biggest success and biggest challenge				14/14	2/24	15/38 (39.5%)

*Two beneficiaries benefited from two different projects, accounting for discrepancy between total program beneficiary interviews and specific project type interviews.

Theme: SAFE effectively targets the first delay

Many community group members specifically referenced impacts on the first delay. A key reported aspect of that success was the delivery of first delay interventions by community members. This was particularly evident when considering how many members felt that their involvement in the groups required that they make their own behavior “set as an example.” To exemplify these points, consider the following quotes:

Because right now we in [group name] set as an example and we go out in the community. We are all healthy and neat in our homes and we are clean. And we are teaching what we have already gone through. We have to teach about going to health centers. So when we get pregnant, we set an example and we go to health centers. So it is being very good for us.

(Female, SAFE women’s group, member)

[Name of group] is a unique group of men formed to educate men and work with SAFE to prepare them for their wives when the wives get pregnant. We have to educate them to prepare for safe pregnancy and safe delivery... The big dreams of [group] are, or aims are, once a woman gets pregnant a father expects a child, or both the parents expect a child and when the child is delivered we need to care for that child.

(Male, SAFE men’s group, leadership)

We go to communities educating women to deliver in health centers, because delivering in villages at homes has caused much maternal death, but after our education on safe pregnancy and delivery women go to health centers and are helped by midwives.

(Female, SAFE women’s group, leadership)

I tell my girl that if you’re pregnant, you should make sure you go to health center or to hospital to get treatment when your pregnancy is one month old. Then you should follow, like you should always go back when you need it. And when you reach the time you need to go to deliver you need to go to deliver in hospital and not to a TBA.

(Female, SAFE women’s group, member)

Theme: SAFE second delay work is effective and well-received

Generally, both community group members and program beneficiaries of second delay projects (savings boxes in Save for Safe Delivery, and the eRanger motorcycle ambulance) reported being satisfied with SAFE’s second delay work. Moreover, while community groups certainly seemed to “own” their work on first delay barriers, this sense of pride and ownership

was even more clear when they referred to second delay projects. Judging from the interviews, it is likely that this sense of community ownership is contributing to the projects' success, and as such, that replicating the "ownership" piece of the model in any added projects or expansions to new communities would be vital. Quotes highlighting these trends include the following:

I bought a saving box because I'm pregnant and it will help me when I start with labor pains to reach the health center. I have delivered some of my babies in hospitals... We decided to start saving to prepare while pregnant so that when labor starts, I have the funds. I got the box in February. [In one month] I have saved 3700 [Ugandan Shillings]. It is helping. I encourage other women to start saving with the box.

(Female, Savings Box Program Recipient)

SAFE provided transport for us, the eRanger which is used to carry pregnant women so they are no longer dying on the way.

(Female, SAFE women's group, leadership)

Before, we used to not make it sometimes and we used to lose those women because of the poor transport. But right now it is doing a lot of work, people are in the position to reach the health facility in the right time and not too late.

(Female, SAFE women's group, leadership)

The eRanger which is helping us, the mothers so much that they don't lack transport and we have reduced the number of mothers who lose their babies and mothers who die on the way.

(Female, SAFE women's group, leadership)

Like we are sensitizing the community to do some good things which can bring good health to them. And by doing that we have organized the whole exercise, sensitizing people to use the eRanger motorbike ambulance to take them to Lubira and that one is doing very well. And I am happy as the [leadership title], that is a very good achievement! Because our women who have been dying on the way are no longer dying because there is means of transport to take them to the maternity ward. And SAFE has done a lot of things with us as I have just talked, we started with the motorbike ambulance which is helping us do a lot of work to the women to the sick people who may need it and it stops death which has been raising up now and then.

(Male, SAFE men's group, leadership)

Much effort we put in applying for support of the transport. And Safe Mothers, Safe Babies agreed to hand us an eRanger. So what I was talking about was that we as group members, we must fight to see that that program does not end up, [pause], so we must

really work hard for the contribution and we must take time to go down to the community members and be sensitized about how to maintain the eRanger and they will have to contribute as much as they are fulfilled. Why we want the community to be involved is to make sure that eRanger is theirs. It is their responsible, to feed it, to contribute to make it move. Yes we want them to know that it is theirs, they own it, and whenever they see it carrying another figure, apart from carrying the sick people or pregnant women. They can alarm. That, 'Oh look there is our eRanger going to another activity which is not our good work.' So we make sure that the community is aware of their eRanger.

(Male, SAFE development association, leadership)

I failed to deliver at [health facility]. The midwife decided that I had to be referred to [health facility]. They called the driver, he came, and he drove me here to [health facility]. We rode on the bike four people—the driver, the mother, and two family members. We felt comfortable, almost like on a car, so it was fun coming here because we weren't fearing. I delivered normally here, but had some tears, so they sutured me.

(Female, eRanger Program Beneficiary)

Theme: SAFE third delay interventions are biggest success and biggest challenge

SAFE third delay projects seemed to be very important to both community members and health facility workers. From the health worker perspective, these projects (especially solar installation) had the most direct impact on improving birth outcomes; in fact, *all* health workers interviewed specifically cited third delay projects as being directly related to improved maternal and neonatal outcomes. These interviews with healthcare workers also had the strongest and most conclusive language related to impact of any interviews conducted. That being said, there was also a sense that SAFE hadn't done enough to respond to third delay barriers. Although SAFE has sought to improve the commodity security of target facilities (which was noted most clearly in SAFE primary health facilities), more is needed to really ensure that healthcare workers have what they need to save lives when necessary. Key quotes in this theme include:

The other people, they brought the AMBU bag with the big mask, so big it cannot fit the baby's small face. We thank you for bringing us this small mask, we save many babies when they need resuscitation.

(Nursing Assistant, SAFE Secondary Partner Health Facility)

SAFE gave us solar in our health center and our hospital. It has solar. Before women were dying in hospital because they didn't have enough light, they were giving birth in darkness, but right now we have solar. So we use solar in hospital.

(Female, SAFE women's group, leadership)

The most difficult part, delivering a baby in darkness, like it's hard to resuscitate if you don't have light. It's so easy for the baby to take in the fluid that comes. But with the solar light, it's so easy to do that.

(Midwife, SAFE Secondary Health Facility)

[In the past] we could buy kerosene and then be worked on at night but now it's no longer there. There is light in maternity ward everyday and on top that there is no electricity in the whole ward of maternity so it's solar power which is being used on a daily basis. It has also improved on the performance of our health workers in maternity ward, as they would fear to sleep in the ward during night because of darkness but now there is light everywhere.

(Female Program Beneficiary)

I used to deliver from TBAs because whenever I could come out at night I would not find the midwife in the ward, and they would tell me to buy kerosene . But now that problem is solved [motioning to Solar Suitcase] and I deliver from the health unit.

(Female, Program Beneficiary)

My daughter suffered from measles, malaria and pneumonia at the same time with severe vomiting and diarrhea, which made her dehydrated. On reaching the hospital at half-passed midnight on the [date] of December, there was no power in the hospital. We were referred direct to the operation theater room for the doctors to put canula [IV] so that treatment is provided to her... I told my wife that I helped Safe Mothers, Safe Babies to identify five health centers in areas that received Solar Suitcases. Am happy for this intervention. Baby [name]'s life was saved and now she is improving because it would have been difficult to see the vein where the canula was injected without good lighting.

(Male, Program Beneficiary)

Except they are lacking a few few things, bedding, sheets, blankets, are not there. But they are coming with their own. What we are lacking also is the outside lamp. When patients are coming in you cannot tell whether patients are the ones who are coming, you fear also to open. Because we don't have light there at the gate.

(Midwife, SAFE Secondary Health Facility)

But in post-partum, that is where we have no light. Whereby now she remains in darkness, but that one remains permanent. So there when a mother has delivered it is when we always get problems. She remains in darkness, you never know she can easily bleed. You are not seeing what is going on. So that room also needs at least a bit of light.

(Midwife, SAFE Secondary Health Facility)

I wanted to stop producing and go to family planning. But they told me in the hospital that I'm still young and I may need to give birth another time because I have a lot of eggs to produce children.

(Female, SAFE women's group, member and mother of five)

But my biggest concern is about mama kits. If you could come up with some other mama kits because the first ones were so good but these others were not so good so if you could get other mama kits for the mothers it would be fantastic.

(Female VHT)

At that time, there was no mama kits. But we would just carry the things... Like you're supposed to carry soap, [indecipherable], cotton, twine to tie the umbilical cord, the clothes to carry your baby, and syringes and gloves.

(Female, SAFE women's group, member)

Observed impact and deficiencies in third delay interventions

This last notion—that SAFE's third delay work has the most direct impact on birth outcomes but that SAFE has not yet done enough to address third delay deficiencies—was confirmed by results from the review of obstetric emergencies and by observations in health facilities. First, the evaluation of complications and emergency maternal referral from reviewing cases in secondary health statistics suggest that SAFE facilities have a slightly higher capacity to provide emergency obstetric care than non-SAFE facilities. Results are presented below.

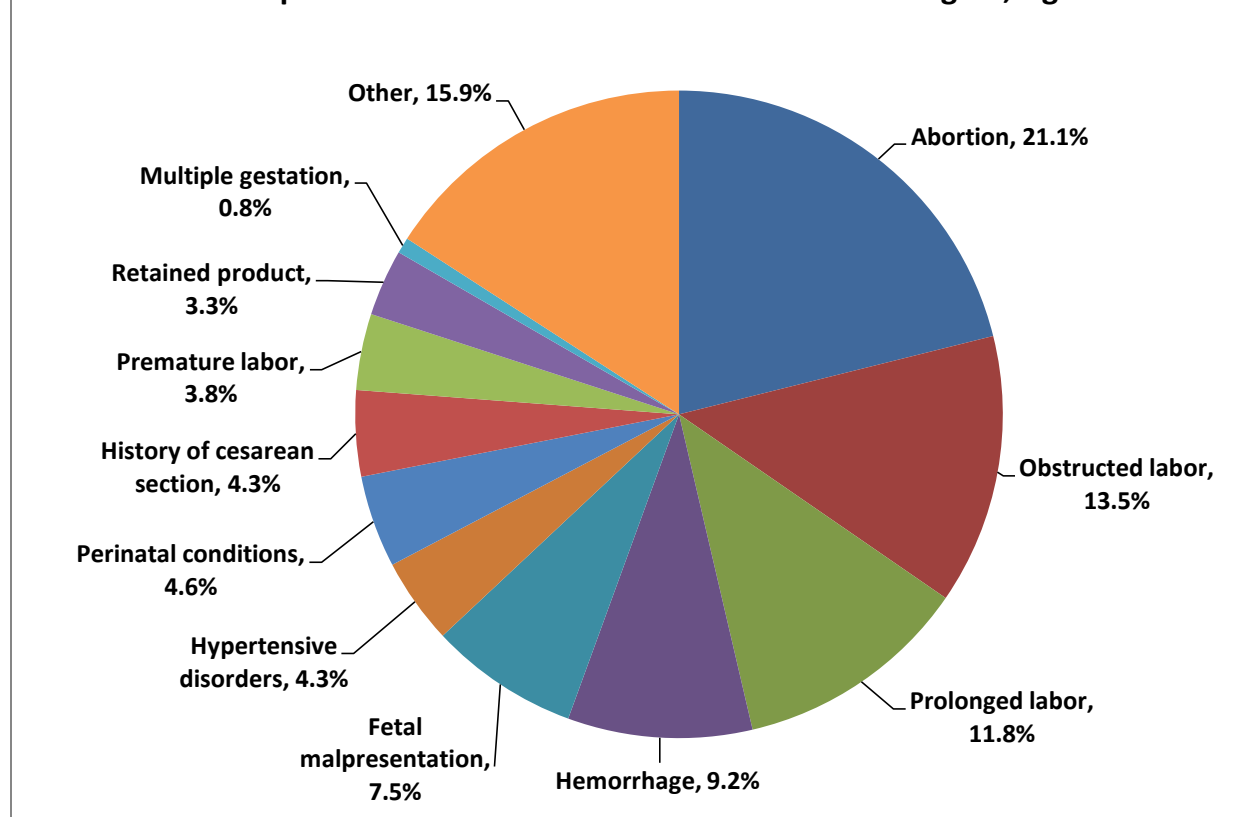
In total, 1,536 cases of obstetric complication were reviewed, of which 630 cases (41.02%) were referred to a higher level health facility. Within referral cases, 382 cases occurred in SAFE facilities and 248 cases occurred in non-SAFE facilities. Sociodemographic and medical history characteristics for all cases, all referral cases, and SAFE referral versus non-SAFE referral cases are given in Table 3.3.

