

Use of the Human-Centered Design approach for a birth companion program in Dar es Salaam,

Tanzania: An analysis of the approach and implementation experience

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Abstract

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Human-Centered Design (HCD), sometimes referred to as Design Thinking, is increasingly gaining recognition as an approach that promotes people-centered care in global health. With its history embedded in the technical and engineering fields, HCD has potential to create interventions that are feasible and acceptable to program beneficiaries. Providing emotional and psychosocial support through the use of a birth companion of choice is associated with several significant clinical health outcomes as well as satisfying birth experiences. This intervention is recognized and recommended by the World Health Organization (WHO) as fundamental and is included in the WHO guidelines for improving quality care for women and their newborns. Despite all this background information, there is insufficient evidence on the factors influencing design and implementation of birth companion programs in people-centered ways in low- and middle-income countries (LMICs). The dissertation investigated the specific factors influencing implementation of a birth companion program in two health facilities in Dar es Salaam, Tanzania. Additionally, the dissertation explored key learnings of Human-Centered Design as it was the approach utilized to design and implement a birth companion program in the two facilities. By understanding the factors influencing birth companion programs, as well as

people-centered approaches such as HCD, it is hoped that the findings will provide important practice recommendations as well as inform policy and research.

The dissertation used two data sets that employed qualitative design methodologies to meet its two broad objectives. The first data set was primary data collected to critique and reflect on the utility of the Human-Centered Design approach that was used to design and implement a birth companion program at Mwananyamala Referral Hospital and Tandale Health Center in Dar es Salaam, Tanzania. Data were collected using observations of design workshops, field notes, and face-to-face in-depth interviews as well as Zoom interviews of 13 participants including program staff, research team members, HCD experts, and providers who participated in the process. These data were analyzed using Critical Systems Heuristics (CSH) for framework analysis as well as thematic analysis. The second data set was secondary data for a pilot study conducted by Averting Maternal Death and Disability (AMDD) that aimed to develop a birth companionship model that responded to the context and needs of women, considered health provider expectations and concerns, and adhered to and observed Tanzania's health system requirements. Data were collected using in-depth interviews, focus group discussions, observations, and other project data such as meeting minutes, guided tours, influence maps, document review, and field notes. Data from this data set were analyzed using the Consolidated Framework for Implementation Research (CFIR) for framework analysis. No comparisons were made between the two facilities as the key findings that surfaced were similar across both facilities. However, the author made mention of the specific health facility where a key finding was more pronounced in one facility compared to the other facility.

Findings for the Human-Centered Design Approach were guided by the Critical Systems Heuristics framework. The findings showed that power dynamics exist across different stages

during the HCD process, for example between local researchers and expatriate design experts. However, power differences were more pronounced in complex settings such as health facilities, especially between provider needs and those of women. Power dynamics were also seen between nurses and other providers such as doctors and facility heads, and these differences influenced important decision-making. These power imbalances stemmed from existing power hierarchies that are part of government-led entities such as the two facilities. The power asymmetry also stemmed from the providers' responsibility to prioritize human lives and also to protect themselves against potential litigation, as birth companions become an eyewitness of the birth experience. In such environments, the execution of HCD is challenging and requires a lot of compromise. Due to these and other provider concerns, providers became the primary co-designers of the birth models implemented at the facilities. However, HCD proved to be an approach that sparked creativity, enabling participants to realize their capacity to solve problems on their own without external influence or being told what to do.

Findings for the factors influencing implementation were guided by the CFIR framework. Before program implementation, providers and women generally accepted the birth companion program and saw it as an important intervention to offer women needed non-clinical support such as providing food, supporting the mothers emotionally, and helping women exercise. However, there were general concerns from most stakeholders, especially providers, on limited space, proliferation of infections, and privacy and confidentiality violations by providers. During implementation, most of these concerns disappeared, as providers and women co-created a birth companion model that was feasible, acceptable, and low cost. However, at Mwananyamala Hospital, space challenges continued, as the program implementers could only start with small numbers due to limited space. Space issues also manifested in other forms as birth companions

could not be accommodated at night in the event of complications such as cesarean birth or admissions into the Neonatal Intensive Care Unit. Other key findings that emerged during implementation included poor communication networks, failure to engage other stakeholders, and lack of leadership engagement.

The dissertation concludes by illustrating that implementation of a birth companion program in health settings such as Tandale Health Center and Mwananyamala Hospital is feasible, acceptable, and can be done without huge financial investments. There is a significant opportunity to adopt this model across Tanzania and in other settings with comparable contexts. What made this model feasible and acceptable is the Human-Centered Design approach that enabled a shift in the mindset of providers, sparked innovation, and allowed women and providers to develop their own solutions and test them out without imposition from the program planners. The Human-Centered Design approach therefore offers opportunities to design and implement interventions that are acceptable to users and other key stakeholders on the frontlines, leading to potential increased use of the interventions. HCD should not, however, be viewed as an antidote to all complex public health challenges-but should be used as a guiding framework together with other participatory approaches that explore deeper into the complexities of the wicked problems pervasive in global health. The power dynamics it seeks to dismantle are sometimes difficult to disrupt due to other systemic variables that interplay within global health systems. Considerable efforts to locate where the power lies, what contributes to that hegemony, and how it can be reconfigured are necessary for the utilization of HCD. Application of HCD should prioritize the different contexts and evolve and adapt to suit the complexities within each context, yet at the same time maintain the major characteristics that separate it from other participatory approaches.

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Acronyms

AMDD	Averting Maternal Death and Disability
ANC	Antenatal Care
AIDS	Acquired Immunodeficiency Syndrome
BMGF	Bill and Melinda Gates Foundation
CFIR	Consolidated Framework for Implementation Research
COGP	Code of Good Practice
CSH	Critical Systems Heuristics
DONA	Doulas of North America
DT	Design Thinking
HCD	Human-Centered Design
HIC	High Income Country
HIV	Human Immunodeficiency Virus
ICAP	International Center for AIDS Care and Treatment Programs
IPCHS	International People-Centered Health Services
CHMT	Council Health Management
LMIC	Low and Middle Income Country
MDG	Millennium Development Goal
MMR	Maternal Mortality Ratio

MNH	Maternal and Newborn Health
MoHCDEC	Ministry of Health, Community Development, Gender, Elderly and Children
NICU	Neonatal Intensive Care Unit
QoC	Quality of Care
RCC	Respectful and Compassionate Care
RHMT	Regional Health Management Team
RMC	Respectful Maternity Care
SDG	Sustainable Development Goal
SRH	Sexual and Reproductive Health
SSA	Sub-Saharan Africa
TZSH	Tanzanian Shillings
UNICEF	United Nations International Children's Emergency Fund
USAID	United States Agency for International Development
WHO	World Health Organization

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Dedication

To my dearest dad, Abel Mugovewashe Mvuvu (April 08, 1956-September 29, 2016).

This is for you. I remember your last message the night before you departed, you said I was a shining and illuminating star. I will keep soaring and shining for you dad. *Zororai murugare baba vangu:* Keep resting with the angels. I love you and I miss you forever and ever.

Chapter 1: Introduction and Background

Although the current global health estimates show a significant decline in maternal mortality ratios (MMRs) by 44% over the past two decades, maternal mortality remains an intractable challenge as countries jointly failed to meet the Millennium Development Goal (MDG) 5 of reducing MMR by 75% (Lieberman, 2016). Unacceptably high maternal and newborn deaths and disabilities are still being reported across and within countries. The last 15 years were dominated by a strategic focus, commitment, and activism towards increasing utilization of maternal health services in low- and middle-income countries (LMICs). However, despite the increase in the use of health facilities, nearly 830 women still die daily, worldwide, with 550 of these deaths occurring in Sub-Saharan Africa (WHO, 2016). Studies in India on cash transfers providing women with financial means to access facilities showed dramatic increases in facility-based deliveries, with little effect on the maternal mortality rate (Randive et al., 2013)

As more and more women continued to give birth in facilities, challenges of poor quality care in health institutions, disrespect and abuse by providers, and interventions rarely being people-centered have surfaced as critical concerns in the post-MDG era (Campbell et al., 2016; Koblinsky et al., 2016; WHO, 2016; Afulani et al., 2017). Resultantly, the concept of Respectful Maternity Care (RMC) has emerged as a crucial component of quality of care. Growing concerns over disrespect and abuse of women by providers have elevated RMC to the top of maternal health discourse. Disrespect and abuse during the birth continuum is a long-standing public health and human rights challenge that received minimal global attention until recently (Asuquo et al., 2000; Ishola et al., 2017; Kruk et al., 2014; Mselle et al., 2013). Women have reported incidences of verbal abuse, neglect, and abandonment as well as grievous cases of extreme

physical abuse such as slapping and kicking (Bowser & Hill, 2010; Center for Reproductive Rights and the Kenyan Federation of Lawyers, 2007; Maung et al., 2020; McMahon et al., 2014; Mselle et al., 2013; Sando et al., 2014, 2016).

The start of the Sustainable Development Goals (SDGs) era ushered in a renewed focus on global health care delivery and management. Among the priority areas spotlighted by maternal health actors during this era are the issues of quality of maternal health services provided, respectful maternity care, and effective implementation of maternal health programs (Schaaf, 2018). Moreover, at the apex of the health-related SDGs is the prioritization of universal health coverage, which calls for a major shift towards health systems that are people-centered and respond to the needs of the people they serve (WHO, 2017). In 2016, WHO member states adopted the *Framework on integrated people-centered health services* (IPCHS), which focuses on providing health services that are safe, affordable, and tailored to meet the requirements and preferences of the people who will use them (WHO, 2017). Additionally, the framework encourages the conscious utilization and engagement of informal carers in providing quality health care. This framework, therefore, aligns with two critical issues that have received significant attention within global maternal health: employing the human-centered design (HCD) approach as a strategy towards people-centered care, and inclusion of non-clinical support persons during childbirth as informal carers in delivery of quality care.

The introduction of a support person (referred to henceforth as a “birth companion”) into the health system is an essential step in the right direction towards achieving a high-quality health system, as it has been cited as one of the quality indicators of emotional support during childbirth (Kruk et al., 2018). Furthermore, the presence of a birth companion potentially lowers

the likelihood of mistreatment of women by health providers, leading to more respectful maternity care (Kruk et al., 2018; Bohren et al., 2017).

Apart from women experiencing quality care due to birth companionship, increasing evidence also reveals meaningful clinical health outcomes for the mother and the newborn (Bohren et al., 2017). Among these, several positive health outcomes include shortened labor durations, satisfactory births, decreased use of pain medication, more spontaneous vaginal deliveries, and reduced utilization of invasive procedures such as cesarean sections, episiotomies, and vacuum extractions. Babies born to mothers with a birth companion score higher on the Apgar scale than babies born to unsupported mothers (Bohren et al., 2017; Hodnett et al., 2012). Efforts to show commitment towards inclusion of birth companions as germane to improving quality of care for pregnant women include several normative guidelines such as the *Standards for improving quality of maternal and newborn care in health facilities* (WHO, 2016) and the *WHO recommendations: intrapartum care for a positive childbirth experience* (WHO, 2018).

However, promoting birth companionship alone as a quality measure is not enough if the “implementation and aspiration gaps” are not considered (Freedman, 2016). Poor implementation strategies (Campbell et al., 2016) as well as poor prioritization of the needs of people at the frontlines (i.e., patients, providers, and managers) exacerbate maternal health gaps in LMICs (Freedman, 2016). Consequently, there is increasing pressure on the maternal health task force to shift their mindset towards building and implementing programs with the participation and shared value of program users (Andrawes et al., 2016a). There is a need for targeted efforts to incorporate the needs and experiences of intended program beneficiaries during the design and implementation of global health programs in LMICs.

One approach that is gaining traction within global health as a promising measure to rectify the "decades-long gaps between intervention, development, and implementation" is the human-centered design approach (Altman et al., 2018, p.1). While definitions on HCD and its variants¹ (user-centered, design thinking) vary across disciplines, its core philosophy is that it prioritizes the needs of the people on the frontlines and includes them as co-designers in the creation of novel solutions tailored to meet their needs and requirements (Altman et al., 2018; Bazzano et al., 2017; Ideo.org, 2015).

1.1 Research Problem

The utility of HCD in public health is on the rise. Global health communities acknowledge that failure to successfully implement evidence-based interventions stalls progress in most settings even when clinical evidence on their effectiveness exists (Campbell et al., 2016; MacDonald et al., 2016; Raman et al., 2016). A more significant component of this problem originates from failure by program developers and implementers to include program users in the creation and implementation of these initiatives; thus, interventions are rarely people-centered.

One of the legacies of global health initiatives is their top-down approach, often branded as “travelling models” due to their poor prioritization of context and the mechanisms that make interventions work (Olivier de Sardan et al., 2017).

The “travelling models” have also been lamented for displaying signs of isomorphic mimicry, a concept of copying interventions from functional systems or contexts and replicating them in a different system (Andrews et al., 2013; Freedman, 2016b). Similarly, if birth companion programs are designed and implemented in LMICs without considering the

¹ For this dissertation, the term Human-Centered Design (HCD) will be used consistently throughout the thesis unless stated otherwise, for example design thinking (DT).

expectations and needs of targeted program users, their implementation is likely to fail. The current SDGs' pledge of "leaving no one behind" reinforces the importance of inclusivity and participation of everyone as equal agents to developmental progress and sustainable development. The Human-Centered Design approach could potentially close this gap because of its focus on program users' needs, preferences, and, most importantly, user inclusion throughout the whole process in generating solutions that meet these needs and preferences.

Proponents of HCD believe that employing this approach yields innovative solutions custom-made to suit the needs and expectations of program users. This upsurge in the interest and adoption of HCD to rectify intractable and complex issues surpasses existing knowledge on the application, practice, challenges, and value of the approach. Data on the inherent challenges associated with the whole process in global health, how these challenges are addressed, and how decisions are ultimately made is still thin (Bazzano et al., 2017; Karrel, 2017). Existing information presents a seemingly simple process involving participatory data collection methods, high stakeholder engagement, and interaction—despite the glaring differences in power, influence, levels of understanding, and knowledge among stakeholders. Success stories about innovation and HCD in global health are widespread but hardly feature the challenges experienced by practitioners as well as the cases of failure (Denend et al., 2014; Karrel, 2017). There is a shortage of literature documenting these failures and limitations in global health, yet it is required to guide institutions and other groups interested in utilizing HCD in their work (Karrel, 2017). The issue of power dynamics, especially regarding co-design and co-creation, is also rarely discussed and critically analyzed in HCD literature (Donetto et al., 2015; Farr, 2018).

Similarly, discussions and efforts to include a birth companion to support women during labor and delivery in LMICs are also mounting. The World Health Organization considers birth

companionship as a fundamental and low-cost intervention that offers promise towards attaining high-quality maternity care in LMICs (WHO, 2016). However, there is an unwillingness of countries and policymakers to implement the intervention, despite increasing evidence of the positive outcomes associated with it (WHO, 2018). Part of this reluctance is due to an inadequate understanding of how to effectively roll out birth companion programs in low-resource settings (Bohren et al., 2019). A study piloted in South Africa found that introducing birth companions presented more challenges than initially predicted, particularly in resource-limited health care systems (H. Brown et al., 2007). The literature on key programmatic and implementation factors, especially in growing economies, is minimal. The recently published Qualitative Cochrane Review on birth companions, as well as the 2017 paper by Kabakian-Kasholian and Porter, provide perhaps essential baseline syntheses on factors impacting the effective implementation of birth companion programs. While both papers provide detailed descriptions of the factors gathered from qualitative studies, they focus mostly on high-income countries. There is, therefore, a scarcity of data from LMICs, especially Sub-Saharan Africa (SSA), outlining different stakeholder perceptions of birth companionship as well as factors influencing the design and implementation of birth companion programs. There are currently no peer-reviewed articles documenting design and implementation factors of birth companionship programs in Tanzania, and more specifically, in Dar es Salaam.