Table 3.3: Select sociodemographic and medical history characteristics in cases of complicated pregnancy among seven health facilities in the East Central Region of Uganda over a 16 month period.										
Variable	Overall (N=1,536)		Non-Referrals (n=906)		Referrals (n=630)		Non-SAFE Referrals (n=248)		SAFE Referrals (n=382)	
	No.	%	No.	%	No.	%	No.	%	No.	%
Maternal Age										
10-14	8	0.5%	4	0.4%	4	0.6%	2	0.8%	2	0.5%
15-19	404	26.3%	237	26.2%	167	26.5%	68	27.4%	99	25.9%
20-24	384	25.0%	231	25.5%	153	24.3%	60	24.2%	93	24.4%
25-29	269	17.5%	157	17.3%	112	17.8%	49	19.8%	63	16.5%
30-34	234	15.2%	139	15.3%	95	15.1%	35	14.1%	60	15.7%
35-39	121	7.9%	70	7.7%	51	8.1%	17	6.9%	34	8.9%
40-44	23	1.5%	10	1.1%	13	2.1%	5	2.0%	8	2.1%
45+	5	0.3%	2	0.2%	3	0.5%	0	0.0%	3	0.8%
Missing	88	5.7%	56	6.2%	32	5.1%	12	4.8%	20	5.2%
Overall Average	24.7 years		24.6 years		24.8 years		24.5 years		25.1 years	
Parity										
0*	207	13.5%	104	11.5%	103	16.4%	47	19.0%	56	14.7%
1	318	20.7%	194	21.4%	124	19.7%	43	17.3%	81	21.2%
2	180	11.7%	108	11.9%	72	11.4%	28	11.3%	44	11.5%
3	155	10.1%	97	10.7%	58	9.2%	29	11.7%	29	7.6%
4+	554	36.1%	315	34.8%	239	37.9%	83	33.5%	156	40.8%
Missing	122	7.9%	88	9.7%	34	5.4%	18	7.3%	16	4.2%
Average Parity	3.3 pregnancies		3.2 pregnancies		3.3 pregnancies		3.0 pregnancies		3.5 pregnancies	
History of Abortion *										
No	507	33.0%	311	34.3%	196	31.1%	57	23.0%	139	36.4%
Yes	172	11.2%	124	13.7%	48	7.6%	7	2.3%	41	10.7%
Missing	857	55.8%	471	52.0%	386	61.3%	184	74.2%	202	52.9%
Maternal HIV Status*										
Positive	64	4.2%	30	3.3%	34	5.4%	16	6.5%	18	4.7%
Negative	1,115	72.6%	678	74.8%	437	69.4%	169	68.2%	268	70.2%
Missing	357	23.2%	198	21.9%	159	25.2%	63	25.4%	96	25.1%

* Denotes statistically significant difference between non-referral and referral cases.

The distribution of primary reason for referral for all referral cases is given in Figure 3.1 on the following page. Overall, the leading cause of referral was abortion (21.1%). The second leading cause of referral was obstructed labor (13.5%), followed by prolonged labor (11.8%), hemorrhage (9.2%), and fetal malpresentation (7.5%), with the remaining categories each taking up less than 5%. The category “other” included other direct (5.9%) and indirect causes (1.6%) that were rare and case-specific along with unspecified causes (8.4%).

Figure 3.1: Primary Reason for Referral among Cases of Obstetric Complication that were Referred in East Central Region, Uganda



Complicated cases in SAFE facilities were referred 15.7% less often than complicated cases in non-SAFE facilities ($\text{Chi}^2(1)=5.45$, $\text{Pr}=0.02$). Yet, they were still as likely to be referred for cases of serious complication (malpresentation, non-abortive hemorrhage, hypertension, and prolonged and obstructed labor (see Table 3.4). These results suggest that SAFE facilities might be slightly better prepared to handle complications, which was confirmed by observational data.

Yet, results from the observations also showed that quality was generally low in all facilities and that there were significant deficiencies in both emergency obstetric care capacity and in basic infrastructure and other areas of service provision.

Table 3.4. Percentage of each type of obstetric complication that was referred, overall and by intervention status, among cases of obstetric complication in seven health facilities in the East Central Region of Uganda over a 16 month period.							
Variable	Overall (N=1,536)		Non-SAFE (n=552)		SAFE (n=984)		P value
	No.	%	No.	%	No.	%	
Complicated cases that were referred*	630	41.0%	248	44.9%	382	38.8%	*
Cases of malpresentation that were referred (n=79)	49	62.0%	19	65.52%	30	60.0%	
Cases of non-abortive hemorrhage that were referred (n=70)	53	75.7%	23	71.9%	30	79.0%	
Cases of hypertension that were referred (n=29)	26	89.7%	3	100.0%	23	88.5%	
Cases of prolonged labor that were referred (n=83)	80	96.4%	35	100.0%	45	93.8%	
Cases of obstructed labor that were referred (n=86)	84	97.7%	35	100.0%	49	96.1%	

*Denotes a statistically significant difference between intervention and control cases.

Scores are given for each of the 12 observed SAFE and non-SAFE facilities in Table 3.5. The average score for health centers on capacity to provide basic EmOC was 1.9 overall and 2.1 for HC IIIs and IVs (out of five possible points). The average score for basic EmOC for SAFE primary health facilities was 2.4 whereas it was 1.5 for SAFE secondary health facilities. The biggest deficiencies were in the provision of anticonvulsants and assisted vaginal delivery. In fact, no facilities (including hospitals) could provide assisted vaginal delivery and only two health centers could provide anticonvulsants (both of which reported only occasionally having a supply of proper drugs).

The average score for hospitals on their capacity to provide comprehensive emergency obstetric care was 4.25 (out of seven possible points). It is encouraging to see that the only basic Signal Function hospitals did not provide in any way was assisted vaginal delivery. Yet, even though hospitals reported the capability to provide the other services, they also experienced shortages in supplies, technology, infrastructure, and staff.

Furthermore, all facilities were able to manually monitor labor. Additionally, all SAFE-affiliated facilities (primary and secondary) had functional solar electricity in the maternity ward. Skilled care was available at night in all but one health center and in both hospitals. All SAFE primary facilities had a functional and appropriately sized neonatal bag valve mask.

HC Identifier		Signal Function (Capabilities)								
		Parenteral antibiotics	Oxytocic drugs	Anticonvulsants	Manual removal of retained products	Assisted vaginal delivery	TOTAL Basic EmOC	Cesarean section	Blood transfusion	TOTAL Comprehensive EmOC
HC II	1	0	0.5	0	0	0	0.5	0	0	0.5
	2	0	0.5	0	0.5	0	1	0	0	1
HC III	*3	1	0.5	0.5	0	0	2	0	0	2
	*4	1	1	0	1	0	3	0.5	0	3.5
	*5	0	0.5	0	1	0	1.5	0	0	1.5
	6	1	0.5	0	0	0	1.5	0	0	1.5
	7	1	0	0	1	0	2	0	0	2
	8	0.5	0	0.5	1	0	2	0	0	2
	9	0.5	0.5	0	1	0	2	0	0	2
HC IV	*10	1	1	0	1	0	3	0.5	0	3.5
Hospital	11	1	1	0.5	1	0	3.5	0.5	0.5	4.5
	12	1	0.5	0.5	1	0	3	0.5	0.5	4.0

* Denotes a SAFE Primary Health Facility. All others are SAFE Secondary Health Facilities.

Scoring: 0=Reported as never available or performed.

0.5= reported having capability but did not possess equipment at the time of observation, reported stock-outs of necessary drugs or supplies, or reported only providing service sometimes.

1=reported as providing service all the time, having no stock-outs, and required drugs and equipment directly observed.

Mean Basic EmOC Score for SAFE Primary Health *Centers*: 2.4 (and 2.2 excluding the HC IV) (out of 5 possible points)

Mean Basic EmOC Score for SAFE Secondary Health *Centers*: 1.5 (out of 5 possible points)

Mean Total Comprehensive EmOC Score for *Hospitals*: 4.25 (out of 7 possible points)

Although all 12 facilities had some basic vaginal delivery supplies, nine of them (75%) either had observed or reported shortages of the most basic commodities in between supply shipments. The floor of the birthing environment was covered in bodily fluids and/or bat guano in five health facilities and one of the hospitals. Only three facilities and one hospital had *any* clean delivery bed that was stable and accessible to patients and providers. Three of the SAFE secondary health facilities lacked a functional and appropriately sized neonatal bag-valve mask. Both hospitals had an insufficient number of the masks, with one hospital having no functional mask in the operating theater. All but three facilities lacked enough nighttime staff to provide care to all mothers and all babies whose deliveries were occurring at the time of observation.