1.2 Objectives

Consequently, the gaps highlighted above call for more evidence to be presented on how people-centered approaches in global health unfold. Equally, there is a need for more evidence on the design and implementation of birth companion programs in LMICs (Bohren et al., 2019). Specifically needed are more qualitative studies that uncover and substantiate the value of HCD

and its actual practice in global health, as well as studies that explore the factors that influence the successful implementation of birth companion programs in the Sub Saharan region.

This dissertation, therefore, had two broad objectives. Firstly, it aimed to to determine and understand the utility of the Human-Centered Design approach in its application in the design and implementation of a birth companion program in Dar es Salaam, Tanzania. Specifically, it sought to determine the power dynamics, inclusion, decision-making pathways, and other key learnings during the process.

Secondly, this dissertation aimed to understand stakeholder perceptions and the factors influencing implementation of birth companion programs at Mwananyamala Referral Hospital and Tandale Health Center. Understanding the factors that influence the successful implementation of birth companion programs through an implementation science lens and HCD perspective is unique; both approaches allow a more nuanced and detailed exploration of the context, facility practices, prevailing culture, and lived realities of the different stakeholders impacted by the intervention.

1.3 Research Questions

1.3.1 Main Objective 1

- a) How were the needs and desires of intended users captured and considered during the whole HCD process? [The *source of motivation*, *source of expertise*, and *source of legitimacy* boundary sections from the CSH framework helped in answering these questions.]
- b) How were final decisions made, by whom, and for whom? How was consensus reached? [The *source of power/control boundary section* from the CSH framework helped in answering these questions.]

- c) What lessons were learned from the utilization of the HCD approach in program design and implementation of the birth companion program in Dar es Salaam, Tanzania? What were some of the challenges and benefits experienced in the utilization of the HCD process?

1.3.2 Main Objective 2

- a) What are the different stakeholders' perceptions of the implementation of a birth companion program in two government facilities in Dar es Salaam, Tanzania? How do these perspectives influence implementation?
- b) What factors influence the implementation of a birth companion program in two government facilities in Dar es Salaam, Tanzania? How do these factors influence implementation?

1.4 Structure of the Dissertation

This section provides an overview of the dissertation chapters. The dissertation explored the utility of the HCD approach in the design and implementation of a birth companion program in Dar es Salaam, Tanzania. More specifically, the dissertation investigated the power dynamics, inclusion of participants in the process, decision-making pathways as well as other key learnings from the entire process. The dissertation also explored how utilization of the HCD approach shaped the implementation process, taking a deep dive into the several factors influencing the implementation of birth companion programs in Dar es Salaam, Tanzania. The dissertation includes seven chapters, six of which are all described below and the seventh chapter is the reference list:

1.4.1 Chapter 1: Introduction

This chapter presents the background and introduces the notion of birth companions and HCD. It also includes the research problem, research objectives, and research questions. The chapter also provides a brief discussion of the country context of Tanzania and the country's suitability as a study setting for this dissertation.

1.4.2 Chapter 2: A Review of Literature

This chapter is divided into two sections and discusses the relevant literature on the two key objectives of the dissertation. The first section of the literature review looks at the existing global grey and peer-reviewed literature on birth companions. This review explored the factors influencing implementation across the globe and utilized the CFIR for typology and structuring. The next section looked at the literature around Human-Centered Design. This section looked at the definition of HCD and the historical lineage of the approach. A historical investigation of HCD was necessary for providing an understanding of the characteristics and value of HCD since it is a phenomenon without a standardized definition. This section also addresses the values and challenges associated with HCD.

1.4.3 Chapter 3: Theoretical Frameworks

Chapter 3 provides an overview of the two theoretical frameworks utilized in this dissertation to guide the attainment of the two main objectives. Critical Systems Heuristics (CSH) and the Consolidated Framework for Implementation Research (CFIR) are proposed as two frameworks to guide the dissertation. Firstly, CSH was used to critique and reflect on the utility of the HCD approach as it was applied in the design and implementation of a birth companion program in two health facilities in Tanzania. The CFIR was then used to investigate the factors that influenced the implementation of the birth companion model that emerged from

the HCD process. The chapter presents the importance of each framework and why it was chosen to guide the two objectives that make up this dissertation.

1.4.4 Chapter 4: Research Design and Methodology

This chapter outlines the research design and methodological approach selected for this study. The chapter consists of the research design, methods used, selection of study participants, ethical considerations, rigor, and the data analyses. The chapter also briefly discusses why a qualitative design was chosen for this particular study.

1.4.5 Chapter 5: Study Findings, Discussion of Findings

This chapter is split into different sections and presents descriptive and analytical accounts of participants. The chapter starts by presenting findings of the application of the HCD approach. This HCD section foregrounds the learning from instituting the HCD approach for a complex program in a complex environment. This section utilizes the CSH framework to help surface power, inclusion, and decision-making pathways in HCD. The section also includes other key learnings that emerged inductively, separate from the deductive themes from the CSH framework. The subsequent section presents the findings on the factors influencing the implementation of birth companion programs in two facilities in Dar es Salaam, Tanzania. The CFIR guides the findings and the discussion of this section. The second section includes the findings for the HCD process as well as the study limitations.

1.4.6 Chapter 6: Conclusion and Implications for Policy, Practice, and Research

This chapter provides a summary of the dissertation. It gives a brief review of the justification of the dissertation and how it adds value to the current literature. It reflects on the key issues that surfaced as guided by the research questions and the objectives. The chapter ends

with a discussion of the dissertation's implications to policy, practice, and research and a conclusion that summates the entire dissertation.

1.5 Country Context

The nation of Tanzania lies in the eastern parts of the African continent and is regarded as a low-income country (LIC) by the World Bank (World Bank, 2019). According to the 2015-2016 Tanzania Demographic and Health Survey (DHS), the estimated population for the nation stood at 50.1 million people. Of these ~50.1 million, approximately 49 million people live on mainland Tanzania. Roughly 12 million of this mainland population are women in the reproductive age group of 15-49 years, accounting for about 47% of the total female population in mainland Tanzania (Tanzania Revised One Plan II 2018 Report). Among these 12 million women, two million are estimated to become pregnant annually, resulting in an annual population growth rate of 3.1%. Figure 1 illustrates the geographical distribution of women in the reproductive age group (15-49 years) in mainland Tanzania. According to the presented data, the city of Dar es Salaam is the region with the highest proportion of women within this reproductive age group (Tanzania Revised One Plan II 2018 Report).

Tanzania, like most countries in SSA, continues to experience unacceptably high maternal and newborn mortality. The 2015-2016 Tanzania DHS estimated the maternal mortality ratio to be 556 maternal deaths per 100,000 live births for the ten years preceding the survey. The DHS also estimated the neonatal mortality rate to be 25 deaths per 1,000 live births in 2015-2016 (Tanzania Demographic and Health Survey and Malaria Indicator Survey, 2015). According to a WHO country report, maternal and newborn illnesses are among the main causes of death and disability in the country (WHO Country Cooperation Strategy 2016-2020, Tanzania). Maternal mortality, child morbidity, and HIV prevalence are all higher in urban areas

of Tanzania than in rural areas (MMR: 432 vs. 336/100,000 live births) (Levira & Todd, 2017), despite the fact that urban areas have better access to facilities and drugs, suggesting many problems may be rooted in poor quality of care (QoC) (Levira & Todd, 2017). However, it is also likely that the numbers appear higher in urban settings due to better documentation of vital registration and better reporting.

Nevertheless, the government of Tanzania has adequately responded to these alarming statistics. The Tanzanian government has prioritized the reduction of maternal and neonatal deaths by signing numerous global and regional efforts to improve maternal and newborn health (MNH) (Tanzania Revised One Plan II 2018 Report). For example, Tanzania, together with eight other countries, joined a quality network supported by the WHO, UNICEF, and other partners and committed to halve its maternal and newborn mortality burden in five years (WHO, 2017). The quality network focuses on how providers deliver quality care to mothers and their newborns and how women experience this care. By joining this network, Tanzania has set an ambitious goal of halving its current maternal and newborn mortality within five years since the time of joining the network. Tanzania complied with accelerating this goal through adopting and adapting the WHO's eight standards for promoting quality of care, one of which includes birth companionship.

In addition, the country has revised and developed guidelines aimed at accelerating the achievement of these targets, such as the "One Plan II" strategy for reducing maternal, newborn, and child deaths. More importantly, Tanzania's prioritization of Respectful Maternity Care (RMC) led to the modification of the One Plan II strategy to highlight the importance of respectful care in childbirth (Tanzania's Revised One Plan II, 2018). Resultantly, the One Plan II has integrated RMC, of which birth companionship is a component and a critical focus.

In 2017, the Ministry of Health Division of Nursing and Midwifery formulated the National Respectful and Compassionate Care Guidelines specifically to promote respectful and compassionate delivery of nursing and midwifery care, including HIV and AIDS services (USAID Tanzania RMC Scoping Activity Draft, 2019). The guidelines fundamentally aimed to enhance nurses' and midwives' capacity in delivering respectful and compassionate care (RCC), and strengthen relationships between the end user and nurses/midwives. The guidelines targeted improvement of service utilization and satisfaction of end users with their maternity experiences. Tanzania is, therefore, a particularly relevant setting within which to examine the dissertation's key objectives in light of the country's focus on birth companionship and end user satisfaction (a key component of HCD).

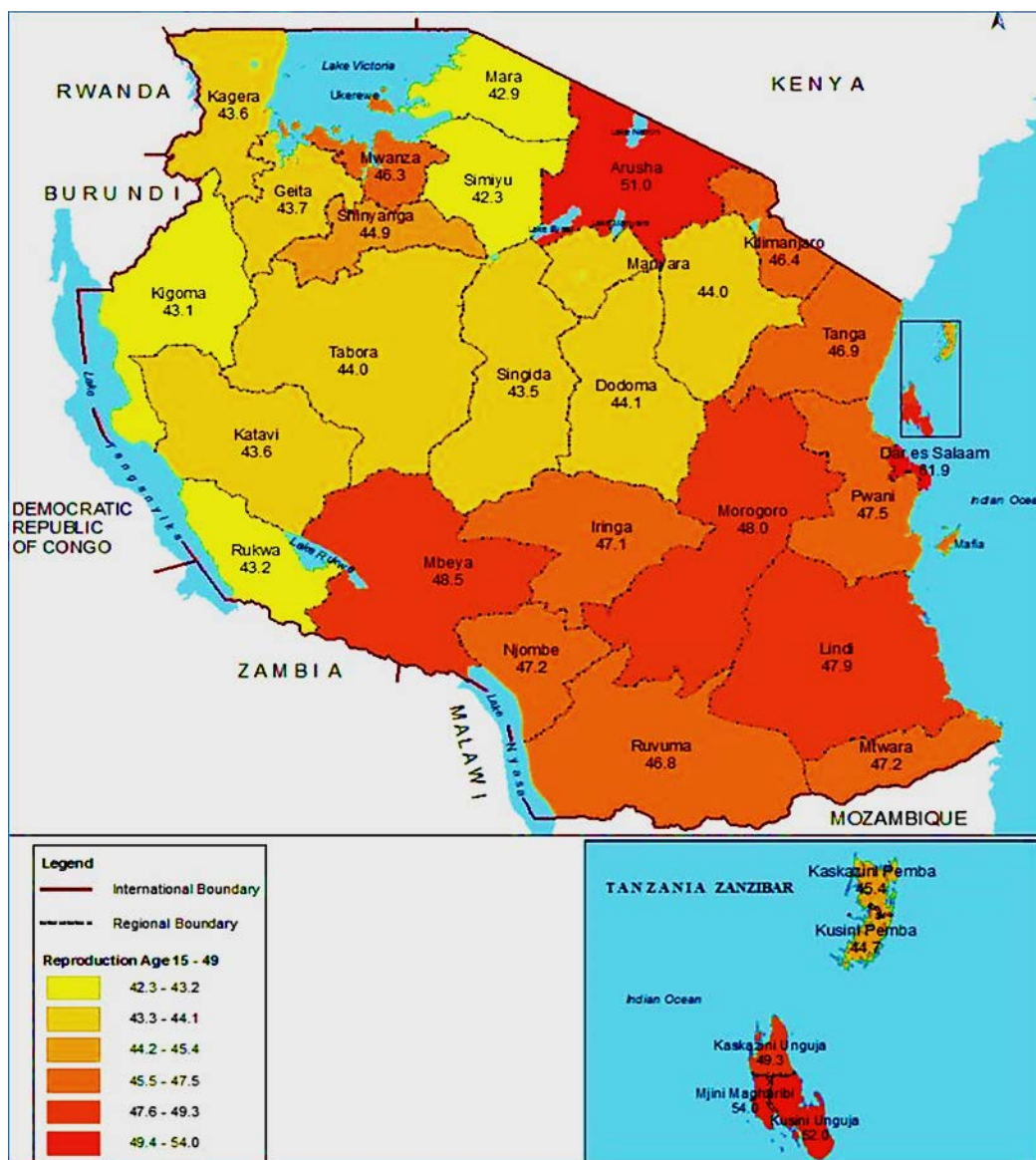


Figure 1: Regional Distribution of Proportions of Women of Reproductive Age 15-49 years: Tanzania Mainland 2012 Census Data

Source: Tanzania Revised One Plan II 2018 Report

Chapter 2: Literature Review

This chapter is divided into two sections. The first section provides a literature review of HCD, starting with an overview followed by HCD's evolution, challenges, and values. This section therefore provides key information on the approach that guided the design and implementation of a birth companion program piloted in Dar es Salaam, Tanzania. The succeeding section provides a global scoping literature review on what is currently known about birth companionship, particularly existing models, what might have shaped the design of current models, as well as the factors influencing implementation of the intervention.

2.1 Literature Review on Human-Centered Design

2.1.1 An Overview of Human-Centered Design

As the WHO calls for more people-centered approaches in delivering health care services, there is a growing appreciation for the prioritization of direct engagement and involvement of program beneficiaries in the creation of interventions. The more siloed and top-down approaches of health care delivery have demonstrated several inadequacies such as fractured health systems and poor acceptance and utilization of interventions by their intended users. Global health financing organizations such as the Bill and Melinda Gates Foundation (BMGF) and the United States Agency for International Development (USAID) are pushing for partnerships between program users and other program stakeholders as program users have become co-partners in program design with "valuable expertise, perspectives, and insights..." (Witteman et al., 2015, p. 2)

Human-Centered Design is a promising approach to the successful realization of this user-stakeholder partnership. HCD focuses on "systematically uncovering end-user needs, building empathy among decision-makers and co-designing solutions to ensure sustainability in

the long term" (Andrawes et al., 2016, p. 97). HCD is comprehensive, taking into account human needs, capacity, perception, and culture of the communities that program developers serve. Equally important is that the solutions that later emerge are formulated from a partnership with these communities and are tailor-made to suit their needs (Ideo.org, 2015). The HCD approach has received increased recognition and acceptance in the development of sustainable and user-focused programs in global health, including in maternal health. Recently, the WHO employed HCD in the Better Outcomes in Labor Difficulty (BOLD) project in Nigeria and Uganda to develop innovative tools to improve quality of care during childbirth (Soo Downe & Gülmezoglu, 2017).

2.1.2 Defining Human-Centered design

To date, no standard definition for human-centered design exists (Bazzano et al., 2017; DiRusso, 2016; Holeman & Kane, 2019a; Kimbell, 2011; Lourens, 2015). Several scholars and practitioners have made numerous attempts to define HCD, but there is no consensus regarding a common definition. Part of the complexity in defining HCD stems from the practice's intricate history (later discussed in this chapter). Additionally, HCD falls under various names such as design thinking, user-centered design, and service design, among others, further complicating the discussion around a de facto definition. Holeman and Kane (2019), while acknowledging the lack of a universal definition of HCD, suggest that the definition provided by the International Organization for Standardization (ISO) be used as an important starting point in understanding the practice. ISO defines HCD as "an approach to interactive systems development that aims to make systems usable and useful by focusing on the users, their needs and requirements, and by applying human factors/ergonomics, and usability knowledge and techniques" (International

Organization for Standardization, 2010, p. 2). Giacomini (2015, p. 608) lists the following six attributes that characterize HCD according to ISO:

- The adoption of multidisciplinary skills and perspectives
- Explicit understanding of users, tasks, and environments
- User-centered evaluation driven/refined design
- Consideration of the whole user experience
- Involvement of users throughout design and development
- Iterative process

The main attributes from this ISO characterization are that the user is involved in the process, there is a thorough understanding of that user's environments, and the process is multidisciplinary and iterative. Although this definition has been criticized by some for being too technical and is influenced by engineering techniques (which presume the user as static and constant), Bazzano et al. (2017) reason that the definition provides a roadmap to some of the essential attributes that make up HCD. However, it is important to bear in mind that this ISO definition makes sense within engineering fields where the focus is on object usability (Nielsen, 1994). Although the ISO definition is generally accepted in the technical field, within global health contexts the definition falls short as human life is at the center. In health, project users' experiences are "colored by illness, fear, and suffering. The expectations of these latter users are in that regard qualitatively different from those of users of specific kinds of hardware or software" (Iedema et al., 2010, p.85).

Most scholars shy away from defining HCD but rather focus on describing its essence and core characteristics. Seemingly, conceptualizing HCD in this way is perhaps more judicious than a standardized definition. Contemporary practitioners and scholars often describe HCD as a

mindset (Brown, 2008; Docherty, 2017; Hassi & Laakso, 2011; Design for Health, n.d), an approach (Andrawes et al., 2016a), methodology (T. Brown, 2008), bottom-up method (Searl et al., 2010) and a process (Catalani et al., 2014; Docherty, 2017) to solving complex problems through innovation (Ideo.org, 2015). According to Di Russo (2016), these varied attributes and descriptions of Design Thinking (DT) cement the argument that “design thinking is transitive and may differ depending on the context in which it is applied” (p. 206). She further reasons that inasmuch as more concrete vocabulary and boundaries are required to describe HCD/DT for teaching purposes, these boundaries must also be flexible and adaptive. By relaxing these boundaries, Di Russo proposes considering Design Thinking as a flexible and continually changing process; therefore, its definition should be evolving and flexible as well. Because of this inability to come to a consensus definition, it is imperative to track the historical lineage of HCD/DT as an attempt to identify some key aspects that might provide a basis of the structure and meaning of HCD/DT.

2.1.3 History of Human-Centered Design/Design Thinking²

The history of human-centered design/design thinking is convoluted and multifarious. This complexity largely stems from its scattered origins across multiple disciplines (Di Russo, 2016). These disciplines vary from engineering, ergonomics, computer science, and artificial intelligence (Giacomin, 2014), design (Di Russo, 2016; Hassi & Laakso, 2011; Johansson-Sköldberg et al., 2013; Johansson & Woodilla, 2010), and business management (Di Russo, 2016). Some have argued that design thinking is an antiquated discipline dating back to the time human beings learned the craft of making fires and inventing tools (Nelson & Stolterman, 2014).

² Human-centered design is often described as Design Thinking by several authors (Bazzano et al., 2017, Ideo.org). In this section, HCD and DT will be used interchangeably. The history of HCD is difficult to find, yet the history of DT is widely available and therefore the author decided to use this history to explain the origins of HCD.

All these different fields established important seminal work and communicated a zeitgeist around a particular thought that gave rise to HCD/DT. Given the expansive history of DT, this literature review deliberately narrows in on the history of DT from design theory and management. This review recognizes and appreciates the history of HCD from other fields; however, an in-depth review of these disciplines falls outside the remit of this analysis. Design theory and management discourses were selected because: design theory provides a body of literature that indicates DT is *intimately* connected to design practice (Di Russo, 2016). According to GK VanPatter (2017), design and design thinking “are not two unconnected subjects from two different planets. For better and for worse, the notion of and center of knowledge for the existing and evolving conditions around Design Thinking today reside in the design community.” A discussion of the history of HCD/DT illuminates important aspects within DT and helps in determining its value and nature (Hassi & Laakso, 2011; Lourens, 2015).

Although some scholars go back to as early as the 1930s in tracking DT history, the period between the 1960s and the 1980s significantly influenced the design (thinking) movement and its evolution to date (Di Russo, 2016). Some of the prolific figures during this time included Herbert Simon, Richard Buchanan, Nigel Cross, and Donald Schön. Johansson-Sköldberg and colleagues (2013) provide a binary approach to help in the discussion of this history, which they grouped as “designerly thinking” and “design thinking.” According to the authors, the designerly thinking discourse is design practice and theory anchored in the academic field of design. The authors further elaborate that this discourse is purely academic in order to gain a deeper understanding of design. They refer to the other paradigm as design thinking, a discourse where design practice and competence are employed in other disciplines outside design theory, particularly for and utilized by practitioners without a DT academic background

(Johansson-Sköldberg et al., 2013). Johansson-Sköldberg and colleagues reason that this discourse popularized design thinking, particularly within the management field. Design thinking in global health does not have a clear history, but it seems like contemporary design thinking influenced how the practice grew in global health.

Among the notable scholars within the designerly thinking paradigm are Herbert Simon, Rittel & Webber, Donald Schön, Nigel Cross, Richard Buchanan, and Klaus Krippendorff.

2.1.4 Designerly Thinking Paradigm

2.1.4.1 Herbert Simon

Simon's work seemed to have been influenced by Christopher Alexander, who argued that design is about giving order and form to physical objects. Kimbell (2011) reasons that Alexander's assertions of design as a "form making" discipline still holds to date as design is fundamentally about making things. Simon and Alexander wrote their foundational work during the technical rationality and positivist era; therefore, the hegemony of positivism influenced their ideas. Simon published "The Science of the Artificial" in 1969, which, like Alexander, focused on describing and understanding what design was and the role of the designer (Kimbell, 2011; Lourens, 2015). Simon saw design as normative. He argued that design is about "how things ought to be" as opposed to what already exists (Simon, 1996, p.115), suggesting that design facilitates the creation of things to achieve a preferred outcome that works better than before. This was a notable move from the prevailing ideology of the day, as he saw design as about *the creation of new things* rather than other sciences that focused on what already is or existing reality (Johansson-Sköldberg et al., 2013). He also recognized and highlighted that designing is for solving *complex (ill-structured)* problems (Simon, 1996, p. 106). He described ill-structured problems as those that are complex, not immediately solvable, and have ill-defined goals; hence,

their solutions are uncertain. Simon, however, regarded human beings as bounded and having limited cognitive ability to solve these complex problems optimally (Di Russo, 2016; Huppertz, 2015; Simon, 1996). He believed that because of this cognitive limitation, humans were only capable of creating “good enough” solutions or only those that “satisfy” rather than resolve the problem—a process he termed “optimization theory” (Di Russo, 2016; Simon, 1996). He then suggested that human beings can increase their problem-solving capacity through “problem decomposition,” a process of fragmenting or breaking down the problem into semi-independent, well-structured solvable components (Huppertz, 2015a; Kimbell, 2011; Simon, 1996). While decomposition provided designers with alternatives to leverage problems, it failed to adequately address all the composite, socially messy problems that could not be broken down into tractable and solvable chunks (Buchanan, 1992; Rittel & Webber, 1973).

In his later work on social planning and revisions of *Science of the Artificial*, Simon acknowledged that the planner (who is the designer)'s creativity should build systems that satisfy the needs of the public and saw the potential of *a participatory design process*. He reasoned that such large-scale social problems as city planning should be thought of “as a valuable creative activity in which many members of a community can have the opportunity of participating if we have wits to organize the process that way” (Simon 1996, p.130). Simon's views departed from his traditional approach, which had little or no participation of the consumers of the design artifact. Simon saw the potential of citizen involvement and creativity (Huppertz, 2015a)- both concepts which characterize design thinking as it is understood today.

2.1.4.2 Horst Rittel and Melvin Weber³

While Simon's work is argued to have paved way for design thinking, it still echoed the dominant rhetoric of the 1960s, which conceptualized design as a systematic and linear approach that dealt with well-defined problems. Rittel and Webber argued that the traditional, scientific, and formulaic processes were insufficient in resolving the social and political nature of complex problems. They opposed the positivist approach and argued that it required more conceptual development to account for open, ambiguous, evolving, "wicked problems."⁴ Wicked problems are defined as a "class of social system problems which *are ill-formulated*, where the *information is confusing*, where there *are many clients and decision-makers with conflicting values*, and *where the ramifications in the whole system are thoroughly confusing*" (Churchman, 1967). They elaborated on the nature of wicked problems and described ten characteristics of these problems. Their understanding of wicked problems as ill-formulated aligned with Simon's earlier assertions that design is for solving ill-defined and complex problems.

Rittel and Webber described ten characteristics of wicked problems as follows:

1. *Wicked problems lack a definitive formulation:* Rittel and Weber argued that wicked problems had no definitive formula for resolution. To them, a problem can only be adequately defined once the designer develops a conclusive inventory of possible solutions in advance. In other words, Rittel and Weber believed that the formulation of the problem paralleled with the formulation of the solution (Buchanan 1992).

³ Although not included in Johansson-Skoldberg et al. (2013)'s list of Designerly thinkers, I added them here because of their important contributions to DT.

⁴ The term "wicked problems" was borrowed from Karl Popper and was first used in design contexts by Horst Rittel in 1962 (Buchanan, 1992; Bousbaci 2008; Lourens, 2016)

2. *Wicked problems have no stopping rule informing the designer that the job is done:* The designer only stops working on wicked problems because of considerations outside the problem, such as running out of resources or patience.
3. *Wicked problems do not have true or false solutions:* Wicked problems involve multiple entities working on the solutions, yet “none of them has the power to set formal decision rules to determine correctness.”
4. *Wicked problems do not have immediate and ultimate tests to validate a solution:* Implemented solutions of wicked problems are bound to have consequences over time and may even produce unwanted outcomes offsetting the intended advantages.
5. *Solutions to wicked problems are “one-shot” operations with no chance for trial and error:* Once implemented, solutions for wicked problems have irreversible consequences. Any effort to rectify the undesired outcome creates another set of wicked problems.
6. *There is no exhaustive set of possible solutions or permissible operations for wicked problems:* There are no standards to determine that every solution to a wicked problem is recognized and considered. Designers usually have to select from a menu of potential solutions and use judgment to decide which solution to follow and implement.
7. *Wicked problems are unique, and so too are the processes of dealing with them:* Existing problems might show similarities with previous problems, yet there is a chance that these two sets of problems which appear are different and should be tackled differently.

Therefore, there are no “one size fits all” solutions with wicked problems. Contrary to well-defined problems whose solutions are generalizable, “part of dealing with wicked problems is the art of not knowing too early which type of solution to apply” (Rittel & Webber, 1973, p. 164).

8. *Every wicked problem is manifestation of another higher-level wicked problem:* Wicked problems usually are a manifestation of another greater problem, and designers are expected not to manage symptoms of the original problem but resolve the problem as much as possible.
9. *There are numerous explanations on the existence of a wicked problem, and the choice of explanation defines how the problem is resolved:* Because explanations for the existence of a problem are varied, no right answer or rule determines the correctness of an explanation. People usually use attitudinal criteria to select explanations reasonable to them and to fit their intentions.
10. *The wicked problem solver can never be wrong:* The role of the designer is to “improve some characteristics where people live” (Rittel & Webber 1973, p. 167); therefore, they should be liable for the outcomes of their efforts when improving people's livelihoods.

Buchanan (1992) argues that this characterization of wicked problems fails to explain why social design problems are wicked and does not provide solutions to these problems; therefore, it lacks a sound and well-grounded theory of design. Despite this criticism, Rittel and Webber’s wicked approach unpacked the authentic nature of wicked problems faced by designers in complex systems (Buchanan, 1992; Di Russo, 2016; Kimbell, 2011; Nelson & Stolterman, 2014). Also, the concept of wicked problems radicalized and explained the uncertainty of design practice as a method of thinking that set precedence for contemporary Human-Centered Design (Di Russo 2016).

In his later work, Rittel introduced various ideas that are fundamental to date in HCD/DT. Among these key concepts was the notion he termed “symmetry of ignorance,” which described problem definition as subjective. Rittel argued that all stakeholders included in the process

possessed equal knowledge or ignorance; therefore, the stakeholders made value judgments towards a solution (Protzen, 2010; Rith & Dubberly, 2007). He also saw design as a collaborative process where all stakeholders should be given equal opportunity to voice their opinions on probable solutions (Rittel, 1984; Protzen, 2010; Rith & Dubberly, 2007). Rittel viewed project consumers as “accomplices” (1984, p. 322), marking an important milestone towards user participation in design theory. According to Lourens (2016), this was not only a fundamental shift from the heritage of the scientific model but an effort towards collaboration and involvement of both designers and users as equal partners in the design process.

2.1.4.3 Donald Schön

Like Rittel, Schön criticized the traditional scientific model as inadequate for dealing with what he called the “swampy lowlands,” similar to Rittel and Webber's wicked problems and Simon’s ill-structured problems. He described design from a practice-based lens and introduced an epistemological alternative rooted in designers’ thought processes and perceptions of real practices of professionals, attained through experience rather than technical rationality (Waks, 2001). Schön claimed that design was a reflective practice in which the designer was *reflecting-in-action or reflecting-on-action*. With the former, the designer simultaneously thinks about what he or she is doing while doing it and makes specific judgments at each stage of the design process, usually through intuition and experience (Schön, 1983). Reflection-on-action, on the other hand, is retrospective thinking after completion of the task—when the designer revisits the experience, analyzes and interprets retrieved information, and draws lessons from experience (Schön, 1983). Schön emphasized that in these reflective conversations with the situations,” the designers work by *naming* (or identifying) the design problem’s key factors, then *framing* or viewing the problem in a certain way, then “making (experimental) moves toward a solution and

evaluating those moves. Unlike Rittel and Webber (1973), who felt that designers had no room for error, Schön argued that one of the designer's methods of inquiry was through “experience, trial and error, intuition, and muddling through” (Schön, 1983, p. 43). Also, his notion of problem framing provided more clarity on the designers’ reflection of their work and became understood as the core of design work (Johansson-Sköldberg et al., 2013). Schön was, therefore, more concerned with setting and framing the problem in a way that made it comprehensible to the designer than he was with the in-depth analysis of the process (Di Russo, 2016). Schön argued that designers should not only identify and name the problem but also frame it. According to him, framing the problem gave it structure and direction, enabling the designer to find ways of solving it. Problem framing is one of the methods used in contemporary DT/HCD and underlined as core in the IDEO Field Guide Manual. The manual describes problem framing as a way of unpacking, shaping, and presenting the design challenge to the stakeholders to allow for deliberation on a wide range of solutions (Idea.org, 2015).