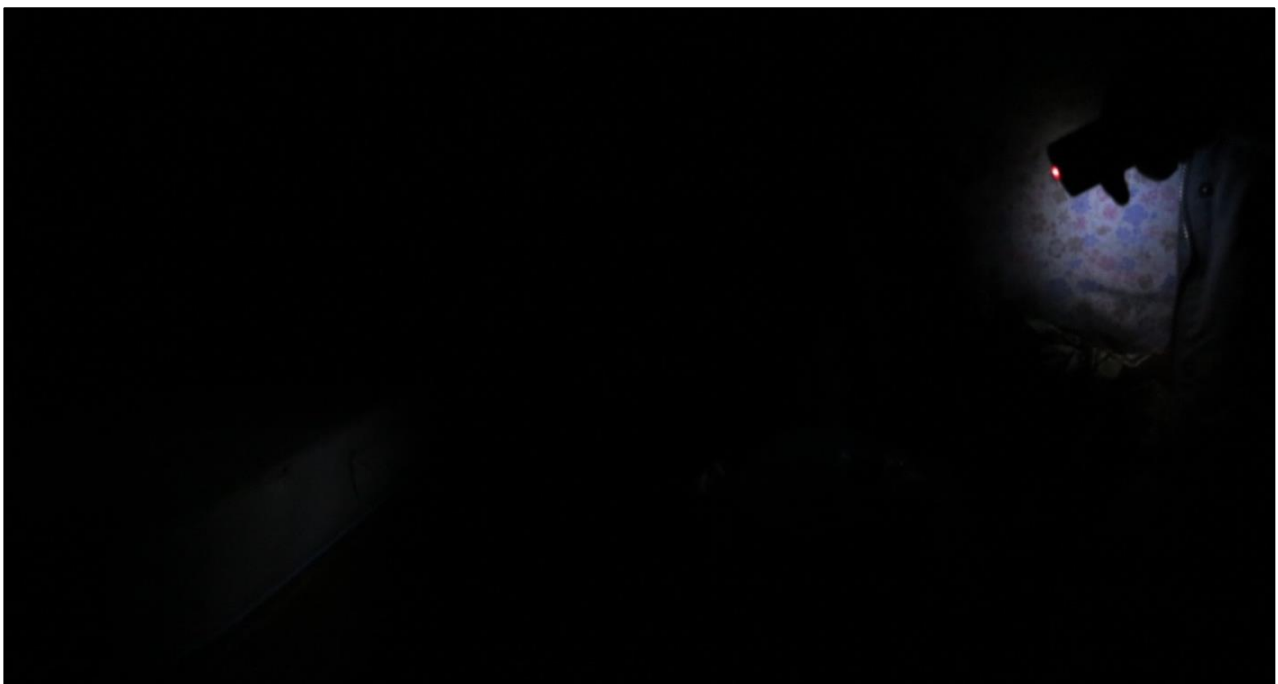
Only two health centers and the two hospitals had any grid electricity, and no facilities had *reliable* grid electricity. SAFE-provided solar electricity was not only the sole light source at night in most health centers, but also a primary source of light in the daytime for both health centers and hospitals. Non-SAFE affiliated facilities had no back-up source of light, and reported regular outages that impacted the quality of care provided, the security of the facility, whether the facility could stay open at night, and the utilization of services for nighttime delivery. Additionally, the observations portray four more generally encompassing themes related to SAFE third delay work, each of which is explained in greater detail below:

- SAFE-provided solar electricity has impacted quality of care both day and night.
- Too few healthcare providers provide services at night.
- Facilities lack the supplies and infrastructure needed to provide high-quality care.
- Some providers provide compassionate, respectful maternity care, but others do not.

Theme: SAFE-provided solar electricity has impacts quality of care both day and night.

The most vivid example of SAFE's impact on the third delay was contrasting the way that non-SAFE facilities struggled to provide obstetric care at night without a mechanical light source with SAFE-affiliated facilities who provided care under Solar Suitcase light. Procedures observed in the dark included labor monitoring, vaginal examination, delivery, and neonatal resuscitation; these procedures were conducted by the light of a candle or cell phone in two facilities that were not yet affiliated with SAFE (both of which has subsequently received a Solar Suitcase, one from SAFE and one from a different organization). Please see the on the following page for examples. The first picture shows a maternity ward in the East Central Region that has

no electricity. If you could turn the lights on, you would see ten pregnant women lying on mattresses and on the floor. The room has only one light source, a small candle furnished by a patient's family at the far corner window. The next two pictures are from the delivery rooms of two facilities also lacking electricity, the first showing a labor bed by cell phone light and the second showing a labor examination by candlelight.





Observing the provision of obstetric care under Solar Suitcase light made it easy to understand how essential the presence of reliable electricity is for the provision of obstetric services and emergency obstetric care. The lights were used to not only conduct deliveries and identify/manage complications, but also administer medications, perform cesarean sections, and manual vacuum aspiration, to name a few. Consider the following pictures that show care provision in Solar Suitcase lit facilities. The first page shows labor, birth, and breastfeeding instruction in a health center; the next shows an emergency cesarean section in a hospital.





Theme: There are not enough healthcare providers present to provide services at nighttime.

Even in facilities where there were 2 or 3 healthcare providers present for a nighttime delivery (which was rare), enough staff was rarely available to provide care for both mothers and their newborns at night. In six months of the midwife's documented observations and the thesis' author's own observations, in only two instances did a facility have adequate staff to tend to all patients at night. The SAFE-employed midwife was forced to step out of her observer role to provide services an average of once per week when a facility didn't have enough staff to care for a post-partum mom and an apneic (not breathing) newborn. This was consistent with the thesis' author's experiences. On five separate occasions, the thesis author was the only other person in the delivery room besides the birth attendant who was capable of providing even basic medical care during deliveries in which both the mother and the newborn had complications requiring immediate life-saving intervention.

Although observed daytime deliveries encountered some of the same problems, they were not nearly as frequent or severe as they were during nighttime deliveries. Through these observations, it became clear that there are, in general, just not enough healthcare providers to provide services, particularly at night. This is particularly important given that SAFE has not intervened to increase the availability of staff, despite the fact that SAFE programs directly target increasing the strain on the healthcare workers by increasing institutional deliveries.

Theme: Facilities lack the supplies, infrastructure, and environment needed to provide high-quality care.

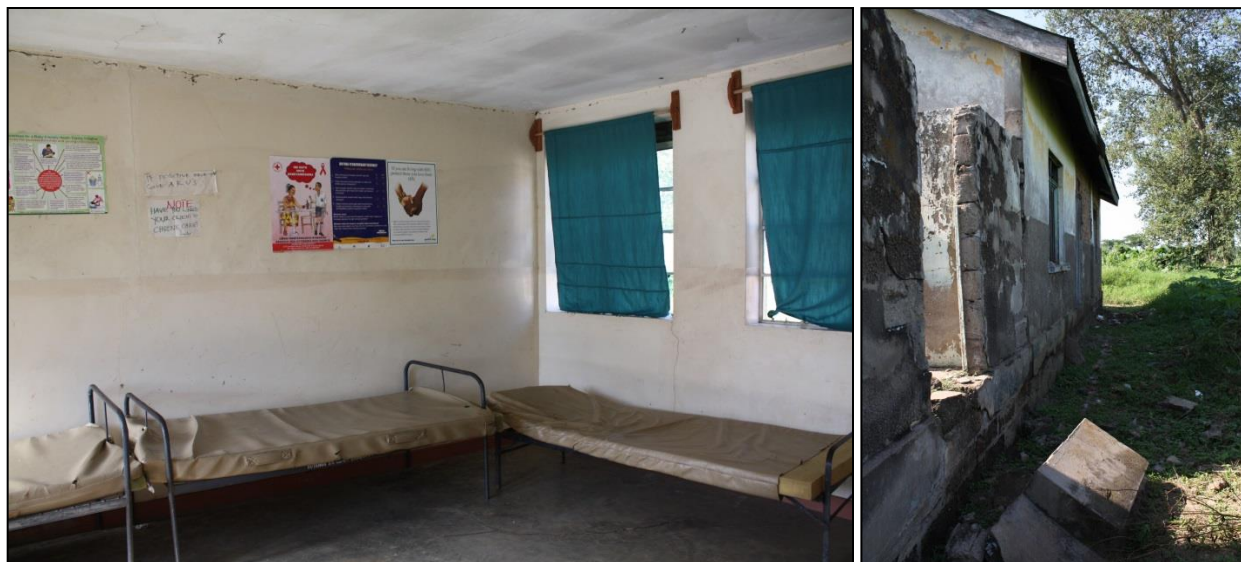
All facilities, without exception, lacked some type of basic medical supply that is necessary for the provision of even the most rudimentary quality obstetric care (blood pressure cuff, stethoscope, gloves, cord clamp, etc.). Even the health center delivery that had the most staff members present with the most stable bed and the cleanest compound still encountered significant supply deficiencies, best exemplified through excerpts of my field notes (pertinent supply deficiency examples and related effects are shown in bold) :

*While we waited, one of the other patients' pregnant sisters was present in the delivery room and started talking with us about feeling sick and her past history with elevated blood pressure. [Midwife] reported that **the facility's blood pressure cuff and stethoscope had "got spoiled."** We used our own blood pressure cuff and stethoscope to take the woman's blood pressure while she was seated with her legs flat; **her blood***

pressure measured 210/120, taken in both arms 15-20 minutes apart from each other [this is very high and could lead to very serious health consequences]...

*The patient had incurred a second degree tear about 1” into the vaginal canal and 1” down towards the anus during delivery. The nursing assistant was instructed to find lidocaine [numbing agent] in preparation for the suturing, and asked me to accompany her to look for the medication so that she could utilize my light, as the lidocaine was kept in another area of the health center that was not illuminated by Solar Suitcase light [facility did not have grid electricity either]. She searched the filing cabinet to no avail, and searched supplies in another part of the building; she concluded that **they had no lidocaine**. As a result, [midwife] **provided only four stitches to the tear with no anesthesia**. The patient was in significant pain during this process, and thereafter; **stitching was inadequate to provide sufficient repair, as the skin inside the vagina and the perineum was not sutured completely shut**.*

In another health facility, every inch along every single wall in the maternity ward was cracked at the joints where it met the ceiling. There was also a crack running the entire length of the ceiling across the building. Women on the premises for antenatal care reported that they were “scared to deliver here for fear it will just fall down.” The step up to the maternity ward bathroom had long since fallen away from the building, making it a 1.5 foot leap from the ground to the doorway. Likewise, bat guano was sometimes so potent in the maternity ward that antenatal care clinic had to be held outside. Nobody—providers, women, or researchers—wanted to stay in the room, let alone give birth in it. Examples are shown in the pictures below.



These types of experiences were common in both rural health centers and hospitals. In one instance, a cesarean section taking place in a hospital operating theater was to begin immediately after another cesarean section had ended. The hospital was out of bleach, which is the only disinfectant they use to sterilize the operating room following procedures. The staff said that they “had to improvise to save somebody’s life”, so they washed the blood and amniotic fluid from the first delivery off the gurney and down the operating theater room floor with cold soapy water, wiped it down with a squeegee, and wheeled in the next patient.

Moreover, although the Solar Suitcase light benefitted patient care, reported staff satisfaction, and security, it often did not have enough bulbs to light all rooms of the health facility involved in obstetric care. For example, in one facility, the light did an excellent job illuminating the delivery room and post-partum ward, but was unable to provide light for the “sluice room” (where all materials, medications, and equipment are kept). This resulted in the midwife’s inability to find a bag-valve mask to resuscitate a distressed newborn. Another common problem was that many facilities wanted to provide a “security light” in the window of the health facility to communicate that a healthcare provider was present to provide services. Given that the Solar Suitcase usually provides only two lights, taking one of them to hang it in the window dramatically reduced the use of light in patient care. Yet, providers felt that this light was important enough to warrant taking it away from other potential uses. In summary, all observations of patient care revealed significant deficiencies in the physical infrastructure of health facilities and their medications and equipment.

Theme: Some providers provide compassionate, respectful maternity care, while others do not.