2.1.4.4 Nigel Cross

Like Schön, Cross’ epistemology mirrored the reflexive tradition (Johansson-Sköldberg et al., 2013). However, Johansson-Sköldberg et al. (2013) state that Cross' discussions were more practice-based and supported by practical examples rather than the philosophical approach that dominated Schön's work. Cross introduced the concept of “designerly ways of knowing” to design and argued for an individualized design discipline that had its own unique “things to know, ways of knowing them and ways of finding out about them” (Cross, 1982, p. 221). He focused on how designers think and what they know in solving problems. He situated the designer at the center of his argument. He further suggested that design education should inherently develop a designer who understands the nature of ill-defined problems, how they

differ from other problems, and who is able to identify ways of tackling them (Cross, 1982). Cross saw the designer as a professional with a unique skill set and mindset. He argued that designers should “adopt solution-focused cognitive strategies, employ abductive or appositional thinking, and use nonverbal modelling media” (Hassi & Laakso, 2011, p. 11). These non-verbal tools include diagrams, sketches, and drawings that stimulate cognitive thinking and communication of instructions and concepts (Cross, 1982). In his later work, Cross explored the role of intuition in design and contested the “creative leap” philosophy, which assumed that designers had impulsive bursts of creativity that enabled them to solve problems. Instead, he regarded this part of design as the construction of “creative bridges” that link different ideas from unrelated fields to form solutions (Di Russo, 2016; Cross, 1997).

2.1.4.5 Richard Buchanan

Buchanan changed the trajectory of design from its heritage in industry and craft towards a more generalized and universally accessible DT (Kimbell, 2011). He promoted Rittel and Webber's (1973) “wicked problems” as well as Peter Rowe's (1987) use of the term “design thinking” into mainstream design discourse (Di Russo, 2016). For him, the design was a form of liberal art that could be applied to any product or system to address wicked problems (Buchanan, 1992; Di Russo, 2016; Kimbell, 2011). Although he viewed design thinking as universally applicable, he reasoned that it was a skill mastered by a few who practiced the craft with a unique insight (Buchanan, 1992; Di Russo, 2016). This paralleled Cross’ assertions of a certain “designerly ways of knowing” peculiar to designers. He argued that designers own a special set of tools called *placements*, developed and verified by experience (Buchanan, 1992). He defined placements as tools by which a designer “intuitively or deliberately shapes a design situation, identifying the views of all participants, the issues which concern them and the invention that

will work as a hypothesis for exploration and development” (Margolin & Buchanan eds, 1995, p. 16). Through placements, the designer will be able to make sense of one's design intent without an excessive commitment to the idea while it is still developing. Simply put, the use of placements allows designers to develop ideas that can be tested through several of these placements in which both the idea generated and the placement used can be adjusted, revised, modified, or replaced (Wylant, 2008). Through the concept of placements, Buchanan echoed Schön's perception that design involved learning through trial and error.

Buchanan identified four unique areas of design, further emphasizing the universal nature of design. He classified the areas as follows: (1) symbolic and visual communications (or graphic design); (2) material objects (or industrial design); (3) activities and organizational services (or service design); (4) complex systems or environments for living, working, playing and learning (or interaction design) (Johansson-Sköldberg et al., 2013). This categorization openly recognized design thinking as a typology of practice and offered a groundbreaking framework that has guided the expansion of design thinking (Di Russo, 2016)..

2.1.4.6 Klaus Krippendorff

Krippendorff changed the trajectory in design from the technological determinism of just making artifacts or *things* to making *sense of things* (Krippendorff, 2006). He argued that “humans do not see and act on the physical qualities of things, but on what they mean to them” (2006, p. 47). This perception of design was a radical conceptual shift in design from a preoccupation in the production of aesthetically appealing objects towards the creation of artifacts and material that had *meaning* and value to the user (Johansson-Sköldberg et al., 2013). Krippendorff, therefore, perceived design as an approach through which designers should identify the meaning that the product, system, or service offers to people. According to him, the

design process should revolve around what motivates users to use the service, engaging users in dialogue and learning before moving towards identifying the means of implementation. He further argued that designers had to recognize that users also attach different meanings to the same product and therefore proposed that products or services should match the diversity in the user population (Hill, 2008; Krippendorff, 2006).

2.1.5 Design Thinking Paradigm

Johansson and Woodilla (2010) described the design thinking paradigm as mostly characterized by design from the management schools. They purport that Design Thinking emerged in the 1970s as an academic field within management practice and is younger than designerly thinking. Several scholars heavily criticize this modern DT for its lack of academic rigor and robustness in comparison to the more academically anchored “designerly thinking.” However, it seems to have popularized design thinking as it is understood today, and therefore has more traction and recognition within the DT landscape (Di Russo, 2016; Hassi & Laakso, 2011; Kimbell, 2011).

This modern discourse found homage within management schools and amongst practitioners and scholars. It has promoted DT as a concept of innovation, although Di Russo (2016) argues that the concept of innovation started with Richard Buchanan. Among the promoters of the management design thinking discourse include design company IDEO; Roger Martin who advocates for DT as a way of solving indeterminate organizational problems (similar to wicked problems) (Johansson-Sköldberg et al., 2013).

Di Russo (2016) states that the consulting agency IDEO promoted the popular resources for modern-day design thinking methods which developed several toolkits utilized mostly in business innovation, education, and social innovation. She further argues these methods are often

used as tangible demonstrations of Design Thinking, and the methods utilized in DT stimulate the mindset of those involved in the process. IDEO's model of HCD borrows heavily from the anthropological and behavioral disciplines, and critical to this trend is the “adoption of a human-centered, multidisciplinary practice that re-contextualizes problems in a more empathetic way in order to discover innovative possibilities” (Di Russo, 2016, p. 37). In addition, IDEO provides narratives and case studies assisting people in utilizing their methods, mostly business personnel and social innovators (Brown & Wyatt, 2010; Johansson-Sköldberg et al., 2013). Lourens (2015) reasons that this use of real-life case studies provides tangible evidence of the efficacy and practical value of DT. However, these case studies are often criticized for being anecdotal, as the claims from these case studies are not grounded on scientific studies and evaluations (Hassi & Laakso, 2011; Lourens, 2015). Additionally, the approach has been criticized for lacking rigor and a sound theoretical framework (Johansson-Sköldberg et al., 2013).

Another proponent of DT is Roger Martin, who famed design thinking across business management education. Martin seemed to echo Rittel and Webber's (1973) earlier assertions that DT is an approach to solve wicked problems, although he refers to them as indeterminate organizational problems. He further popularized Cross' assertions that designers should employ abductive reasoning when dealing with ill-defined problems. According to him, DT is a continuous cycle of “generating ideas (abduction), predicting consequences (deduction), testing, and generalizing (induction)” (Johansson-Sköldberg et al., 2013, p. 128) in approaching indeterminate organizational challenges. Abductive reasoning is common in most DT projects, as designers work with program users to generate as many ideas as possible, paving the way to solutions to the identified problems.

2.1.6 Human-Centered Design/Design Thinking in Global Health

As human-centered design continued to evolve and be utilized across disciplines, the global health community has also joined the HCD bandwagon in tackling some of the world's indeterminate and intractable health challenges. The history of HCD in global health is, however, fuzzy. Like management design, HCD in global health has no scholarly and academic background but seems to have latched onto and appropriated the tenets of HCD in management discourse. This is unsurprising, as management DT practitioners and organizations such as IDEO have extended their consultancy into what they refer to as "social innovation," which focuses mainly on dealing with social challenges, such as those dominant in global health.

Within global health, the most notable commitment to the use of HCD is perhaps from leading global health funders such as the BMGF and the Center for Innovation and Impact-USAID. Both institutions recently launched the Design for Health platform and availed resources to assist existing and future design thinkers in applying the HCD approach to the field of global health. The platform also tries to give a brief history of HCD in global health, but only goes as far as explaining how designers have worked in the field of global health, creating products, facilities, and technologies to improve population health (Design for Health, n.d). The platform shows over 35 global health projects that have utilized DT as a fundamental component in the past years. The group further provides a specific definition of what design is in global research, describing it as "a craft and a discipline that applies a specific *mindset* and *skillset* to a creative problem-solving *process*." They assert that the application of DT in global health results in the "development of informed, inclusive, purposeful, compelling, and innovative solutions." By describing DT as a mindset and skill set, the Design for Health group echoes Nigel Cross' claims that designers have a way of thinking and knowing as well as IDEO's field manual on HCD,

which also describes HCD as a mindset. According to them, designers with a design mindset focus on the early and continued engagement of people throughout the process. A design mindset engages a systems approach to problem solving through enabling collaboration among stakeholders. The Design for Health group further explains that this design mindset is similar to primary global health principles and that DT strengthens these principles by engaging intended audiences in identifying needs and root causes, generating ideas, and creating and testing prototypes. The group also describes design as a skill set where designers apply diverse skills to peculiar challenges across various project phases; therefore, individual designers should have the know-how in more than one design area. Additionally, these designers should be creative problem solvers, visual thinkers, and skilled in the craft of making things.

The Design for Health platform promotes the Double Diamond model to illustrate the utility of HCD/DT. The Double Diamond Model was created by the UK Design Council and is illustrated in Figure 2 below. Divergence involves activities that generate as many ideas as possible, while convergence involves the synthesis of ideas generated during divergence. Convergence also includes building prototypes and iteratively refining these prototypes (Holeman & Kane, 2019). The continuous interchange between “divergent activities that ‘create choices’ and convergent activities that ‘make choices’ safeguards against groupthink and the problem of prematurely converging on a way forward” (Holeman & Kane, 2019, p. 8). By so doing, the problem is reviewed and reframed from different angles and different solutions are explored instead of reaching a predetermined solution (Holeman & Kane, 2019). The first diamond shows how discovering the needs of users and defining the problem accurately enables designers to design the right solutions for the need identified. The second diamond illustrates that

the identified solutions have to be appropriately defined so that they have meaning and are acceptable to the user.

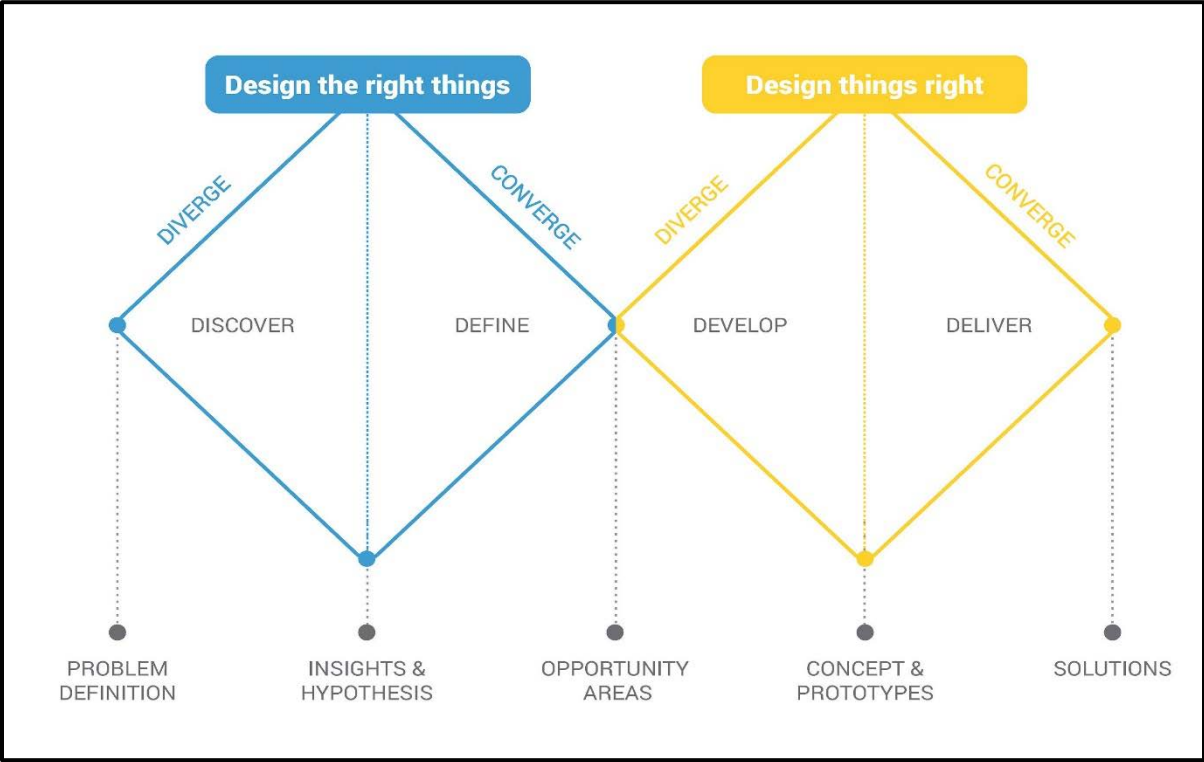


Figure 2: Double Diamond Diagram

Source: Design for Health website

2.1.7 Characteristics of Contemporary Design Thinking

Although inconsistencies with the standard definition of HCD/DT persist, key characteristics of design thinking are consistently noted in design literature (Di Russo, 2016; Lourens, 2015). This illustrates that “whilst interpretations of design thinking may vary, the design community is not as inconsistent as many believe” (Di Russo, p. 256). Di Russo (2016) reasons that the historical and current HCD descriptions illustrate foundational characteristics, processes, methods, and mindsets that have been accepted as essential to DT. For example, the earlier works of theorists such as Simon, Rittel and Webber, Schön, Buchanan, and Cross all acknowledge that DT is a process for solving ill-defined (or wicked) problems which are later reiterated by modern-day practitioners such as Brown and Martin. In modern-day DT, several scholars such as Owen, Brown, Hassi and Laasko, Di Russo, and Design for Health have attempted to integrate knowledge of design thinking by providing some typology based on their analysis and investigation of the literature. These characteristics are succinctly summarized in Table 1 below:

Table 1: Characteristics of HCD among different authors

(Owen, 2007)	Tim Brown and Ideo.org	(Hassi & Laakso, 2011)	(Di Russo, 2016)	Design for Health
<p><i>Conditioned inventiveness</i></p> <ul style="list-style-type: none"> Innovation and invention of novel ideas rather than focus on what already exists <p><i>Human-centered focus</i></p> <ul style="list-style-type: none"> Driven by user needs, wants, and preferences <p><i>Environment-centered concern</i></p> <ul style="list-style-type: none"> Designers should also create solutions that consider the environment 	<p>Empathy</p> <p>Integrative Thinking</p> <p>Optimism</p> <p>Experimentalism</p> <p>Collaboration</p> <p>IDEO</p> <p><i>Mindsets</i></p> <ul style="list-style-type: none"> Iterate Make it – build/create something tangible 	<p>HCD/DT as a PRACTICE</p> <ul style="list-style-type: none"> <i>Human-centered focus</i> – empathizing, ethnography, observation <i>Thinking by doing</i> – early and fast prototyping, rapid, iterative development cycles <i>Visualizing</i> – visualizing intangibles, visual thinking 	<p>Empathy</p> <p>Abductive reasoning</p> <p>Prototyping</p> <p>Problem situation</p> <p>Framing</p> <p>Optimistic</p> <p>Fuzzy front end</p> <p>Wicked problems</p> <p>Inventive and innovative</p> <p>Multidisciplinary</p> <p>Iterative</p>	<p>DT as a MINDSET</p> <p>Early engagement of people (and continued engagement throughout the process) in problem solving to identify root causes, generate ideas, and test prototypes</p> <p>Systems approach</p> <p>Facilitate collaboration among stakeholders</p> <p>DT as a SKILL SET</p>

<p><i>Ability to visualize</i></p> <ul style="list-style-type: none"> • Use of some presentation to illustrate solutions <p><i>Tempered optimism</i></p> <ul style="list-style-type: none"> • Positivity is key <p><i>Bias for adaptivity</i></p> <ul style="list-style-type: none"> • Designer’s ability to create versatile products for a continuously evolving context and user needs <p><i>Predisposition towards multi-functionality</i></p>	<ul style="list-style-type: none"> • Creative confidence • Learn from failure • Embrace ambiguity • Optimism 	<ul style="list-style-type: none"> • <i>Combination of divergent and convergent approaches</i> – ideation, pattern finding, and creating multiple alternatives • <i>Collaborative workstyle</i> – multidisciplinary collaboration, involving multiple stakeholders, interdisciplinary teams <p>HCD/DT Thinking Styles</p> <ul style="list-style-type: none"> • <i>Abductive reasoning</i> – the logic of what could be, finding new 	<p>Intuitive</p> <p>Ethnographic</p> <p>Systemic Thinking</p> <p>Rapid</p>	<p>Designers should possess diverse skills for specific challenges, across different project phases.</p> <p>Skills in creative problem solving, visual thinking, and the craft of making things.</p> <p>Skills required: interaction design, service design, product design, and visual design</p>
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<ul style="list-style-type: none"> • Solution to problems should not have a single function <p><i>Systemic vision</i></p> <ul style="list-style-type: none"> • Focus on holistic problem solving approaches rather than narrow focus <p><i>View of a generalist</i></p> <ul style="list-style-type: none"> • Allowing coordination across disciplines and bringing diverse experts together <p><i>Ability to use language as tool</i></p> <ul style="list-style-type: none"> • Use of visual and verbal language to illustrate, 		<p>opportunities, urge to create something new, challenge the norm</p> <ul style="list-style-type: none"> • <i>Reflective reframing</i> – systems thinking, 360 degree view on the issue • <i>Integrative thinking</i> – harmonious balance, creative resolution of tension, finding balance between validity and reliability <p>HCD as a Mentality</p> <ul style="list-style-type: none"> • Experimental & explorative – license to explore possibilities, 		
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<p>reveal, and explain abstract concepts and simplify complex phenomena</p> <p><i>Affinity for teamwork</i></p> <p><i>Ability to work systematically with qualitative information.</i></p> <ul style="list-style-type: none"> • Ability to use qualitative methods to gather data, gain insights, conceptualize, and use the data throughout the process 		<p>risking failure, failing fast</p> <ul style="list-style-type: none"> • Ambiguity tolerant – allowing, tolerating, and comfortable with ambiguity, liquid and open process • <i>Optimistic</i> – viewing constraints as positive, optimism attitude, enjoying problem-solving • <i>Future-oriented</i> – Orientation towards the future, vision vs. status 		
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		quo, intuition as a driving force		
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Color legend showing common characteristics

Light Brown: teamwork/collaborative effort/multi-disciplinary

Magenta: Optimistic mindset

Light Blue: Human-centered focus/prioritization of user needs/empathy

Olive Green: Intuition as a skillset

Bright Red: Abductive reasoning/innovativeness

Navy: Systemic in approach and orientation

Bright Green: Iterative/trialing

Purple: Visualization mindset

Brown: Experimentation/ willingness to learn from failure

Turquoise background: Tolerance to ambiguity/uncertainty

Yellow background: Prototyping

Table 1 illustrates the different characteristics of DT, as contemporary scholars understand it. The different colors depict the commonalities across each scholar, and analysis of these common characteristics reveals that the scholars understand DT to be a user need-focused, empathetic, iterative, and multidisciplinary approach that involves prototyping of solutions before implementation. DT is also a mindset that requires its adopters to tolerate uncertainty, to be optimistic, and to learn from failure. Users of HCD focus on holistic problem-solving approaches rather than a narrow focus.

2.2 Summary of History

An analysis of the history of HCD/DT uncovered the characteristics and value of the approach despite its several origins or differences in theoretical orientations among scholars and practitioners. It is apparent that both designerly thinking scholars, albeit with different perspectives, learned something from theorists that came before them, and either built on the early theories or refuted some perspectives yet appreciated how the earlier seminal work influenced DT. On the other hand, although the modern design thinking practitioners purport HCD as a new concept, it is clear that they build their concept of design thinking from the foundational work of the designerly thinking scholars. Through the interrogation of this history, all the theorists and practitioners collectively acknowledged that DT is a problem-solving technique, particularly for ambiguous “wicked” or indeterminate problems without a finite solution. In addition, both paradigms understood that design is normative, creative, and focuses on creating a preferable outcome that worked better than before to improve the lives of people.

The history also illustrated that HCD is an evolving concept. The earlier works described what design was, what it could do, the nature of the problems it solved, and it grew into an investigation of how to solve these problems. The “*how-to*” *solve* part included describing the characteristics of the designer, the tools, methods, and, most importantly, the mindset of those involved in solving the problems. As early as the time of Herbert Simon, there was a recognition that DT should be participatory. However, it appears as though the more modern theorists promoted the inclusion of the target audiences in the design and implementation process. In addition, while designerly thinking scholars such as Schön and Buchanan explained extensively how design involved iteration and trialing, it was the more recent practitioners through their practice-focused approach that made both these key DT principles mainstream. Furthermore, an

analysis of the history also demonstrated that design, and ultimately design thinking, have gone through an evolution as a way of adapting to complex problems as they surface over the years. It is perhaps this evolving and adaptive nature of HCD/DT that makes it suitable for tackling complex and wicked problems that are also continually evolving. Lastly, the history concludes with a summarization and identification of common HCD characteristics shared across different scholars and practitioners. Di Russo (2016) states this succinctly: “it is clear in the literature...that, whether realized or not, a common ground for consensus is emerging across individual accounts on design thinking (p. 45). She further elaborates and states that this uniformity is what should provide consistency and a basis for articulating and understanding the nature of design thinking (Di Russo, 2016). These common characteristics perhaps provide a framework of the mechanisms that are necessary for HCD to be effective in program design and implementation.

2.3 HCD Phases

The HCD phases or stages, such as those depicted in Figure 2, vary according to different scholars and organizations. However, despite these differences among scholars and practitioners, they all agree that the phases are not linear. This dissertation will employ the three phases described by Ideo.org, which are the inspiration, ideation, and implementation stages. The *inspiration* phase primarily involves a deeper understanding and engagement with the intended users of the program. During this phase, the research team engages in rigorous data collection using methods that allow the research team to immerse themselves and collect data that uncover the user's needs, expectations, challenges, opportunities, and interactions (Ideo.org, 2015; Salgado et al., 2017). During *ideation*, data collected in the inspiration stage is collated, grouped,

and analyzed using a variety of tools to identify themes, opportunities, and insight statements that will morph into tangible prototypes. Prototyping involves creating a draft version of the proposed intervention and testing out its usefulness and acceptability with potential users before its final implementation in the field (Ideo.org, 2015; Salgado et al., 2017). It is during the ideation phase that different stakeholders gather to deliberate and identify user needs as well as engage in prototyping solutions. The assumption is that all different groups will deliberate and converse at the same capacity and level during this process. The final stage is the *implementation* stage, which is the actual roll out of the innovative solution or intervention.

2.4 Challenges with HCD

Despite its increasing popularity in global health, HCD is not immune to criticism. However, understanding the challenges experienced by practitioners, researchers, and organizations is necessary for directing future users of the approach. The most frequently cited shortcoming of HCD is its convoluted history and lack of definition of what it is and what it involves, as discussed in the earlier sections of this chapter. There are, however, more challenges with undertaking HCD, especially within the global health landscape (Moody, 2015; Karrel, 2017, Bazzano, 2015; Bazzano & Martin 2017). These challenges will be discussed in detail in the subsequent sections below:

2.4.4 Articulation of HCD and What It Entails

As previously discussed, there is no standardized definition of HCD and no defined *modus operandi* of its standardized application in practice. These limitations are also felt in global health as practitioners, researchers, and scholars not only struggle with its operationalization in the field, but it also makes documenting and describing health projects that

involve design arduous (Bazzano & Martin, 2017; Bazzano et al., 2017). However, efforts to regulate and appropriate HCD into global health are underway, evidenced by the most recent creation of the Design for Health platform to provide resources for practitioners in the field.

In global health, the use of evidence-based research to inform practice is highly emphasized. Apart from the use of trials to document evidence, one of the hallmarks of health research is the aggregation and synthesis of existing literature about a specific area of interest to inform policy or practice on the efficacy or impact of that specific area of inquiry (Bazzano & Martin, 2017). While this is effective within other areas of global health, abstracting literature for a concept such as HCD, which does not have a fixed definition, creates a caveat for scholars to gather and synthesize information on the issue. Bazzano and colleagues (2017) reported this limitation as they experienced challenges during the write up of their scoping review on HCD in global health. The authors explained how it was difficult to search for literature, as HCD falls under different names and definitions. Additionally, they noted that there are several practices and activities that fall under the purview of HCD but are not defined as such. It is therefore likely that the authors could have missed important articles that could have enriched their synthesis (Bazzano & Martin, 2017). Unclear definition and processes of HCD further compound its complexity in global health work. It becomes particularly challenging to effectively evaluate and measure its impact if the approach evolves and takes different forms through its application across different projects.

2.4.5 Complexities with the design language and design methodology

Involving users and other non-design stakeholders to work together with design practitioners can lead to challenges in terms of collective understanding and communication (Moody, 2015; Van Der Bijl-Brouwer, 2016). Global health practitioners have reported

challenges with understanding design language and application of certain design methodology as it applies to health (Groeneveld et al., 2018; Holeman & Kane, 2019a; Moody, 2015; Panditi-Rajani, 2016). Designers are blamed for using design-specific jargon when working directly with program users and other non-design stakeholders, making it difficult for these groups to articulate what HCD entails (Kujala, 2003; Moody, 2015). For example, in a pilot study exploring the use of HCD in Maternal, Newborn, and Child Health (MNCH) programs in Ghana, Kanagat & LaFond (2018) reported that some program managers had initial difficulties comprehending the HCD process. This lack of understanding, coupled with the short time that program staff had to grasp and absorb HCD concepts, further exacerbated the program staff's frustrations. The authors further reported that the communities these program managers worked with also struggled with understanding and adopting the project because the program staff failed to communicate the project objectives effectively. This confusion possibly resulted from the program staff's limited understanding of the HCD process. Similarly, Holeman & Kane (2019) describe how global health researchers and practitioners often find "design language and practices startling, and may perceive them as disruptive or lacking in rigor if they are not explained well" (p. 9). An Adolescent 360 (A360) multi-component evaluation in Nigeria, Ethiopia, and Tanzania also raised these concerns. The authors reported methodological gaps between the evaluation team who had a social science and public health background and the IDEO design team who were leading the HCD process (Doyle et al., 2019a). To resolve this challenge, the program staff and implementers who had public health backgrounds and experience working with IDEO stepped in and assisted in bridging the gap. Furthermore, orienting the evaluation team on the HCD methodologies also helped in improving the methodological tensions between these two groups.

Because of these challenges, global health funders such as the Bill and Melinda Gates Foundation (BMGF) and United States Agency for International Development (USAID) financed the Design for Health platform. The platform seeks to address some of these challenges by availing resources that offer new skills or enhance existing skills related to HCD in the global health landscape. Among the many resources available on this platform are resources for five types of users of HCD in global health: the newbie, the curious, the trialist, the believer, and the pioneer. The “newbie” and the “curious” reported that they struggled with articulating design terms and concepts and wanted to learn about HCD without the design lexicon.

In the same way, it can also be problematic for designers to easily acquaint with and understand global health language, procedures, culture, and standards (Groeneveld et al., 2018). Without this shared understanding of language and practices, it can become difficult for effective collaboration and for non-designers to see the value of HCD in their work. Groeneveld and colleagues (2018), in their study on challenges of design research, found that design research students struggled to explain the value of HCD to health care workers. The study also exposed notable differences in practice between the two disciplines. For example, health providers immediately wanted to know the specific outcome of the human-centered design. This starkly contradicted with design research, which does not focus on a fixed or known outcome.

Challenges also exist between design and public health methodologies as different techniques and methods are applied in both disciplines. Sometimes the methods are similar, yet interpreted differently, further intensifying the methodological tensions. Groeneveld et al. (2018) noted variances between design research and traditional clinical health research methodology. Design research is characterized by contextual inquiry; therefore, it employs mostly qualitative methods and uses small samples, whereas clinical research often uses large randomized

controlled trials and large samples (Groeneveld et al., 2018). Design research is, therefore, largely criticized for its lack of generalizability, as innovations that come out of the process might only be suitable for the targeted communities they were designed for (Altman et al., 2018; Catalani et al., 2014). Catalani and colleagues (2014) mention that this shortfall in HCD is a significant concern since HCD is largely condemned for its “chronic pilotitis,” or the proliferation of interventions that are limited in size and scope and cannot be delivered sustainably across large populations” (p. 7). In *Human-Centered Considered Harmful*, Norman (2005a) further argues that the more something “is tailored for the particular likes, dislikes, skills, and needs of a particular target population, the less likely it will be appropriate for others” (p. 16). A study conducted in two hospitals in the United States reinforces Norman's assertions, as the researchers faced resistance from other facilities not included in the original design who stated that the intervention was not made for them (Lin et al., 2011).

HCD practices of embracing ambiguity, learning from failure, iteration, and understanding human needs sometimes face backlash from the global health community, as all these methods can place human lives at risk. For instance, the iterative process can be long, time-consuming, and exhausting. In health care settings, delivery of care to patients is the primary and mandatory duty of health providers. As such, providers might find it challenging to allocate time and resources to work with designers (Moody, 2015). Additionally, the removal of health practitioners from care delivery to iterate on a potential solution has ethical implications as patients might develop complications or die in the process, thereby making iteration harder in health contexts. Similarly, learning from failure and intuition contradicts global health practice, particularly with issues or conditions that require immediate solutions. Altman et al. (2018) posit

that there might be an unwillingness across global health to experiment with low-fidelity prototypes (solutions) in a field where morbidity and mortality are at stake.

Design practitioners and scholars extol the brainstorming technique often used in HCD for its ability to generate many ideas. However, some scholars criticize it for its lack of clarity about how these ideas are selected (Thoring & Muller, 2011). Idea selection consists of voting as participants choose and narrow down solutions. Thoring and Muller (2011) argue that this selection process is subject to bias, as teams are likely to select their own ideas or those they find interesting even if their ideas are not the best. Also, voting in HCD occurs in the open and powerful participants may influence the votes of those in lesser authority. Within paternalistic systems, those with less authority might select or vote for ideas chosen by their superiors even when they disfavor these ideas. Steen (2011) opines that there is exercise of power with each voting decision and some actors have more agency than others, leading to disparities and inequity.

2.4.6 User-centrism

The hallmark of HCD is placing the program recipient at the center of the design process. However, this user-centrism can be a detriment if not properly articulated (Andrawes et al., 2016). Andrawes and colleagues argue that identifying project users as equal partners with rights can create what they termed the “rights rhetoric.” They argue that the rights rhetoric can stifle thinking, causing program users to view themselves as just beneficiaries with ‘entitlements’ instead of stakeholders with ‘responsibilities’ who can actively effect change. This problem probably emanates from unclear explanations of HCD to targeted program users, especially in settings with populations used to following orders. It is, therefore, critical to ensure that users

understand HCD ideology and view themselves as co-designers and owners of the program (Andrawes et al., 2016).

Also, some authors criticize HCD for its heavy dependence on user feedback, and users might not always fully understand or be aware of their needs or wants (Catalani et al., 2014). Differences can occur between what users prioritize and what health providers and researchers consider useful based on research, experience, and expertise (Witteman et al., 2015; Altman et al., 2018). Within global health, evidence and estimates can show alarming rates of health challenges that require immediate responses. However, users might not see the challenge as a problem that needs instant attention. For instance, maternal deaths are considered rare from an epidemiological standpoint (WHO, 2017), and might not occur often enough for communities to see their devastating effects. Yet maternal mortality remains one of the unfinished agendas of the MDG era that requires immediate efforts at the international and local levels (Kassebaum et al., 2017). While this point is valid, there is a need to tread cautiously as it potentially carries paternalistic undertones in violation of HCD philosophy that program users are passive and oblivious of their health needs and requirements. Expanding on the notion of user feedback, Moody (2015) posits that users as co-designers must be confident and willing to share their experiences and ideas with others. This can be extremely challenging when users have to discuss sensitive subjects (Groeneveld et al., 2018; Moody, 2015) or when they are afraid to critique honestly, especially in settings where the power differentials are not addressed adequately (Moody, 2015).