Some of the observations exemplified the provision of very compassionate and respectful maternity care. In one nighttime delivery, the midwife worked diligently to preserve the privacy and confidence of an HIV positive mother delivering her fourth child. She encouraged the mother to walk around and eat and drink. She not only followed protocol in the management of each stage of labor, but also took extreme caution to contain body fluids and follow protocol to prevent mother to child transmission of HIV. She even helped the mother dress and walk back to the post-partum area. Although the presence of the research team may have influenced her behavior, the compassionate care of the midwives in that facility was noted by many women who

had received delivery care at the facility when asked in informal discussions about the strengths and weaknesses of the community and health facility.

This contrasts sharply with two other experiences. In one health facility, a midwife put on two pairs of sterile gloves, but then dipped her gloved fingers in a bottle of pure bleach before conducting a vaginal exam (thus inserting pure bleach into a laboring woman's vaginal canal). During the same birth, when the patient screamed during crowning [when the baby's head emerges at the vaginal opening], the midwife slapped the woman both on the face and on the thigh close to her vagina and told her to be quiet.

During another observation, a midwife delivered premature twins at approximately 30-32 weeks gestation who were both born alive with heartbeats but not breathing; but she did not try to resuscitate the babies and recorded them as "fetal deaths" in the maternity register because she "didn't think that they would survive." She would not allow her patient to see the babies and discouraged the mother from crying.

During both of these latter experiences, it would have been inappropriate to inquire or comment about the behavior from the midwife directly at the time. Instead, the thesis author discussed the observed behavior (while keeping the location and identities of the health facilities and personnel involved confidential) with a leading district health official who was charged with managing midwives. Her explanation was that the midwives get so overworked, underpaid, and undertrained that they often lose patience with laboring women and take "shortcuts", some of which make health outcomes worse. Although not an excuse, she said it was the reality of what was happening because of the severe infrastructure, training, and personnel shortages.

Results Aim 3: Strengths and Weaknesses of the Approach

The strengths and weaknesses of SAFE's approach were assessed by key informant interviews and the photovoice project. A few themes emerged from the interviews have not been covered elsewhere. They portray an image that SAFE's approach is well-perceived and successful from the perspective of community members. Yet, it also becomes clear that there are many aspects of the approach contributing to success that SAFE has not overtly recognized as crucial to the model, which should be acknowledged to facilitate replication. Themes include:

- Maternal health is personal, which can be leveraged to improve behavior.
- SAFE's approach is unique.

- SAFE work empowers women.
- Being inclusive of men is an essential component of SAFE’s model.
- Community definitions of maternal and child health vary widely.
- Community perceptions of the greatest barriers to good maternal and child health vary widely, which must be acknowledged in the model for it to be replicated.

The frequency of responses for each of these themes is given in Table 3.6, after which each theme is discussed in greater detail.

Table 3.6: Frequencies of key informant interview themes under Aim 3.						
Theme	SAFE Unaffiliated (n=3)	Program Beneficiaries (n=21)*			Community Group (n=24)	Total
		eRanger (n=6)	Savings boxes (n=3)	Solar (n=14)		
Aim 3: Identify strengths and weaknesses of SAFE’s approach, and make recommendations to improve the program and potentially facilitate future scale-up.						
1. Maternal health is personal	2/3	6/6	2/2	9/14	22/24	40/48 (83.3%)
2. SAFE’s approach is unique		6/6	2/2	13/14	23/24	43/45 (95.6%)
3. SAFE work empowers women					17/24	17/24 (70.8%)
4. Involving men is essential for SAFE’s approach to work	2/3				10/24	12/27 (44.4%)
5. Definitions of maternal and child health vary widely	3/3				17/24	20/27 (74.1%)
6. Community perceptions of MCH barriers vary widely	3/3				21/24	24/27 (88.9%)

*Two beneficiaries benefited from two different projects, accounting for discrepancy between total program beneficiary interviews and specific project type interviews.

Theme: Maternal health is personal

All participants but one reported knowing someone (and usually more than one person) who had died during childbirth. Moreover, those people the SAFE team would describe as the best “change champions” pushing for the improvement of maternal health in their communities (either in SAFE communities or non-SAFE communities) would describe their motivation in personal terms. After hearing their stories, it became easier to understand both the urgency of

their viewpoints related to maternal health, and their success in addressing it. This finding has important implications for understanding how SAFE's model works and, potentially, how to replicate it. For example, consider the following quotes:

I know of a woman, a lady called [name]. She died during labor. She gave birth in the village so that when things became bad, they wanted to rush her to the hospital, but she died on the way. Even now, if my wife gets pregnant, until the day of having given birth, that is when I can eat food as if it is in my stomach. It gives me worry, though I like children, but it gives me worry. According to the examples of those ladies who died during labor because when I remember how those people, [pause], because you can get her in the morning a normal person, by noon you can find that she has died during labor. If my wife reaches the seventh month to the end of the day of labor, my minds are not settled. You can find me talking alone, thinking of how can I pass that small short time to finish it. I cannot feel like eating when my wife is in that time.

(Male, unaffiliated with SAFE)

Yes, my brother-in-law's wife experienced that. She got labor pains when she was at home and they didn't have transport to take her to health center. So they got TBA to help. But after giving birth she bled until the time she reached the hospital but she didn't make it. [pause]. She died on the way.

(Female, SAFE women's group, leadership)

*Many, I know **many** women who have died while giving birth.*

(Female, SAFE women's group, leadership)

I have. I have known women who died in labor [long pause]. Even one of my daughters, called [name] [crying].

(Female, SAFE women's group, member)

Theme: SAFE's approach is unique

One of the most interesting themes that came from the interviews was a notion of uniqueness. Both community members and district leadership reported a sense of respect for SAFE's approach, sometimes in comparison to other organizations. The respect centered on the approach involving and being driven by community members, which was felt to add to sustainability. For example, consider the following quotes:

Many projects have come with a lot of money. They did a good job, but at the conclusion of their lifespan, they left without leaving anything behind. Because their program was so expensive and unsustainable. Even the local government could not sustain it. So it died a natural death. But the one you have brought, it started right from the grassroots. You have built the capacity of the communities, so that they can sustain it. We are very grateful.

(District Leadership Representative)

We have worked with SAFE for now two years and we have benefited because SAFE has empowered us to do a lot of things. First of all to maintain our sanitation and hygiene in our homes. That is very important, what we started with and it has been maintained up to now. People didn't have pit latrines, basins, tension stands, dust bins, but we have now done it. And we have continued to do with SAFE a lot of things. Like we are sensitizing the community to do some good things which can bring good health to them.

(Male, SAFE men's group, leadership)

SAFE has helped us because it joined us. It started to mobilize us on what we didn't know. Now we can mobilize our fellow women who didn't know the relevance of hospitals. Now women are taking children to hospitals, [and there are] good nutrition programs for the children.

(Female, SAFE women's group, leadership)

I have so much hope in SAFE. We expect to get birth and healthy children and mothers because of what SAFE has introduced to us that we are moving out and teaching to pregnant women, the importance of going to health centers, giving birth in health centers, going for ANC, and being clean in their homes.

(Female, SAFE women's group, member)

I am very humble and pleased to work with SAFE which has come up with very good ideas for helping us reduce maternal rate of death. And this has encouraged us to work with SAFE because it has a very good vision and this vision we know if it continues the death rate of pregnant mothers and their children who die immediately after delivery will reduce.

(Male, SAFE men's group, leadership)

Theme: SAFE work empowers women

Women (and in one case a women's husband) in SAFE community groups report feeling empowered both in their groups and in their personal lives. They also report feeling like they can

empower other women by imparting knowledge to both women and their families. Consider the following explanations from women in SAFE community groups:

Me, as me, I just continue thanking SAFE and appreciating SAFE for what they have done because for me, in my home, I didn't have anything, I could not even introduce people to my home. But right now, since SAFE came, I am somewhere, I am someone, and I can show that that is my home.

(Female, SAFE women's groups, leadership)

SAFE has helped me personally. In the past I was not confident enough to do anything on my own, but since the time SAFE entered my life I can do a lot of things in my home; now I walk confidently and I am something. I have to educate women in the community to deliver at health centers.

(Female, SAFE women's groups, leadership)

I am one of the husbands of the [group name] group members. I thank you very much, I am excited that SAFE taught our women, because before they were somewhat behind in not knowing. But right now they are now able to go out there in the communities and do some good work. And they do it, but SAFE initiated it, the idea. And I welcome you to my home and thank you for the work you have done with them. I am grateful, whenever the women go out, sometimes they say we are going to go out, we are going to have a meeting with SAFE team, they say we are learning "A-B-C-D", but when they come back, we really see what they go to learn. They are doing some good work in the communities. Whatever they doing, they are now presentable ladies and they are looking good. They bring back the information wherever they go. And it is very good.

(Male, husband of SAFE women's group member)

Personally I am proud of SAFE activities that we do in that I am learning a lot that will help me to support my family, be sure that maternal health in my family is good, and know how to care for my children because I have understood everything from SAFE.

(Female, SAFE women's group, leadership)

Theme: Involving men is essential for SAFE's approach to work

Interviews confirmed that being inclusive of men is a very important part of community-based work, and that part of SAFE's success is as a result of not only working with them but really empowering them to be a recognized, integral part of the solution. The following quotes

demonstrate that men can either be very constraining or very encouraging to the quest to improve maternal and child health at the community level:

One of the barriers is misunderstandings between the husband and wife who is pregnant. Sometimes when she is sick and tries to open up to the husband that “I’m sick, I need to get some treatment,” men tend not to bother so it is also a very big problem.

(Female, SAFE women’s group, member)

SAFE has helped me and there is a big difference especially in my life and the way I do my work. I feel empowered to do my work... SAFE programs that were introduced to us empowered us to reach out to relatives and other people in the entire community to know more about the importance of, for example, delivering in health centers.

(Male, SAFE development association, member)

I am [name], [leader] of [group name], or in short [group acronym]. [Group] is a unique group of men, to educate men and work with SAFE to prepare men for their wives when the wives get pregnant... And we have started children’s education foundation circle, which is catering for the children properly delivered from our maternity center. So that these children can be educated, and can be very useful to the nation and to the community as well.

(Male, SAFE men’s group, leader)

Theme: Definitions of maternal and child health vary widely

Community definitions of maternal and child health included a wide variety of ideas. Some included specific mention of both men and women; some were specific to delivery; many included nutrition; others really defined maternal and child health as a “healthy family”. Each of these definitions collectively convey the point that maternal and child health means different things to different people, and that in order to address it from a community perspective, the underlying definition must be contextualized to this local context. Consider the following quotes regarding the meaning of maternal and child health to community members:

Maternal and child health means having a healthy baby and having a healthy mother and that means that there will be development and happiness in the community.

(Female, SAFE women’s group, leadership)

Good homes have people who are healthy, and they have love.

(Female, SAFE women’s group, member)

[Maternal and child health] means giving birth sometimes in hospitals.

(Female, SAFE women's group, member)

Maternal health is having a healthy mother who feeds well and who goes for checkups at the health center. Child health is about caregiving. Childcare has to do with feeding, bathing and making sure that the hygiene of the child is good.

(Female, SAFE development association, member)

It means good family and good child spacing so that you give your body time to rest and for the baby to grow.

(Female, SAFE women's group, member)

Good families have healthy babies with proper feeding and a balanced diet with greens.

(Female, SAFE women's group, leadership)

[It means] once a woman gets pregnant a father expects a child, or both the parents expect a child and when the child is delivered we need to care for that child.

(Male, SAFE men's group, leadership)

It gives to me the picture of where we are going, that we shall have a bright future and that our country is developing because mothers are alive and their babies are alive. That means that we can develop and we can do a lot of things.

(Female, SAFE women's group, member)

Maternal and child health means going to health center or health facility as early as possible when you're pregnant, not waiting for 6 months then you go for ANC. And it means that you have to go to the health center and they check up, you go for ANC, you get advice, they check you to see whether your baby is fine, and also means to go and feed well when you're pregnant, you feed on vegetables, dodo, and all resting and feeding well.

(Female, SAFE women's group, leadership)

Theme: Community perceptions of MCH problems vary widely

Just as varied as the community definitions of maternal and child health were, so were community perceptions of what the key maternal and child health problems and barriers were. People that had been exposed to more of a medical context (like Village Health Team members) had a more medicalized view of "problems" whereas community group members and community

members at large held a more social view of the problems. Answers varied from everything from illegal abortions to poverty to lack of preparedness to men not being supportive of their partners to specific conditions like malnutrition, malaria, and measles. For example, consider the following quotes:

Some parents I have found they are taking to their daughters for abortion which is illegal and they are losing their lives.

(Female, SAFE women's group, member)

The biggest barrier to child health is malaria and because most of the children don't have mosquito nets. And some of them are being affected by measles, but since they are trying to go for immunization, that is not so big. But the biggest is malaria.

(Female VHT)

The biggest barrier to maternal health is the problem of lack of enough money or people don't prepare for themselves when they are going to give birth, they don't prepare for their pregnancies... And then another barrier is lack of transport whereby mothers are sometimes give birth in villages where they don't have enough equipments [sic] like gloves, so in that process, sometimes if the baby comes out they may fail to do it in the smart way and something bad may happen. So in the process of her rushing to the hospital where they can get help for the baby and the mother, the baby die.

(Female, SAFE women's group, leadership)

The biggest barrier is ignorance. People don't know what they are supposed to do, most women don't know what they are supposed to do when they are pregnant. So they need more light to know what they are supposed to do. Another barrier is lack of money, when they don't prepare for their pregnancies. So they reach time of going to hospital to give birth and they don't have money so they end up going to TBAs and giving birth in their homes which has caused a lot of problems.

(Female, SAFE women's group, member)

We have suffered as communities because health centers where deliveries happen are far and the transport to reach those health centers are not good. For example, we have been using our feet and bicycles... Many women have delivered at Traditional Birth Attendants, TBAs, because of the short distances to TBA but when they hear about the e-Ranger and get used to it, they will choose to deliver at health centers.

(Male, SAFE development association, leadership)

Some families are challenged in that they don't have enough money to pay for treatment when they are sick. Some women have lost husbands, and they are widows.

(Female, SAFE women's group, leadership)

Poverty hinders us from buying good food, delivery supplies and the things you need to go and deliver. Women fear going to the hospital for care. They fear that the health center will test them for HIV which will create stress and deteriorates their health. Some women have confidence in local herbs so they decide that instead of going to the health center, they will just take the local herbs.

(Female, SAFE development association, member)

One of the barriers is poor feeding of mothers and misunderstandings between the husband and wife who is pregnant. Sometimes when she is sick and tries to open up to the husband that "I'm sick, I need to get some treatment," men tend not to bother so it is also a very big problem. And too much poverty in the communities whereby someone is poor, doesn't have any savings, she has not saved for the baby. And when it reaches times for giving birth, she's in labor, even if she talks to the neighbor, the neighbor is also can't give any help because they all don't have any money.

(Female, SAFE women's group, member)

The biggest barrier is that most women don't have enough breasts to feed their babies so they have a hard time. Poor feeding is the biggest barrier because when I don't have enough breasts, I am forced to give my kid potatoes, cassava, even before the time they are supposed to eat that. But I have to give that to her or to him because I want the baby to get satisfied. Because if the baby is not satisfied it will cry all that day and you won't get any peace. So in order to make sure that the baby is surviving and satisfied, I will give even what is not supposed to be given, but because I want her to survive and keep quiet and to be quiet and to sleep so that I can also sleep.

(Female, SAFE women's group, leadership)

These ideas related to the definitions and barriers of MCH being varied were confirmed and expounded upon by the results of the photovoice project. Collectively, the photos and captions generated portrayed the idea that maternal and child health is a complicated issue that will not be adequately addressed by a "one size fits all" approach. Community definitions of maternal and child health, and its barriers and solutions are as numerous as the number of people in a community. What public health practitioners often see as cursory support structures to MCH are seen by community members as inextricably linked. Overall, SAFE community group members portray feelings that SAFE's approach is being successful at increasing institutional

delivery and improving outcomes. But they also convey the idea that there is much more work to be done, and success is dependent on that continued community partnership and empowerment.

Towards better understanding these points, consider the following overall themes:

- Community environment and social structures are inextricably linked to MCH.
- Some community-defined MCH problems are addressed by SAFE, others are not
- There are many community strengths/resources to improve MCH.
- Community group members feel pride when they see their work improve MCH.

Each theme is expounded upon in greater detail below, both in writing and with a few example pictures and captions that exemplify the point.

Theme: Environment and social structures are essential to understanding MCH

First, 242 pictures (30.99%) depicted environmental and social structures that the photographers felt were related to maternal and child health. The most commonly photographed elements were agriculture/farming, family structure, and community leaders (formal and informal). For example, consider the following pictures and their captions.



Caption: “This is one of the members of [women’s group name]. She is in the fields. It shows how we survive.”



Caption: "This is a pregnant woman working in the fields. I wanted to show that even if you are pregnant you can work and get something on your own. They will be working until like the eighth month. I wanted to show that harvesting after you plant something. You harvest and you get something."



Caption: "This is my mother's co-wife. She was coming from the garden and that is why she was holding her chin."



Caption: “This is our local council 3 for ladies. She was addressing the community. She was telling the community how to use the boreholes and how it is safe to drink clean water. If you have no Water Guard you have to boil to keep our families healthy. Some of us we know how to use [Water Guard], but some prefer to boil it.”



Caption: “The pastor was praying for a mother and her child during church, during the service time.”

Theme: Some community-defined MCH problems are addressed by SAFE, others are not

Next, 154 pictures (19.72%) showed MCH problems. Some of the problems are already being addressed by SAFE, while others are not. Some of the most common problems addressed in the photos include: competition between co-wives, marital problems, nutrition, hygiene, the health and struggles of widowed women, lack of child spacing, and HIV. For example, consider the following pictures and their captions (shown beneath the picture).



Caption: “This woman fought with her co-wife and she was bitten on the breast. I took this picture because these are the accidents that happen when families fight. I told her to run to the health center... If she had the supplies that we used to give them, I could have offered first aid, but she had nothing. I referred her to [name] Health Center. That was earlier today and I will follow up and see whether she went to the health center. It was early morning... I heard an alarm noise and I ran to this woman. When I arrived, I saw that she was bitten. The co-wife, had disappeared.”



Caption: "This is a mother. She works for her sustainability. The man no longer helps her. When men grow up, they might think that they can dig and they can support themselves and the house. When they grow up, they leave everything to the woman."



Caption: "This is the mother of this one. But she has got a problem - this is her last born. She was in family planning for five years. She has been bleeding for two months. She was pregnant and she had a miscarriage. But she has been bleeding and they told her she has a problem with the placenta. She needs a surgery but she has no money."



Caption: “Those two kids - the one on the left follows the one on the right. Can you imagine? They look like twins. They are facing what we call malnutrition. They don't have enough food. Their mother is divorced. They always stay with their grandmother. The father is a teacher.”



Caption: “This is my husband. He carried these young kids on the boda boda. I wanted to show that this is dangerous and they could have had an accident. These are all my children.”



Caption: “This is a mother with her kids but she is again pregnant. “This is an example of those who don't want to listen about family planning. She even has one that is breastfeeding but she is pregnant. She has 8 kids but she cannot afford to look after them.”



Caption: “She is a widow, elderly. She is helpless. She is alone in the house. She has no son, no daughter. She digs and she can afford to go and dig so she can get food and cook. So she takes care of herself.”



Caption: "I wanted to show some people when they are preparing food, they don't consider hygiene. This lady was preparing sauce but the child is playing next to it."



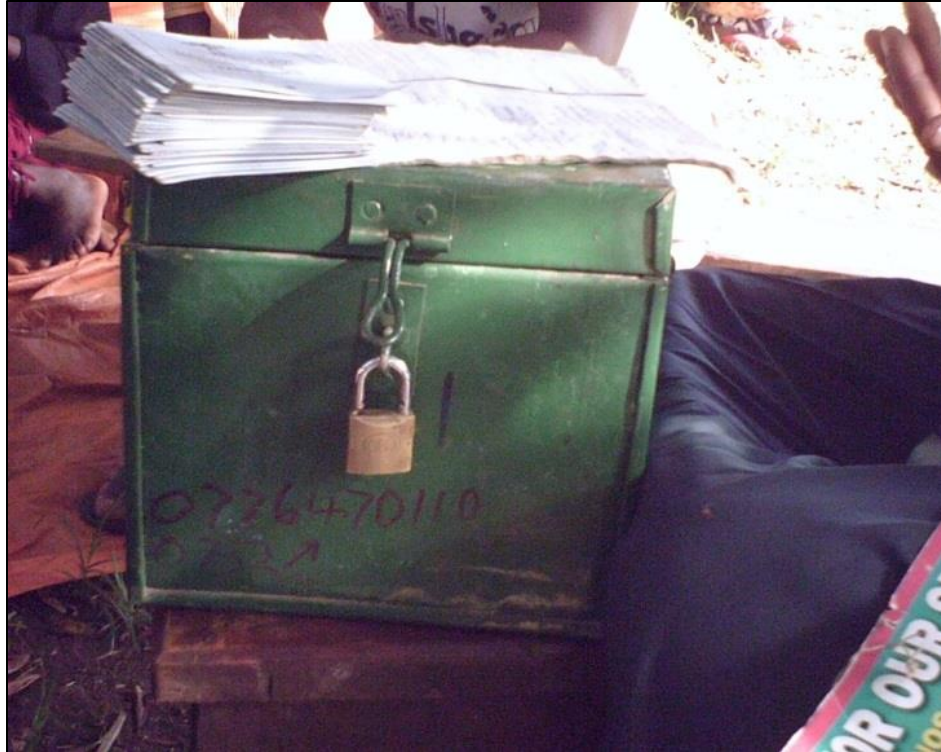
Caption: "The children were fighting for food. I wanted to show that we don't have enough food to feed the large numbers of kids that people have."