Donald Norman advances the debate of user-centrism by arguing that situating the user at the core of design limits the innovativeness of HCD (Norman, 2005b). He argues that human-centered design is incapable of pushing the boundaries of existing technology because it only

focuses on tailoring present-day solutions to meet the demands of the current user, instead of thinking about potential future solutions. He also critiques that giving too much leverage to users can result in a mess of complex designs, which become less comprehensible during selection and refinement. He thus recommends that sometimes what is required is a “design dictator who says, ‘ignore what users say: I know what's best for them’” (Norman, 2005b, p. 17). Norman's argument, however, carries the hegemony of dominance and control, which explicitly contradicts the ethos of HCD. In a field such as global health where rights, ethics, and equity are fundamental, taking such a stance might be retrogressive as the WHO pushes for more human/people-centered care. Assuming that the designer or implementer knows best has resulted in poor utilization of interventions by intended users as well as massive financial losses by global health financial entities.

2.4.7 Clashes with donor expectations

Donors and funders dominate the global health field, and their expectations and standardized planning structures may fail to align with HCD processes (Karrel, 2017). Program funders usually measure the performance and accountability of program users using their own metrics, which are usually short-term (Andrawes et al., 2016a). This contrasts sharply with HCD's long, repetitive cycles, prototyping, and people-centered approaches that do not yield rapid and tangible outcomes whose effects may be measurable over time (Andrawes et al., 2016; Karrel, 2017). As a result, donors might be unwilling to implement programs that employ the HCD process because of the non-systemized nature and lengthy process of HCD. Additionally, donors usually determine programming; thus, most organizations implement what donors prioritize and consider necessary, which might contradict what program beneficiaries want.

2.4.8 Tensions due to methodological issues

Debates around HCD also revolve around how research is conducted across the two disciplines of design and global health (Bazzano et al., 2017). Most public health research is hypothesis-driven, and global health practitioners and funders utilize evidence-based literature as proof of concept for interventions (Bazzano et al., 2017). This approach to public health research design battles with some of HCD's attributes, which include ambiguity, iteration, experimentation (prototyping), willingness to fail, and producing solutions from ideas generated from uncertainty (Vechakul et al., 2015). Ideally, with HCD, public health practitioners are expected to navigate the user's context with an open mind and without imposing how the final intervention should look like. They are expected to explore users' needs, challenges, and experiences and work from the bottom up until a solution is reached collectively. These methodological issues can create tensions between HCD and global health, where global health practitioners want to implement a predetermined intervention that they know from evidence will improve the health of the targeted users. However, GK VanPatter, a proponent of design thinking and founder of Humantifics, clarifies this tension by categorizing these orientations into upstream and downstream approaches. He argues that service design, which is common in public health, is a downstream approach in that it already assumes that the user requires a "service." On the contrary, upstream approaches of design thinking begin with no preconceived outcome assumptions. According to this assessment by VanPatter on HCD, public health research can still adopt an HCD process; however, downstream rather than upstream approaches guide the process. VanPatter's assertions infer that most of public health's approach to HCD is downstream in orientation, and he prefers calling this product, service or experience design. HCD in public health can still provide a "structured process to systematize innovation in public health, shorten

planning timeframes, and co-create with community members and cross-sector partners,” (Vechakul et al., 2015, p. 2558). The main point is that the service, though anticipated by the program managers, can still be developed according to the specifications, expectations, and needs of the end-user and follow the key tenets of HCD.

2.4.9 Measurement issues

Another tension between HCD and public health research stems from the techniques used to measure and evaluate product impact. The process between the two disciplines is quite varied and unique to each field (Bazzano et al., 2017). For example, an artifact to advance public health may be considered an outcome from a design perspective. However, the artifact might not be considered a health outcome in global health where the desired outcome would be the impact of that product or service. Likewise, the designers may prioritize the usability or acceptability of the product and discount the later stages of the process where the impact of the product or service on health outcomes is assessed (Bazzano et al., 2017). In this case, the attributes of the interventions in both fields are at odds, such that the effects of design interventions do not align with public health metrics (Docherty, 2017).

2.4.10 Cost implications

Scholars also dispute the financial and time constraints that HCD places on practitioners and organizations who utilize it (Andrawes et al., 2016; Karrel, 2017; Lafond & Davis, 2016; Moody, 2015; Vasdev, 2013). The HCD process involves multiple non-linear steps such as iteration and testing cycles, which can be long and expensive as logistical and transport factors come into play (Moody, 2015). As a result, HCD requires careful planning, sufficient time allocation, and financial resources in its execution. In the United States, a program that developed a simple asthma spacer that had the potential to lower the asthma burden in low-

income settings closed its doors due to financial problems. The project faced a financial challenge as they were required to test the spacer for regulatory purposes, and these tests needed significant amounts of money which the organization did not have. Seeking donor assistance proved futile as potential funders requested clinical evidence demonstrating that the asthma spacer worked before making substantial financial commitments. Apart from the financial costs, HCD is often time-consuming as it involves much immersion, iteration, experimentation, and willingness to learn from failing (Andrawes et al., 2016a; Davis & LaFond, 2016; Groeneveld et al., 2018; Moody, 2015; Shiferaw et al., 2013; Vohra et al., 2019). Altman and colleagues (2018) note that HCD not only requires considerable time but energy as well. They recommend that teams thinking of using HCD prepare for an intensive process, as HCD is different from the traditional, less iterative, and user-focused approaches.

2.4.11 Power differentials

Implicit in HCD is its potential to alter power dynamics as it aims to empower and provide transformative agency to project users. However, the extent to which this is realized within health care settings is uncertain (Donetto et al., 2015). HCD utilizes multiple stakeholder involvement in coming up with innovative ideas to be implemented in the field. This multi-stakeholder engagement potentially creates a power differential that can present a challenge since the ultimate product or service has to be negotiated (Moody, 2015). Fair negotiation is not guaranteed in organizations where professional hierarchies and bureaucratic structures still exist, especially in governmental establishments (Sanders & Stappers, 2008). Human-centered design threatens these power structures by shifting power into the hands of users, and entities used to profiting from these paternalistic structures might be unwilling to give up control or accept egalitarian idea sharing (Sanders & Stappers, 2008).

Furthermore, public health practice is often characterized by asymmetry as practitioners and program users differ dynamically in terms of status, knowledge, hierarchy, skills, and use of language (Farr, 2018). A case study that used HCD methods to improve breast cancer services showed that while some patients felt a sense of equal partnership with their service providers, others found the experience terrifying despite providers' efforts to make patients feel comfortable and at ease (Farr, 2018). The patients' reaction to the co-creation exercise is unsurprising as patients largely depend on organizational services; therefore, they usually view providers as more knowledgeable, experienced, and skilled. In maternal health, this concept of power asymmetry has been widely discussed and noted within modern-day technocratic childbirth practices, where providers have taken over birth and women become subject to this medical authority (Davis-Floyd, 1992, 2001; Jordan & Davis-Floyd 1993; Henley, 2015; Jordan, 1992). The scholars claim that providers, especially obstetricians, have authoritative knowledge “because of the high status of their profession and the authority that this affords them within the medical system” (Henley, 2015, p. 261). Jordan and Davis-Floyd describe authoritative knowledge as domineering, legitimized, and standardized such that those who contradict it are seen as “backward, ignorant and naïve” (Jordan & Davis-Floyd, 1993, p. 152). Other scholars argue that provider control has existed for a long time in facilities, with those in the lower ranks accepting, conforming, and reinforcing this hegemonic culture (Henley, 2015). Although this culture is diminishing, especially in HICs, it is in settings where authoritative knowledge still prevails that make the proper application of HCD idealistic.

In the breast cancer study, some service providers reported that they still needed to go through certain hierarchies for change to be implemented (Farr, 2018). Similar findings were reported in Ghana in a pilot study to promote MNCH, where the ideas from the HCD process

were not used to develop specific health messages. The program staff first had to confirm that the message content was consistent with the government and other health-based organizations' messaging protocols (Kanagat & LaFond, 2018). These findings further highlight that it can be demanding to equalize power in a system fraught with power disparities, social inequalities, and where government control takes priority over user requirements. While Simon's assertions that design is about formulating “courses of action aimed at changing existing situations into preferred ones” (1996, p. 50) hold, it is Huppertz's questions that continue to linger in these controlled environments: “who determines the “courses of action” and whose “preferred situations” are we to design?” (2015, p.40).

2.4.12 User resistance to change

Human-centered design challenges traditional ways of thinking and focuses on changing the status quo into a desirable future state for end users. While this shift in mindset leads to innovative ideas, potential resistance to change can occur, especially from individuals or organizations used to doing things the same way. Karrel (2017) notes that one of the greatest limitations of HCD in global health is the natural resistance to change by communities, often aggravated by prevailing local cultures that are at odds with HCD. He described how certain cultural mores and taboos might not allow user involvement (for example, in patriarchal settings or within certain religions that forbid the interaction of different sexes or people of social positions in one setting). This resistance to change is further worsened by the ambiguity of HCD, which can make it hard to justify the investment in change when the outcome of the process is uncertain. Maternal health program participants in Sierra Leone described how it was difficult to explain to organizations that had been operating in the same way for long periods the importance of change in HCD (Davis & LaFond, 2016).

2.5 Values of HCD in Global Health

An analysis of the history of HCD/DT provided some useful insights into not only the characteristics of HCD but also the value of HCD (for example, its ability to tackle “wicked problems”) (Buchanan, 1992). Indeed, global health challenges such as maternal health are complex and rightfully fit within the “wicked problems” parlance that HCD seeks to address.

Within global health, HCD has gained ground and is increasingly being integrated into interventions that solve challenges in the field (Altman et al., 2018; Bazzano & Martin, 2017; Bazzano et al., 2017; Brown, 2008; Holeman & Kane, 2019; Ideo.org, 2015; Karrel, 2017; Design for Health). For example, Design for Health provides a database of over 40 global health projects that have incorporated HCD into their work. Incidentally, leading and influential global health institutions such as the BMGF, United Nations (UN) agencies, and USAID have elevated HCD in global health discourses as well as in finance projects employing HCD in their practice (Bazzano & Martin, 2017; Holeman & Kane, 2019b). Like in management science, literature and guiding manuals on HCD have multiplied (Holeman & Kane, 2019b; Kimbell, 2014). At the same time, Holeman and Kane (2019) also mention how grey literature from global health organizations has proliferated, indicating the value of HCD in global health. While HCD offers great promise, Fabricant (2010) cautions against seeing HCD/DT as “a magic elixir that can be sprinkled on anything.” Other scholars fear that HCD has become a catchphrase and feel-good word used in global health circles without people knowing and understanding what HCD entails (Holeman & Kane, 2015; Cheney, 2016; Lee, 2015b). Although this backlash is important, it is also critical not to “throw the baby out with the bathwater” and explore the many good arguments and examples for HCD (Johansson & Woodilla, 2010). Norman (2013), despite his

other earlier criticism on HCD as nothing special, claims that HCD is an essential tool because when done correctly “it is powerful” and can be “transformative.”

The value of HCD in global health can not be overemphasized. The field of global health has been largely dominated by siloed and top-down approaches that have excluded or sidelined program users as partners in creating programs that meet their health needs and requirements. In most cases, global health decision-making is far removed from user expertise and occurs in places and countries distant from where the projects are implemented (Packard, 2016; Lyn, 2014). Unfortunately, these approaches have resulted in services or products that remain underutilized or not used at all because they fail to meet user needs, or fail to adapt to the context (Altman et al., 2018; Searl et al., 2010). Cases of low utilization or alternative uses of health interventions have been reported across the global health landscape. For example, the high poverty rates across Sub-Saharan Africa have led recipients of mosquito nets to use them to catch fish for food and sale instead of for prevention against malaria (Short et al., 2018). In another study conducted in Ghana, recipients of mosquito nets did not use them as they found the nets to be undesirable, uncomfortable, and aesthetically unpleasing (Kim et al., 2019). In addition, users felt inconvenienced by the nets as the process of hanging and entering the nets was demanding, stressful, and tedious (Kim et al., 2019). In southern Africa, a merry-go-round water pump project intended to generate mechanical power to pump water as children played discontinued its services after getting mixed results on its efficacy (Denend et al., 2014). The project managers failed to recognize that it was not the scarcity of mechanical power that hindered the supply of clean water in the region. Instead, it was more systemic issues such as inadequate financing, maintenance of supply infrastructure, water quality, and water scarcity that were the more significant obstacles. Additionally, the project managers failed to consider user

perceptions, as children found the merry-go-round mechanism difficult to operate and immediately lost interest in it (Denend et al., 2014). This project is one of numerous accounts in global health that show repeated cycles of well-intentioned programs that fail to attain the intended impact (Denend et al., 2014).

Catalani and colleagues (2014) contend that the effects of failing innovations in global health are much more damaging than in commercial innovation where loss might be limited to private investment. In global health, failed innovations can lead to mortality, morbidity, and loss of significant amounts of funds (Catalani et al., 2014). Because of these potential failings in the field, global health practitioners can benefit from using design approaches anchored in user focus, iteration, and testing for efficacy, acceptability, and safety (Catalani et al., 2014). Human-centered design is an approach that embraces all these characteristics and offers promise in improving existing practices through fostering novel and user-competent solutions.

In a global scoping review on the purpose and value of HCD in global health, Bazzano and colleagues (2017) found that the application of the approach yielded several results. These included program managers understanding user needs leading to the creation of appropriate products and services, reduced costs related to medical errors, increased employee satisfaction, increased acceptance, and increased feasibility of interventions. This global scoping review is among the few papers referenced by Design for Health as a valuable piece of literature in explaining the importance of HCD in global health. The Design for Health platform provides four broad themes that describe the importance of HCD in global health: better outcomes (user), improved processes (program), expanded capabilities (organization), and increased equity (system).

2.5.4 Better outcomes for the User

HCD can contribute to better outcomes for the user, especially regarding the demand-side challenges and behavior change outcomes (Design for Health, n.d). Users in global health face access and low engagement barriers, which lead to reduced uptake and utilization of health interventions. Moreover, lack of sustained use and local buy-in of programs has stalled progress in the field. HCD's holistic, iterative, understanding of user needs, and user engagement across the ecosystem provides an approach that can help in minimizing the aforementioned challenges (Design for Health). The iterative process enables participants to revisit and modify a solution until it is viable and acceptable to the user, resulting in increased program utilization. Holeman and Kane (2019) state that it is this iterative nature of HCD that makes it amenable to tackle complex, indeterminate, and wicked problems.