Theme: There are many community strengths and resources related to improving MCH

Community strengths and resources working to improve maternal and child health were featured in 370 photos (47.38%). They included photographs of the groups dramas and outreaches; the movement to save money for healthcare; pride that a community raised money to repair a solar unit's battery; immunization outreaches; good nutrition; good hygiene; health facilities that provide good care; breastfeeding; good marital relationships (in some families) and the knowledge and empowerment of community group members.



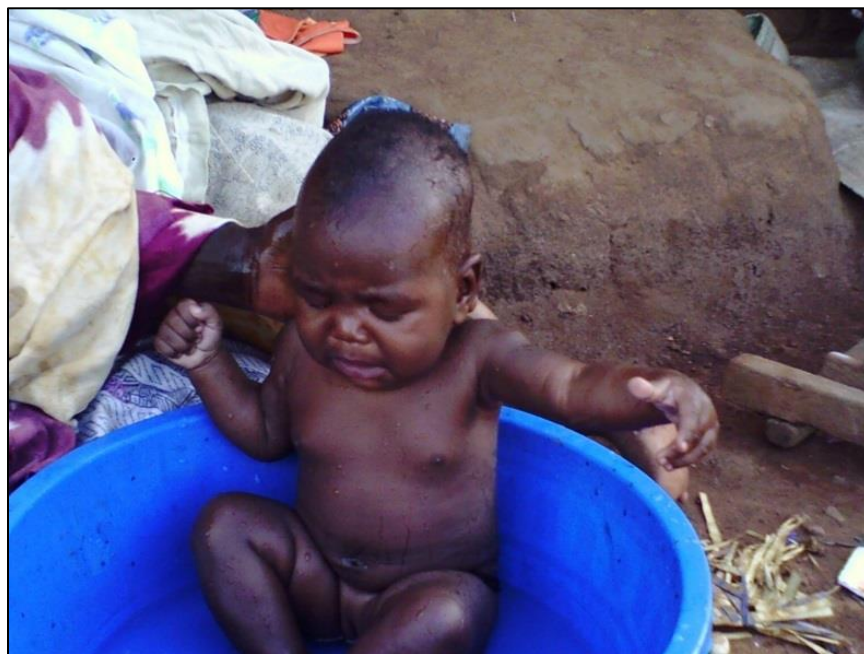
Caption: "A [group name] meeting. The money is for solar power. We are raising it for Lubira Health Center."



Caption: “I wanted to show an activity where people save their money in a safe way and they keep in a box. This is through [group name] - the group that saves together. It is important to save because it controls the expenditure behavior - how you spend your money - when you have all of the money with you, it is easy to use it. When you save, it is harder to use it and it gives people a chance to accumulate money somewhere which can solve problems.”



Caption: “In this photo I wanted to show that it is good to prepare enough food for your home so that you have a variety and you don't have to spend money on food. This woman is preparing food from her garden.”



Caption: “The mother is bathing the baby and I wanted to show that it is good to show good hygiene. It is important to clean the babies.”



Caption: “They are acting what happens at the health center. The midwife is supporting the mother. The woman delayed to go to the health center so the midwife was asking the reason why. The husband had no money to pay for transport. It is a common problem because if you don't have money you can't even use a boda boda for transport.”

Theme: Community groups are proud when they observe healthy MCH behaviors

Finally, community group members talked about photos depicting good maternal and child health behaviors with great pride, and often attributed them to their work with as part of SAFE. They also portrayed poor maternal and child health behaviors negatively and often referenced a desire to improve them in the people in whom they observed the behaviors. These types of photos accounted for 85 of the pictures (10.85%). The behaviors emphasized most often were breastfeeding, antenatal care attendance, health center delivery, child spacing, good nutrition, good hygiene, and education of children. It was clear that community group members have both a good understanding of some of the key maternal and child health behaviors SAFE seeks to improve and a deep desire to ensure that they are utilized in their communities.



Caption: "I wanted to show the importance of breastfeeding in this photograph."



Caption: "I took this photo to show the breastfeeding process. I wanted to show that it is important to breastfeed so that the baby gets all of the food and nutrients that they want when they are breastfed."



Caption: "This woman has just delivered recently and I took the picture. I wanted to show that when you feed well and take care of yourself after delivery you recover quickly and are not in bed."



Caption: "This day, I met her when she had delivered! She delivered in [name] Health Center and I took her photo when she had just returned home from the Center."



Caption: "I wanted to show infant care here. This baby is covered well. The work we are doing is to sensitive mothers to cover their babies when they are infants."



Caption: “This lady is pregnant and that is the husband. For them, they work together. They collaborate in each and everything. If she goes for medical check-up, they go together. He gives her everything that she needs. She is also a member of that group. The man gives her money to go and save for emergencies that can occur.”



Caption: “This is the *entire* family. I wanted to show that it is important to deliver the good number, the number that you can support.”



Caption: “This lady is at her home. She is clean and the baby is clean. I wanted to show the importance of proper hygiene. Some pieces of some dramas address proper hygiene and sanitation.”



Caption: “I wanted to show here that my children are coming back from school. I wanted to show the importance of education. When someone goes to school you can become a nurse or a teacher.”



Caption: “This woman is pregnant and I educated her to save money to prepare for her pregnancy. During her last pregnancy she delivered at home and she had complications. She almost died. This is her second pregnancy and I wanted to show her how important it is to deliver at home.”

Chapter Four: Discussion, Conclusion and Recommendations

Discussion

Utilization of delivery care increased in target intervention facilities, whereas it did not in control facilities. These results were confirmed by key informant interviews in which community group members, program beneficiaries, and healthcare providers all reported an increase in the utilization of delivery services. Collectively, these study results suggest that SAFE's integrated intervention package has effectively improved the utilization of delivery care in target health facilities by addressing the three delays. Yet, results also convey a number of key themes related to the strengths, weaknesses, and utility of the approach that should be acknowledged and addressed to facilitate improvement and expansion of the package.

Facilitating Community-Led Change to Impact First Delay Barriers

First, utilizing a community-based participatory approach did more than just allow community members to build capacity to improve maternal and child health. It also allowed them to form such a strong emotional connection to the issues that they developed the *desire* to promote good behaviors. Both key informant interviews and photovoice project pictures conveyed the message that maternal health was a personal issue. Community group members' portrayed their work to improve maternal health as not only important and successful, but also a source of personal, familial, and community pride.

Female community group members reported feeling empowered as leaders—able to do things that they wouldn't have ever done before. Male community group members reported that they were “different than other men” and even different than they used to be. They reported that they understood the importance of maternal and child health and felt supportive of that agenda, which was distinctly different than the social norm. Although the evaluation did not seek to quantify empowerment, it was certainly a strong undertone resounding through many interviews.

This empowering aspect of the approach was particularly important to addressing first delay barriers. Socio-cultural practices that are at odds with good maternal and child health behaviors are pervasive in these communities. The word for antenatal care in Lusoga literally translates to “drinking medicine,” indicative of the belief that ANC is only for sick women. Delivering with traditional birth attendants is common based on the idea that they have special

powers, or that they will provide better care. Newborn care practices include immediate bathing of the baby (which puts them at risk of detrimental heat loss), pre-lacteal feeding (bad for neonatal nutrition), and putting foreign substances on the umbilical cord (which can cause infections). The idea that maternal health “is a woman’s issue” was the most common response when SAFE first tried talking to men about it. Other organizations sought to address some of these problems in these same communities by providing birth education to pregnant women in a limited number of educational sessions. But no amount of “mzungu [foreign person] lectures” convinced people that deep-seeded cultural beliefs were unhealthy or in need of changing.

Conversely, SAFE’s approach of helping community groups gain knowledge and develop entertaining but evidence-based songs, dances, and dramas were able to address some of these problems from *within* the community. As community group members participated, they began changing their own views and behaviors. They become advocates of that good behavior in others and were able to change behavior in ways that traditional approaches have not. In this way, one of the approach’s greatest strengths is its focus on fostering community-led change to impact socio-cultural practices.

A Sustainable Way to Address Second Delay Barriers

Relatedly, community-led change also made the approach successful at addressing second delay barriers in a more sustainable way than many alternatives. Conventional approaches to emergency maternal referral have included the use of large car ambulances to provide transport to laboring women. Yet, these ambulances are heavy and bulky, making them unable to traverse the harsh terrain of rural developing countries and far too expensive for most families to fuel. These types of programs were successful at reducing mortality, but only so long as their funding agencies chose to invest continual operating capital (usually 3-5 years). By working with community members to design a better alternative—a motorcycle ambulance (eRanger) that could handle the terrain, was cheaper to fuel, and implemented by the community itself—the approach overcame many of these problems.

Likewise, it was during the process of developing the ambulance project that the idea surfaced to implement a savings project. Community members wanted the eRanger to be a sustainable system. Once they trusted SAFE, they spoke about how much they didn’t want another organization to drop a project and have it “die a natural death.” By teaching families to

“save for SAFE deliveries”, they felt able to charge a nominal amount for the transportation and make the system more sustainable. Although originally conceived to increase the sustainability of the eRanger program, this project had the dual function of increasing women’s financial capacity. Likewise, because the community groups decided to implement the project by selling the savings boxes to both women and their spouses, it also became an educational opportunity.

Results from SAFE’s employment of the integrated intervention package demonstrate that second delay barriers can also be addressed when intervention development is paired with community-based participation action methods.

Additionally, this success further attests to the overall importance of CBPAR approaches. So many entities involved in development work are accustomed to treating target beneficiaries as paupers needing to be saved, rather than partners to be respected and to whom the organization should be accountable. Conversely, when an organization treats the people they serve as equals, those people are empowered to change themselves and their communities in phenomenal ways. When they are involved in identifying problems and developing their *own* solutions, they not only impact the issue but also gain confidence in themselves and their own ability to tackle community problems. It also makes sense that they are more likely to utilize and promote projects they design more so than initiatives solely conceived and implemented by a donor. It is natural for people to talk about whatever they are doing in their own lives. If they are responsible for designing and implementing a project that they truly believe will save the lives of people they care about, of course they are going to utilize it and talk about it. In this way, a more general strength of the package and its impacts is its testament to CBPAR.

An Important and Underemphasized Priority: Third Delay Projects

Finally, the package’s incorporation of facility-based interventions to improve the third delay—especially those related to the use of innovative and low-cost technologies—had the most direct and tangible impact on birth outcomes. Solar lighting of health facilities enabled safer births, cesarean sections, higher job satisfaction, and greater security in health facilities. Likewise, SAFE facilities had higher capacity to provide obstetric care than non-SAFE facilities, and many of the criteria (provision of basic emergency obstetric medications and other supplies, medical training on specific related subjects, etc.) had been direct intervention points.

Yet, the package did incur some challenges in addressing the third delay. Although it certainly has impacted third delay barriers, results also suggest that the third delay was the component that suffered from the greatest deficiencies. Observations of midwives providing obstetric care in both health facilities and hospitals showed deficiencies in the physical birthing environment, commodity security, respectful treatment of women during birth, and overall quality of care.

These deficiencies have important implications on access to care and birth outcomes. For example, consider the following quote from a key informant interview with a midwife from a SAFE secondary health facility:

There was one woman who died on the way [to the hospital]. She had a retained placenta. We struggled and struggled, we referred them. But they spent over four hours, delayed transport. We don't do manual vacuum aspiration. Once the placenta retains, at our level, we are meant to refer. You can try other means and see that at least you saved the mother, but of course if you fail, you have to make a transfer. For PPH, we use ergometrine, but nowadays, we have spent over 6 months [without it]. Every time they bring we don't receive ergometrine. The reason they don't get us Pitocin [oxytocin] is because they told us Pitocin has other indications, like they can induce contractions before the mother delivered. So there is a possibility of midwives misusing Pitocin. They can easily be attracted to induce labor, bringing problems.

The first-line drug of choice for any post-partum hemorrhage, including retained placenta, is oxytocin because it will induce uterine contractions. Ergometrine is not the drug-of-choice and is specifically recommended *against* in cases of retained placenta because it can close the cervix before the placenta is expelled. This would lead to the hemorrhage continuing inside the woman's uterus with an inability to stop it without immediate surgical intervention. In effect, a political fear of midwife misuse of oxytocin (most likely for induced abortion), in addition to supply deficiencies (third delay barriers) combined with lack of transport and financial means (second delay barriers) combined to cause a maternal and perinatal death. Currently, there are no efforts within the intervention package to address these types of problems in policy, and not enough focus on improving the quality of care.

These results demonstrate how important it is that the intervention package place greater emphasis on assessing and addressing third delay barriers. Improvements in the other barriers can only do so much if patients whose access to health facilities are increased meet supply, personnel, and training deficiencies in the health facility itself. SAFE must consider these points both for improving the package in current facilities and in expansion to others.

The Need for Increased Capacity of Community Groups

Another area that SAFE should consider addressing is raising the capacity of community groups. Almost ½ (41.7%) of all interviewed community group members specifically and unsolicitedly mentioned that they wanted to be able to do more. They wanted to reach more people, and more villages. To do that, they reported needing more skills, training, and resources (for things like transport and group supplies). They want to have more in-depth understanding of maternal and child health topics, and specifically requested training in theatrical performance.

This is encouraging because it speaks to how invested and excited the members are about the work that they do and the success they feel it has. In this way, the desire for greater capacity is actually a strength of the approach. But it could become a weakness if the members continue asking for help and feel ignored, as this would be contrary to the methodology of partnership on which the intervention package has depended for success. As such, SAFE should consider how it can best respond to this request to provide more skills, training, and resources to community groups. They should also consider this need for higher capacity in the formation of new groups so that resources can be appropriately allocated.

Limitations

This evaluation experienced at least four limitations. First, the principle way it evaluated quantitative impact was utilizing secondary health statistics from health facility records. Although we were able to obtain delivery numbers for all months in all facilities (which was a strength in comparison to the completeness of other data in the same records), these statistics can be inaccurate. Likewise, they do not tell us about maternal or perinatal mortality. Although there were sometimes columns in the maternity registers to collect this data, no facility registered a maternal death and only some registered perinatal deaths. When asked about the discrepancy between what midwives said they had observed in facilities and what the recorded data showed, midwives often responded that once they realized a woman was in such a poor condition, they “had to refer.” Community members also offered the idea that once a woman’s condition was bad enough that a midwife feared she might die, she would refer the woman because the Ugandan government has a law that holds midwives accountable for women who die under their care. We actually observed this during our observations of health facilities, in which a woman with obstructed labor was unable to pay for transport to the hospital and was going to “go home

and mobilize funds to go in the morning.” After more than 48 hours of labor and a low fetal heart rate, we ended up providing transport to the woman out of fear that she and/or her baby would die while waiting to find funding.

We also observed perinatal deaths go unrecorded or be recorded improperly. For example, we saw the premature live birth of twins who both had heartbeats, but who the midwife would not try to resuscitate because she thought they wouldn’t survive. We went back on a later date to review the maternity register and could find no record of the event. When asked about it (by the in-charge of the health facility), the midwife said that her attending physician had asked all the midwives to start recording perinatal deaths (stillbirths and neonatal deaths) in the outpatient department register. When the attending physician was asked about it, he confirmed to the in-charge that he had given these instructions but did not offer any explanation as to why he made the request. We observed these types of discrepancies in multiple facilities, which is why we did not evaluate mortality indicators.

Additionally, the evaluation did not demonstrate what the impact of the intervention has been at the population level. The best proof of success would come from a population-based survey showing the percentage of births happening with a skilled attendant, levels of maternal and perinatal mortality, and exposure and utilization of SAFE projects before and after the intervention, and in intervention and control areas. Resource limitations would not allow this type of evaluation, but does place a limitation on interpretation of the results.

Finally, in-depth interviews were not conducted with community members who were not directly affiliated with the program in SAFE intervention areas (the three non-affiliated interviews were conducted in villages outside of SAFE’s intervention region). It makes sense that community group members and program beneficiaries report satisfaction with the programs as they were involved in designing, implementing, and/or utilizing them. It would be helpful to conduct added interviews in SAFE intervention regions with community members unaffiliated with SAFE to explore wider community perceptions of the package’s interventions and quality.

Conclusion and Recommendations

As mentioned previously, there are standard, tried and true ways to treat the physical causes of maternal mortality—for example, oxytocics, bimanual compression, and blood transfusion for post-partum hemorrhage; magnesium sulphate for eclamptic seizures; parenteral

antibiotics for infection; and cesarean section for obstructed labor. The three delays model allows us to explore *why* these interventions aren't being more widely utilized, but understanding why isn't enough. Our purpose in understanding why something happens is to improve it.

It is this issue that SAFE's integrated intervention package addresses. By utilizing community-based participatory methods in conjunction with the three delays model, SAFE developed a framework to identify barriers to maternal healthcare service utilization and a process to engage and empower end-users in the process. By further incorporating facility-based solutions with community-based ones, SAFE's integrated methodological approach was able to address all types of three delay barriers simultaneously. The results from evaluating SAFE's integrated intervention package demonstrate that the three delays model can be married with community-based and facility-based approaches to develop sustainable solutions to maternal and child health problems. It shows that it is possible, and indeed beneficial, to leverage practitioners' scientific expertise and resources with native communities' ingenuity and momentum to achieve change that is sustainable, ethical, and tangible.

This has important implications for maternal and child health generally. Worldwide, more than 287,000 women [46] and 2,955,000 babies [47] die from pregnancy-related conditions annually. For every woman who dies, 20-30 more are injured in the process [6] [48]. Roughly 99% of maternal deaths take place in developing countries [49], many of which face the same problems that Uganda does. Although the specific issues differ by context, barriers representing each of the three delays can likely be found in all of these environments. Socio-cultural practices, poor education, and poor decision-making are often at odds with good healthcare decisions. Poor infrastructure and poverty frequently limit a woman's ability to access medical care. Poor quality of care—whether from lack of supplies, infrastructure deficiencies, or lack of proper medical training, etc.—is a consistent problem. These are realities that cross national boundary lines.

Furthermore, just like addressing one problem at a time did not make enough impact in Uganda, it has not made necessary impacts in other countries either. Does it matter if a woman makes the decision to seek care if there are no roads or vehicles to physically get her to a health facility? Can providing vehicles to transport women help if there are no trained providers to give the necessary care once the woman gets to a facility? Will it make a difference to have trained providers in facilities if there are no supplies or equipment for them to use? Even if we have providers and supplies, what will happen if women don't want to deliver in a facility?

Clearly an integrated approach to addressing multiple types of barriers to good maternal and perinatal health is important and needed. Yet, no literature was found reporting a program that had developed a framework integrating the three delays model with both community-based *and* health facility strengthening approaches to systematically address all three delays. The results from this evaluation suggest that such an approach is both plausible and now being developed by SAFE. In order to achieve this, SAFE needs to expand efforts to improve the third delay, build the capacity of community groups, and undertake a more scientifically rigorous approach to monitoring and evaluation.

To address the former, SAFE should undertake a participatory health facility evaluation and identify the biggest deficiencies in each facility, then develop a package of low-cost interventions to respond specifically to those deficiencies. Areas that must be addressed in the evaluation include the physical condition and infrastructure of the maternity ward and surrounding area (including the staff quarters); commodity security with a focus on basic birthing supplies and obstetric emergency medications; quality of care rendered during deliveries; and the skills and training of healthcare providers.

To address the capacity of community groups, SAFE should undertake a participatory evaluation of current group capacity and of potential capacity. What *could* community groups do, versus what are they currently able to accomplish? What is a feasible number of monthly outreaches for members to undertake, versus how many are they currently doing? It is likely that the results of such an evaluation will reveal the need to expand the community groups' income generating activities to facilitate greater financial capacity for transportation purposes. Investing added resources in raising community group skills and providing more supplies like drums, tarps, and costumes (which were specific requests from the interviews) will become important.

Finally, as addressed in the limitations section, the very best proof of concept would come from a mixed methods evaluation that incorporates a statistically powered population-based survey at baseline and endline and in intervention and control areas. Moving forward, if the approach is replicated, SAFE should make a concerted effort to allocate resources to a robust evaluation of impact. If done correctly, this could make the intervention package even more successful and lead to the proof-of-concept necessary to facilitate financial investments and scale-up.

References

- [1] S. Thaddeus and D. Maine, "Too far to walk: maternal mortality in context," *Social Science & Medicine*, vol. 38, no. 8, pp. 1091-1110, 1994.
- [2] World Health Organization, "Maternal mortality ratio (per 100,000 live births)," World Health Organization, 2014. [Online]. Available: <http://www.who.int/healthinfo/statistics/indmaternalmortality/en/>. [Accessed 5 April 2014].
- [3] DHS Program, "Maternal Mortality," DHS Program, n.d.. [Online]. Available: <http://dhsprogram.com/Topics/Maternal-Mortality.cfm>. [Accessed 5 April 2014].
- [4] Uganda Bureau of Statistics and ICF International Inc., "Uganda Demographic and Health Survey 2011," 2012. [Online]. Available: <http://www.measuredhs.com/publications/publication-fr264-dhs-final-reports.cfm>. [Accessed 3 October 2013].
- [5] Uganda Bureau of Statistics and Macro International Inc., "Uganda Demographic and Health Survey 2006," Uganda Bureau of Statistics, Kampala, 2007.
- [6] UNFPA, "Obstetric Fistula," n.d.. [Online]. Available: <http://www.unfpa.org/public/home/mothers/pid/4386>. [Accessed 23 February 2013].
- [7] N. & C. H. Partnership for Maternal, "PMNCH Fact Sheet: Maternal mortality," 2011. [Online]. Available: http://www.who.int/pmnch/media/press_materials/fs/fs_mdg5_maternalmortality/en/index.html. [Accessed 3 October 2013].
- [8] World Health Organization, "Maternal Mortality: Fact Sheet No. 348," 2012. [Online]. Available: <http://ww.who.int/mediacentre/factsheets/fs348/en/>. [Accessed 3 October 2013].
- [9] Uganda Ministry of Health, "Annual Health Sector Performance Report 2012/2013," The Republic of Uganda, 2013.
- [10] CountrySTAT Uganda , "Uganda: Population Mid Year Population (000) by District Sex and Year," Food & Agriculture Organization of the United Nations, Kampala, 2014.
- [11] Uganda Bureau of Statistics, "Uganda National Household Survey, 2009/2010," Uganda Burea of Statistics, Kampala, 2010.
- [12] P. Waiswa, M. Kemigisa, J. Kiguli, S. Naikoba, G. W. Pariyo and S. Peterson, "Acceptability of evidence-based neonatal care practices in rural Uganda--implications for programming," *BMC Pregnancy & Childbirth*, vol. 8, no. 21, 2008.