2.5.5 Improved process which leads to better programs/interventions

HCD can strengthen both the approach and implementation of a program through the introduction of iterative and fast ways to gather user feedback and test ideas and solutions. The Design for Health team posits that HCD can reduce the likelihood of a program being implemented without first determining whether it is acceptable, feasible or sustainable within a targeted population and context. HCD departs from the more inflexible, traditional approaches and provides flexibility through iterative feedback cycles and prototyping of ideas with users from program onset. Users can provide valuable feedback to program managers, as they are the experts on whether or not a particular intervention would work in their environments. Program managers and users can then develop innovative ideas or improve existing solutions to suit user needs and preferences. Traditional program implementation has also mostly relied on assumptions of key decision-makers such as technical advisors, who are often removed from the

intervention setting and therefore unaware of changing user needs and behavior (Andrawes et al., 2016). However, HCD addresses this challenge as it questions these assumptions early by concentrating on the needs, contexts, and preferences of users and designing interventions from the user's perspective, not the implementer's. For example, the IDEO team was asked to assist in developing a marketing strategy for a company that sells health insurance through a mobile money platform in rural Nigeria. The team asked the users to co-develop the message with them by first asking what “community health” looks like to them. The team had assumed that the community would focus on medical imagery such as doctors, health facilities, and medical supplies, yet the community had a more nuanced understanding of community health in their minds. They described community health as families, exercise, community events, and marketplaces that sold healthy produce. The community stated that community health went beyond visits to the facilities, extending to anything that promoted healthy lifestyles. They were drawn to messages that focused on investment in individual health, as this ultimately strengthened the community. The IDEO team realized that their understanding of what health insurance is differed significantly from that of community members in this part of rural Nigeria. IDEO perceived health insurance as coverage during worst-case situations; the community in Nigeria viewed health insurance as a community health pool that individuals bought into and everybody would profit from over time. The community's perception of health insurance was the one used for the final marketing strategy. Similar findings were reported in Sierra Leone and Ghana, where the use of HCD prompted program managers to shift their focus towards users and generate deep empathy and understanding of user needs, leading to contextually-appropriate programs (Davis & LaFond, 2016; Kanagat & LaFond, 2018; Lafond & Davis, 2016).

HCD can also accelerate the long data collection and analysis processes used in research. Program managers can miss opportunities to effect meaningful change during the early stages of program design due to lengthy periods of data gathering and analysis. HCD, on the contrary, employs fast data generation and synthesis techniques, which hasten the speed of innovation and program adaptation (Andrawes et al., 2016; Bazzano et al., 2017; Roberts et al., 2016; Design for Health). This is crucial in global health where human life is always at stake; therefore, approaches that accelerate the generation of feasible and acceptable interventions that minimize human suffering are preferred. Vasdev (2013) highlights one of the World Bank's projects that used Short Message Services (SMS) technologies to survey a large number of farmers in rural Uganda. The project managers used the platform to obtain responses within 24 hours from thousands of farmers about a popular banana plant infested by a bacteria strain, enabling them to design an intervention built on the farmers' feedback.

Additionally, Design for Health argues that HCD improves the design process of interventions by providing a quick method for implementers to adapt programs to the local context and user behaviors. This adaptation of programs to suit local settings enhances the probability of achieving preferred outcomes. By providing agile processes to meet specific user desires and adapt to local contexts, HCD offers promise for replicability in new contexts. Design professionals can use similar techniques, but in ways that are more adaptable to local contexts and behavior patterns. For instance, to increase the use of Chlorhexidine (CHX) for umbilical cord care among mothers with newborns in rural Nigeria, USAID co-created simple visual messages based on a Yoruba proverb that compared fences, which shelter crops from animals, to CHX, which protects newborns from cord infection (see Figure 3). The community related well to this message and went on to suggest other metaphors that resonated with their particular

community, such as the use of mosquito nets protecting mothers and babies from mosquitoes. These locally developed messages that suit the rural community in this part of Nigeria promoted the use of CHX in the region (USAID, n.d).

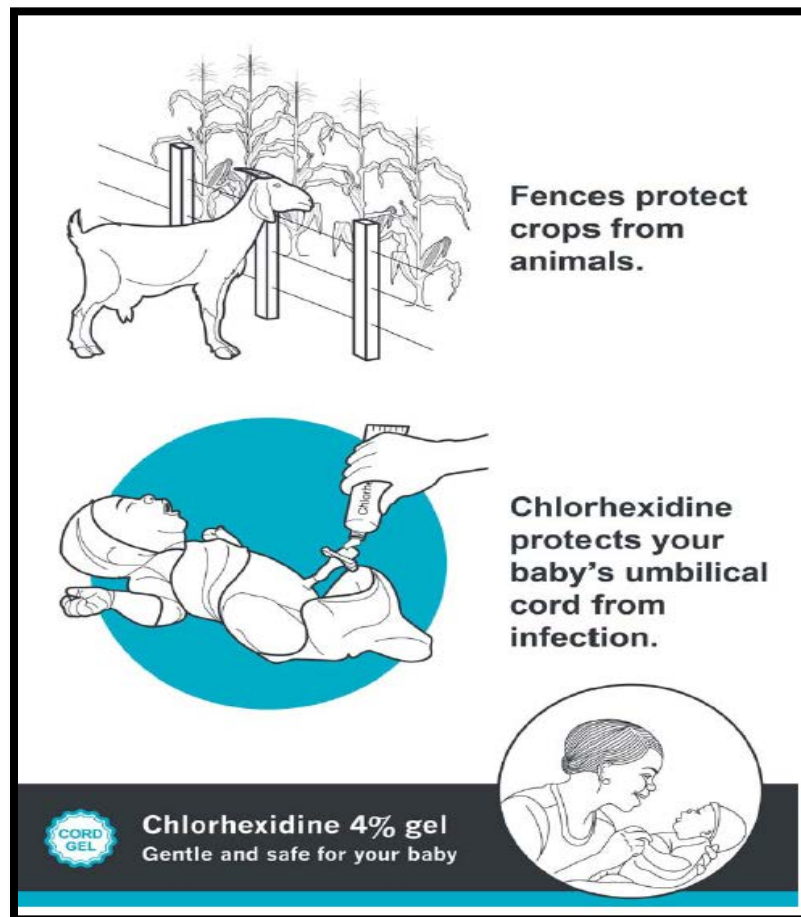


Figure 3: Example of HCD messaging in Nigeria

Source USAID

2.5.6 Expanded capabilities

Human-centered design potentially stretches the capacities of communities and organizations in decision-making due to its focus on collaboration and innovation. Through its support of multi-disciplinary approaches in resolving problems and a comprehensive

understanding of user needs, HCD enables the connection of different insights from across disciplines and experts, leading to more integrated and user-focused outcomes (Design for Health). Moreover, a multi-disciplinary approach allows for a holistic and systemic approach to problem-solving, which is more effective for complex problems such as those pervasive in global health. In Nigeria and Uganda, multi-disciplinary teams were used in the creation of tools for quality care during labor and childbirth, including insights from commercial design and behavioral psychology (Downe & Gülmezoglu, 2017). Participants included women, their spouses, community members, health providers, and facility managers during the different phases of the HCD process. In addition, maternal health experts were also consulted for technical accuracy through their verification of maternal health content and language (Salgado et al., 2017). In Tanzania, the A360 group brought together different disciplines to co-design health interventions pertinent to adolescent girls' reproductive health. These disciplines included adolescent developmental science, HCD, anthropology, public health, and social marketing. Adolescent developmental scientists provided knowledge of adolescents' cognitive development. At the same time, anthropology offered a detailed understanding of the cultural and contextual issues influencing the girls' decision-making abilities on contraceptive use. The human-centered design ultimately enabled these various disciplines to collaborate effectively, through the use of a structured process that combined the insights and ideas drawn from each discipline into action (Mehta & Cole, 2018).

2.5.7 Increased equity

Human-centered design potentially enhances equity, sustainability, and lasting impact through strengthening user buy-in and ownership of interventions. HCD gives a voice to users, especially those often marginalized or underserved, thereby promoting equity (Design for

Health). While generalizability is fundamental in research, it can overlook the specific needs of particular groups of unique populations as communities are not always homogenous, even within countries. HCD offers methods and techniques that group and uncover specific needs of different user subgroups, leading to interventions that are user-appropriate and relevant. In their design of tools to improve the quality of care for pregnant women, Salgado and colleagues (2017) identified four different personas that represented the needs of four types of women in Nigeria and Uganda. Personas are fictitious representations of the user, different from demographic groupings as personas are clustered according to users' psychological or behavioral elements. Personas direct teams towards designing testable solutions that emotionally engage and enhance equity and fairness, as different groupings of users are included in the design solution. Research from the UK and Australia has also provided further evidence on how HCD, through its co-design approach, enabled patients to work jointly with providers to create successful patient solutions to identified challenges (Iedema et al., 2010; The King's Fund, 2011).

2.6 Conclusion

The literature review clarified the tensions in HCD, particularly with regard to how the lack of definition presents a challenge on what the approach entails and how it should be operationalized in practice. However, an interrogation of the history revealed HCD's intention of solving wicked and challenging problems in complex environments such as global health. Furthermore, the scholastic history and contemporary HCD uncovered common characteristics that enable practitioners to utilize those shared characteristics as a guide in the application of HCD across disciplines. The literature review also explored the challenges prevalent in HCD's application in global health. Some of these challenges, such as other stakeholders not willing to share power with users and clashes with donor expectations, are not easy to address within a

short time. However, as HCD is gaining recognition in global health, there is potential for these challenges to dissipate over time as stakeholders become more aware of the gains associated with collaborative and co-creation efforts in enhancing user experience. As HCD continues to grow in global health, there is potential for its increased use in the field given its alignment with the WHO's promotion of people-centered care that is just and fair. Although challenges exist, when properly implemented HCD has potential to spark innovation and promote equity. It is also capable of enhancing user capacity as users realize their potential to create their own solutions, therefore users develop interventions that are feasible and tailor made to meet their own needs leading to more utilization of the intervention.

2.7 Literature Review for Birth Companions⁵

A birth companion is typically a non-clinical person who provides a woman with different forms of support during labor and delivery and who usually comes from the woman's social support networks (WHO, 2016). However, in more resource-rich settings, companions can include a hired, trained, and certified non-clinical person known as a doula. The birth companion is therefore described using many terms across different settings and studies. Among the widely used terms include “companion of choice at birth, labor companion, birth companion, emotional support during birth, social support during labor and delivery, supportive companionship, and continuous support for women during childbirth” (Afulani et al., 2018, p. 2). For this dissertation, the term “birth companion” is used to refer to any person providing this support.

Part of the decision to include birth companionship in the larger quality of care framework is based on growing evidence of the practice's impact. Existing evidence demonstrates a possible association between continuous support (through a birth companion) and meaningful clinical maternal and newborn health outcomes (Bohren et al., 2017). Among the reported benefits include spontaneous vaginal births, shorter labor durations, decreased utilization of pharmacological drugs for pain relief, and fewer invasive medical interventions such as Cesarean sections and episiotomies. Babies born to supported mothers have demonstrated higher Apgar scores (Bohren et al., 2017). Women who are supported during labor and delivery have reported more satisfying birth experiences (Bohren et al., 2017; Srivastava et al., 2015). Additionally, the presence of a birth companion can reduce the likelihood of poor

⁵ This literature review is an adaptation of the global scoping report written by Caitlin Warthin and the author for the Bill and Melinda Gates Foundation. The author and Caitlin contributed fifty percent each to the writing of this report. The author, however, changed most of the adapted CFIR constructs that were included in the report and opted to stick with the original CFIR constructs. Caitlin Warthin is a Senior Program Officer at AMDD.

treatment of women by providers (Abuya et al., 2015; Bohren et al., 2019; Diamond-Smith et al., 2016).

Current evidence shows that women and their newborns tend to experience better outcomes if the support is continuous (Bohren et al., 2017; Afulani et al., 2018). Descriptions of what continuous support is vary across studies (Bohren et al., 2019). Similarly, there are also disparities across settings concerning when birth companion support begins and ends during the birth continuum (Afulani et al., 2018). However, most studies describe continuous support as support characterized by the constant presence of a birth companion that is usually provided during labor and delivery (Bohren et al. 2017, Afulani et al., 2018).

While birth companions are generally female, growing research is providing evidence of male companions in LMICs (Abushaikha & Massah, 2012, 2013; Afulani et al., 2018; Alexander et al., 2014; Kululanga et al., 2012; Sapkota et al., 2012). Ideally, birth companions serve as advocates and provide information, comfort, and emotional support such as praise and reassurance (Bohren et al., 2017a).

Although there is a sudden global interest in childbirth support and it is currently recommended in four WHO guidelines (Kruk et al., 2018; WHO, 2014, 2015, 2016; , 2018), the practice itself is not new. Anthropologists and other childbirth researchers agree that this is an antiquated practice that probably lost prominence due to the hegemony of the bio-medicalization of childbirth (Behruzi et al., 2013; Davis-Floyd, 2001). Interestingly, research has shown that women have long desired this intervention, leading some women to choose to give birth at home because of the availability of social support during labor and delivery (L&D) (Bohren et al., 2014; Sychareun et al., 2012).

Studies carried out in Sub-Saharan Africa, where a significant number of women still give birth at home, revealed that some women still opt for home birth because of the support provided to them during L&D by kin and friends (Maimbolwa, 2003; Selepe & Thomas, 2000; Shiferaw et al., 2013; Shimpuku et al., 2013; Thwala et al., 2011). Also, Downe and colleagues (2016) in their systematic scoping review of “what matters to women” found that women desired and valued a positive pregnancy that considered the physical, emotional, and sociocultural normality. The authors purported that sociocultural, emotional, and psychological support throughout pregnancy emerged as important factors that women valued. Similarly, a recent systematic review that informed the WHO intrapartum guidelines on what women want also established that women valued a birthing experience that catered to their cultural, clinical, and psychological needs—especially one that permitted continuous practical and emotional support from a birth companion (Downe et al., 2018). Prohibiting women from having birth companions in health facilities is often a critical barrier to access and utilization of health facilities (Bohren et al., 2014).

2.7.4 Prevalence of birth companionship in LMICs and Sub-Saharan Africa (SSA)

Globally, health facilities in HICs allow birth companions to support women during childbirth. Birth companionship in public facilities in LMICs, particularly in SSA, is still nascent as fewer countries have included the intervention as a key recommendation in their national policies and strategies. Between 2009 and 2016, the WHO surveyed countries listed as LMICs by the World Bank to collect data on selected policies for improving maternal and newborn health. Out of the 122 countries that responded to the survey, around 41% of these countries asserted that they included birth companionship in their national guidelines, with 16 of them from SSA (as illustrated in Figure 4 and Figure 5) (WHO, n.d.). Though these countries attest to

the inclusion of this recommendation in their national policies or guidelines, little is known about the actual practice at regional and local levels, particularly in public facilities in SSA (Afulani et al., 2018).

Although data on the actual practice of birth companionship in facilities across SSA is lacking, anthropological research on traditional childbirth practices reveals that birth companionship is still a predominant practice in home births across the region (Maimbolwa et al., 2003; Shiferaw et al., 2013; Thwala et al., 2011). Anthropological studies on the sociology of childbirth broadly reveal that, in most instances, female relatives and friends support women during home births (Jackson, 2014; Kwagala, 2013). Among the Xhosa people of South Africa, grandmothers or older women from the community experienced in childbirth assist women during childbirth (Naidu & Nqila, 2013). Similarly, in Uganda (Kwagala, 2013) and among the Kafa people in Ethiopia (Jackson, 2014), older women provide support to birthing mothers during labor and delivery. In Zimbabwe, two helpers—usually older women and younger girls—offer continuous support (Mutambirwa, 1985). In Zambia, up to four women—who are related to the birthing mother or are neighbors or co-wives—assist the traditional birth attendants and comfort the women (Maimbolwa et al., 2003). Traditional birth attendants from the Manxili area of KwaZulu Natal in South Africa particularly encourage support for birthing mothers by a companion of choice, who is usually the grandmother or mother-in-law. Newly wedded women participate in childbirth as well, not only to assist the birthing mother but also to learn from the experience and prepare themselves for their own future births (Selepe & Thomas, 2000).