- [13] Uganda Ministry of Health, "Situation analysis of newborn health in Uganda: Current status and opportunities to improve care and survival," Government of Uganda, Kampala, 2008.
- [14] O. M. R. Campbell and W. J. Graham, "Strategies for reducing maternal mortality: getting on with what works," *Lancet*, vol. 368, pp. 1284-1299, 2006.
- [15] A. Paxton, D. Maine, L. Freedman and S. Lobis, "The evidence for emergency obstetric care," *International Journal of Gynecology and Obstetrics*, vol. 88, no. 2, pp. 181-193, 2005.
- [16] A. K. Mbonye, J. B. Asimwe, J. Kabarangira, G. Nanda and V. Orinda, "Emergency obstetric care as the priority intervention to reduce maternal mortality in Uganda," *International Journal of Gynecology and Obstetrics*, vol. 96, pp. 220-225, 2007.
- [17] Ministry of Health; Health Systems 20/20; Makerere University School of Public Health;, "Uganda Health System Assessment 2011," Abt Associates Inc, Kampala and Bethesda, 2012.
- [18] UNFPA, "Uganda Facility Inventory, 2010," 2010. [Online]. Available: http://www.unfpa.org/sowmy/resources/docs/library/R231_UGANDA_2010_FacilityInventory.xls. [Accessed 2 April 2014].
- [19] D. Barnes-Josiah, C. Myntti and A. Augustin, "The "three delays" as a framework for examining maternal mortality in Haiti," *Social Science & Medicine*, vol. 46, no. 8, pp. 981-993, 1998.
- [20] S. Ramos, A. Karolinski, M. Romero and R. Mercer, "A comprehensive assessment of maternal deaths in Argentina: translating multicentre collaborative research into action," *Bulletin of the World Health Organization*, vol. 85, no. 8, pp. 569-648, August 2007.
- [21] J. W. Blonga, N. N. Hamura, A. J. Umbers, S. J. Rogerson and H. W. Unger, "Insights into maternal mortality in Madang Province, Papua New Guinea," *International Journal of Gynecology & Obstetrics*, 6 November 2013.
- [22] N. M. Vink, H. C. de Jonge, R. T. Haar, E. M. Chizimba and J. Stekelenburg, "Maternal death reviews at a rural hospital in Malawi," *International Journal of Gynecology and Obstetrics*, vol. 120, no. 74-77, pp. 74-77, 2013.
- [23] J. R. Lori and A. E. Starke, "A critical analysis of maternal morbidity and mortality in Liberia, West Africa," *Midwifery*, vol. 28, no. 1, pp. 67-72, 2012.
- [24] A. O. Igwegbe, G. U. Eleje, J. O. Ugboaja and R. O. Ofiaeli, "Improving maternal mortality at a university teaching hospital in Nnewi, Nigeria," *International Journal of Gynecology & Obstetrics*, vol. 116, no. 3, pp. 197-200, 2012.
- [25] V. C. Thorsen, J. Sundby and A. Malata, "Piecing Together the Maternal Death Puzzle through Narratives: The Three Delays Model Revisited," *PLoS ONE*, vol. 7, no. 12, p. e52090, 2012.

- [26] P. Waiswa, K. Kallander, S. Peterson, G. Tomson and G. Pariyo, "Using the three delays model to understand why newborn babies die in eastern Uganda," *Tropical Medicine & International Health*, vol. 15, no. 8, pp. 964-972, 2010.
- [27] R. P. Upadhyay, S. K. Rai and A. Krishnan, "Using Three Delays Model to Understand the Social Factors Responsible for Neonatal Deaths in Rural Haryana, India," *Journal of Tropical Pediatrics*, vol. 59, no. 2, pp. 100-105, 2013.
- [28] E. Corbett, T. Guenther and D. Sitrin, "Applying the Three Delays Model: Improving access to care for newborns with danger signs," Save the Children, Westport, 2013.
- [29] H. Samuelsen, B. P. Tersbøl and S. S. Mbuyita, "Do health systems delay the treatment of poor children? A qualitative study of child deaths in rural Tanzania," *BMC Health Services Research*, vol. 13, no. 67, 2013.
- [30] B. Essén, S. Johnsdotter and P. Binder, "O234: Not too far to walk but too far for reciprocity: Maternal mortality in a migration context using the 'Three Dleays' framework," *International Journal of Gynecology & Obstetrics*, vol. 119, no. S3, p. S343, 2012.
- [31] M. Minkler and N. Wallerstein, *Community-Based Participatory Research for Health: From Process to Outcomes*, San Francisco: Jossey-Bass, 2008.
- [32] B. A. Israel, A. J. Schulz, E. A. Parker and A. B. Becker, "Review of Community-Based Research: Assessing Partnership Approaches to Improve Public Health," *Annual Review of Public Health*, vol. 19, pp. 173-202, 1998.
- [33] K. Lewin, "Action Research and Minority Problems," *Journal of Social Issues*, vol. 2, no. 4, pp. 34-46, 1946.
- [34] B. L. Hall, "In From the Cold? Reflection on Participatory Research From 1970 - 2005," *Convergence*, vol. XXXVIII, no. 1, pp. 5-24, 2005.
- [35] S. Castle, S. Traore and L. Cisse, "(Re)Defining Reproductive Health with and for the Community: An Example of Participatory Research from Mali," *African Journal of Reproductive Health*, vol. 6, no. 1, pp. 20-31, 2002.
- [36] B. A. Zulfiqar , S. Soofi, S. Cousens, S. Mohammad, Z. A. Memon, I. Ali, A. Feroze, F. Raza, A. Khan, S. Wall and J. Martines, "Improvement of perinatal and newborn care in rural Pakistan through community-based strategies: a cluster-randomised effectiveness trial," *Lancet*, vol. 377, pp. 403-412, 2011.
- [37] D. S. Mamandhar, D. Osrin, B. P. Shrestha, N. Mesko, J. Morrison, K. M. Tumbahangphe, S. Tamang, S. Thapa, D. Shrestha, B. Thapa, J. R. Shrestha, A. Wade, J. Borhi, H. Standing, M. Manandhar, A. M. d. L. Costello and MIRA Makwanpur trial team, "Effect of a participatory intervention with women's groups on birth outcomes in Nepal: cluster-randomised controlled trial,"

Lancet, vol. 364, pp. 970-979, 2004.

- [38] P. Tripathy, N. Nair, S. Barnett, R. Mahapatra, J. Borhi, S. Rath, S. Rath, R. Gope, D. Mahto, R. Sinha, R. Lakshminarayana, V. Patel, C. Pagel, A. Prost and A. Costello, "Effect of a participatory intervention with women's groups on birth outcomes and maternal depression in Jharkhand and Orissa, India: a cluster-randomised controlled trial," *Lancet*, vol. 375, pp. 1182-1192, 2010.
- [39] M. E. Jacob, S. Abraham, S. Surya, S. Minz, D. Dingh, V. J. Abraham, J. Prasad, K. George, A. Kuruvilla and K. Jacob, "A Community Health Program in Rural Tamil Nadu, India: The Need for Gender Justice for Women," *Reproductive Health Matters*, vol. 14, no. 27, pp. 101-108, 2006.
- [40] V. Kumar, S. Mohanty, A. Kumar, R. P. Misra, M. Santosham, S. Awasthi, A. H. Baqui, P. Singh, V. Singh, R. C. Ahuja, J. V. Singh, G. K. Malik, S. Ahmed, R. E. Black, B. Mahendra, G. L. Darmstadt and for the Saksham Study Group, "Effect of community-based behavior change management on neonatal mortality in Shivgarh, Uttar Pradesh, India: a cluster randomized controlled trial," *Lancet*, vol. 372, pp. 1151-1162, 2008.
- [41] Y. Tawye, F. Jotie, T. Shigu, P. Ngom and N. Maggwa, "The Potential Impact of Community-Based Distribution Programmes on Contraceptive Uptake in Resource-Poor Settings: Evidence from Ethiopia," *African Journal of Reproductive Health*, vol. 9, no. 3, pp. 15-26, 2005.
- [42] E. Fottrell, K. Azad, A. Kuddus, L. Younes, S. Shaha, T. Nahar, B. H. Aumon, M. Hossen, J. Beard, T. Hossain, A.-M. Pulkki-Brannstrom, J. Skourdis-Worrall, A. Prost, A. Costello and T. A. Houweling, "Design and evaluation of a community-based participatory, birth preparedness project in Cambodia," *JAMA Pediatrics*, vol. 167, no. 9, pp. 816-825, 2013.
- [43] J. Skinner and T. Rathavy, "Design and evaluation of a community-based participatory, birth preparedness project in Cambodia," *Midwifery*, vol. 25, pp. 738-743, 2009.
- [44] K. Azad, S. Barnett, B. Banerjee, S. Shaha, K. Khan, A. R. Rego, S. Barua, D. Flatman, C. Pagel, A. Prost, M. Ellis and A. Costello, "Effect of scaling up women's groups on birth outcomes in three rural districts in Bangladesh: a cluster-randomised controlled trial," *Lancet*, vol. 375, pp. 1193-1202, 2010.
- [45] L. C. Mullany, C. I. Lee, P. Paw, E. K. S. Oo, C. Maung, H. Kuiper, N. Mansenior, C. Beyrer and T. J. Lee, "The MOM Project: Delivering Maternal Health Services among Internally Displaced Populations in Eastern Burma," *Reproductive Health Matters*, vol. 16, no. 31, pp. 44-56, 2008.
- [46] World Health Organization, "Maternal and reproductive health," 2013. [Online]. Available: http://www.who.int/gho/maternal_health/en/index.html. [Accessed 23 February 2013].
- [47] UNICEF, World Health Organization, The World Bank and United Nations, "Levels & Trends in Child Mortality: Report 2012," 2012. [Online]. Available: http://www.who.int/maternal_child_adolescent/documents/levels_trends_child_mortality_2012/en/

ndex.html. [Accessed 23 February 2013].

- [48] Partnership for Maternal, Newborn, & Child Health, "PMNCH Fact Sheet: Maternal mortality," 2011. [Online]. Available:
http://www.who.int/pmnch/media/press_materials/fs/fs_mdg5_maternalmortality/en/index.html.
[Accessed 3 October 2013].
- [49] World Health Organization, "Maternal mortality: Fact sheet," May 2012. [Online]. Available:
<http://www.who.int/mediacentre/factsheets/fs348/en/>. [Accessed 30 January 2014].
- [50] Centers for Disease Control and Prevention, "Savings Mothers, Giving Life Phase 1 Monitoring and Evaluation Findings: Executive Summary," Centers for Disease Control and Prevention, US Department of Health and Human Services, Atlanta, 2014.