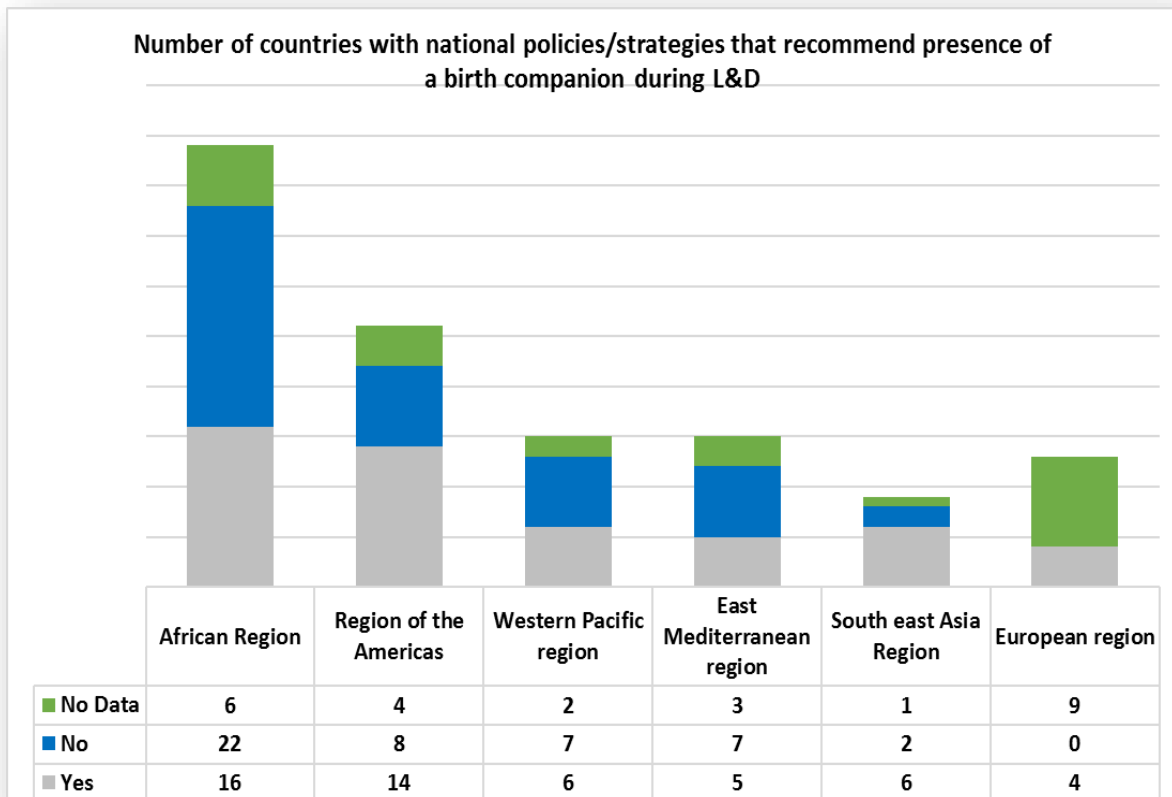


Figure 4: Number of birth companion policies by region

Adapted from the WHO Dashboard of Maternal, Newborn, Child and Adolescent Health (MNCAH)

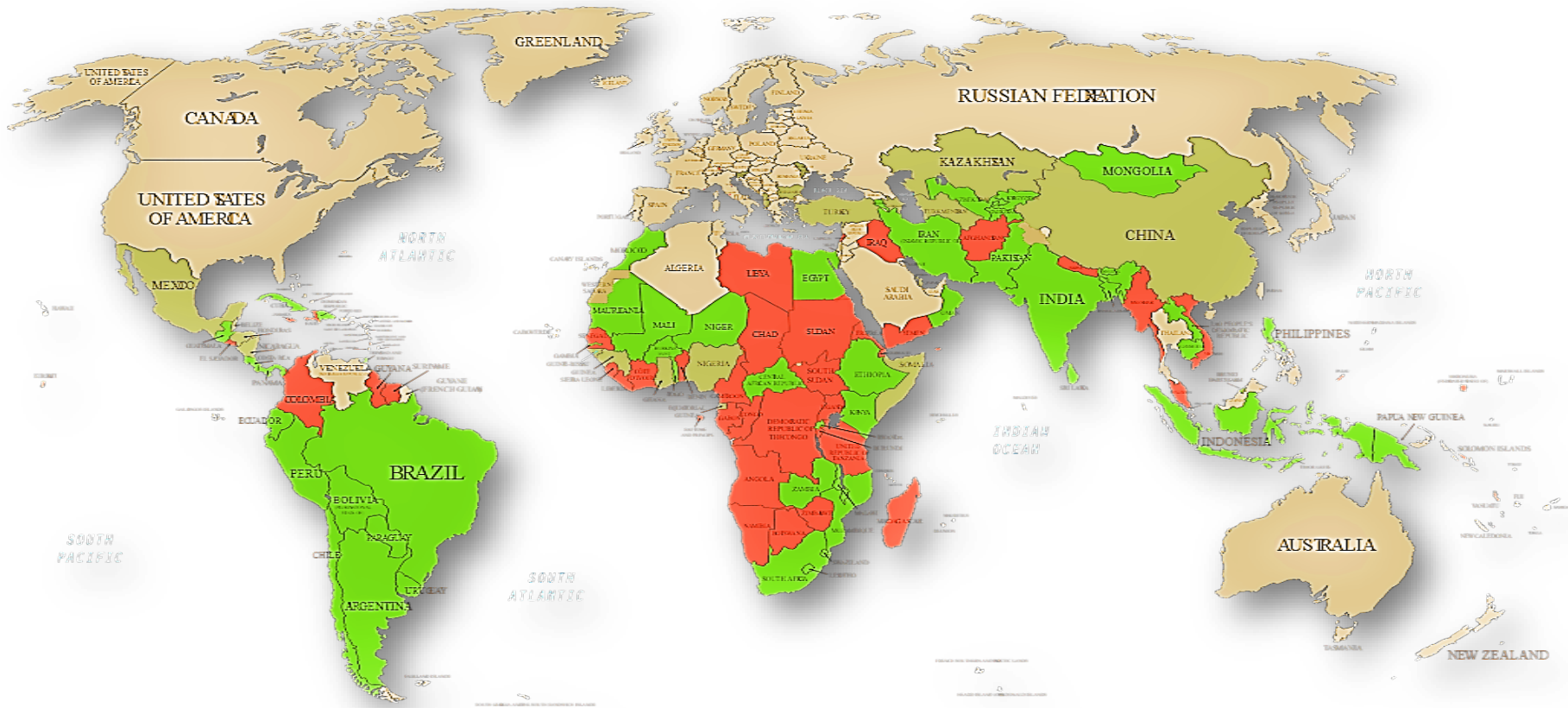


Figure 5: Map showing the distribution of LMICs with birth companion national guidelines/strategies

Source: WHO Dashboard of Maternal, Newborn, Child and Adolescent Health (MNCAH)

Legend: Bright Green: Existence of a policy or strategy

Red: No policy

Olive green: No data

2.7.5 Factors influencing implementation

This section of the literature review draws upon existing peer-reviewed and grey literature on global studies of birth companions. We utilized the Consolidated Framework for Implementation Research (CFIR) by Damschroder and colleagues (2009) to structure the literature on implementation factors. The CFIR consists of five domains that interact and influence implementation: intervention characteristics, the inner setting, the outer setting, characteristics of individuals involved in implementation, and the process by which implementation is accomplished. This framework is further described in Chapter 3. The purpose of this section is to establish the factors influencing implementation of birth companions globally. An understanding of these factors is integral to providing a sense of how these factors influenced the different birth companion models that currently exist, and how they varied across geographical spaces.

2.7.5.1 Intervention Characteristics

The intervention characteristics domain includes several constructs that may influence implementation success, such as stakeholder perceptions on the source of the intervention, evidence quality and strength, packaging, cost, and trialability, among others (Damschroder et al., 2009; Safaeinili et al., 2020). From this domain, three main constructs—evidence strength, packaging, and cost—were purposely selected, as they aligned with most of the available literature on birth companionship.

2.7.5.2 Evidence Strength

Increasing evidence shows an association between birth companionship and clinical health outcomes such as reduced invasive procedures like Cesarean section deliveries, episiotomies, and vacuum extractions. In addition, the evidence also shows that women who are

supported have shorter labor durations and more satisfying births, and their newborns score higher on the Apgar scale (Bohren et al., 2017). In light of this growing evidence, the World Health Organization has included birth companionship as one of the key elements in improving quality of care in health facilities in LMICs (WHO, 2016).

2.7.5.3 Packaging

This construct was adapted to describe the core features of how the existing models that are currently prevalent in the literature are presented. The key themes that emerged under this construct are the identity of the companions, characteristics and experience, period of companion support, training and staffing.

2.7.5.4 Identity, characteristics and experience

Understanding and knowing who the birth companions are and what their unique characteristics are is imperative prior to program implementation. When considered globally, two birth companionship models or archetypes exist. One is the family/friend model, in which women are supported by birth companions whom they know through their social networks (Banda et al., 2010; Maimbolwa et al., 2001). The other model consists of birth companions who are not from women's social networks (and most of the time the women do not know them). The latter group involves mostly trained and certified companions called doulas⁶ who often support women together with the women's partners or other family members. Often times, doulas are recruited by facilities or other welfare organizations (H. Brown et al., 2007; van Dijk et al., 2013) to offer birth companion services to underserved individuals such as the incarcerated,

⁶ The focus of this review however, focus on the doula as the primary support person unless mentioned otherwise in the doula model.

teenagers, victims of violence, and immigrants (Darwin et al., 2017; Dundek, 2006; McLeish & Redshaw, 2018; Schroeder & Bell, 2005). These existing models also differ geographically, with the family/friend model commonly practiced in LMICs, while the doula model is generally practiced in HICs. Within the family/friend model, companions vary by gender and can include male partners (Abushaikha & Massah, 2012; Afulani et al., 2018; Alexander et al., 2014; Kululanga et al., 2012; Sapkota et al., 2012) or female kin such as biological mothers, mothers-in-law, sisters, or female friends (Afulani et al., 2018; Alexander et al., 2014; Kabakian-Khasholian et al., 2015; Madi et al., 1999). With the doula model, birth companions are female, although some doulas support the women together with the women's male partners.

Women who preferred birth companionship from family members elaborated on who this preferred family member should be. Findings from several studies showed that biological mothers, sisters, and mothers-in-law were the most common selections (Alexander et al., 2014; Banda et al., 2010; Kabakian-Khasholian et al., 2015; Maimbolwa et al., 2001; Mosallam et al., 2004). In Ghana, there were women who preferred their spouses as companions (Alexander et al., 2014). Preferences for male birth companions were also reported in Nigeria (Morhason-Bello et al., 2008) and in Kenya, especially from wealthier women (P. Afulani et al., 2018). In Lebanon, Syria, and Egypt, there were women who desired support from their spouses; however, this preference was considered culturally inappropriate, thereby restricting the women's choices (Kabakian-Khasholian et al., 2015).

Opting for a specific model seemed to have been determined by certain factors that women valued. On one hand, women who preferred to be accompanied by their family members explained that they felt more comfortable asking for help from someone they knew and that a family companion would understand their needs (Yuenyong et al., 2012). Women who preferred

this model also stated that they wanted someone who cared about them and whom they could trust during one of their most vulnerable times (Kabakian-Khasholian et al., 2015; Price et al., 2007). In addition to these accounts from the women themselves, some authors rationalized that having a family/friend birth companion present might promote bonding between the birth companions and the mother/baby, which could lead to continued support and its associated gains in the postpartum period (Campbell et al., 2007; Kabakian-Khasholian et al., 2015).

On the other hand, some women preferred for several reasons to have a birth companion whom they did not know. Some women mentioned that they would be embarrassed being seen naked by relatives or friends, or screaming or experiencing the physiological effects of labor (Maimbolwa et al., 2001). Some authors reasoned that women might feel societal pressures of femininity during childbirth (Chalmers et al., 1995; Diniz et al., 2014). For instance, in some cultures, women are not expected to scream or shout during childbirth, thereby putting tremendous pressure on the woman undergoing painful labor. Women also explained how familial birth companions might become overwhelmed with emotions while witnessing the woman going through labor. Some women felt that this would distract the birth companions, resulting in failure to focus on the woman's needs (Berg & Terstad, 2006; Spiby et al., 2015). Women also raised concerns over family/friend birth companions potentially causing conflict in the health facilities (Berg & Terstad, 2006). In Canada and the United Kingdom, women expressed their fears over family members dominating the birth process and telling the women what to do instead of allowing her to make her own choices (Darwin et al., 2017; Price et al., 2007; Spiby et al., 2015). In Malawi, some women felt that family members could interfere with the woman's clinical care and offer their own instructions, leading to tensions between companions and providers (Maimbolwa et al., 2001).

These findings show that women do consider who their birth companions should be. Yet, nurses from one study in the United States felt that the identity or experience of the birth companion was secondary, and that the most important thing was simply that there was *someone* in the labor room providing the woman with continuous support (Deitrick & Draves, 2008). While just having someone to offer support to women is important, women's responses highlight how critical it is for them to make their own choices. Encouraging birth companionship during childbirth should be accompanied by encouraging women to select a person of choice, otherwise the birthing experience can be aggravating if women are supported by people with whom they do not feel comfortable. In Malawi, one woman found the presence of her mother-in-law burdensome (Banda et al., 2010); therefore it is key that women are supported by companions of choice. It can be argued that nurses might not see the value of the birth companion's identity because to them, an extra person should help minimize the workload, especially for providers working in settings with severe staff shortages. Male companionship was not acceptable in all LMICs. In Arab nations, it was socially and culturally unacceptable for men to accompany women, especially in shared labor wards with limited privacy (Kabakian-Khasholian et al., 2015; Mosallam et al., 2004). This gender restriction limited the woman's choice (Afulani et al., 2018; Brüggemann 2014; Bohren et al., 2019).

Birth companions' experience with childbirth and childcare surfaced as important among providers, potential birth companions, and women from both HICs and LMICs. Birth companions with practical experience were perceived to have knowledge that they could impart to their parturient women (Kabakian-Khasholian et al., 2015). Women from both the family/friend and doula models greatly valued that birth companions possess practical knowledge about childbirth, preferably having experienced it themselves (Berg & Terstad, 2006;

Deitrick & Draves, 2008; Koumouitzes-Douvia & Carr, 2006; Lundgren, 2010; Spiby et al., 2015; Gordon et al., 1999; Hardin & Buckner, 2004; Kigoma Formative Report, 2019). Personal childbirth experience was key in certain programs such that program planners included it as a standard during selection of companions, especially with the doula model (Akhavan & Edge, 2012; Chalmers et al., 1995; Thamini Uhai COGP, 2017). Where personal childbirth experience was not emphasized, some program planners for the doula model required DONA⁷ or other certified training, including attending a specified number of births (Coley & Nichols, 2016; Gruber et al., 2006; Koumouitzes-Douvia & Carr, 2006; Kozhimannil et al., 2013; Lagendyk & Thurston, 2005; Spiby et al., 2015; Steel et al., 2013; Gordon et al., 1999; McGrath & Kennell, 2008). Diamond-Smith and colleagues (2016) reinforced the importance of experienced companions when they noted that mothers and mothers-in-law provided higher levels of support compared to birth companions had not experienced childbirth themselves.

In addition to birth companions' experience and knowledge about childbirth, several studies from both HICs and LMICs found that women considered the character and temperament of potential birth companions as key. Women, community leaders, and providers in Kigoma, Tanzania underscored that birth companions should be trustworthy, sane, and mature; they should also provide confidential care, genuinely love the woman, and be able to soothe her (Kigoma Formative Report, 2019). Similar findings were recorded in South Africa and Mexico (Campero et al., 1998; Chalmers et al., 1995; Hofmeyer et al., 1991). Consistent with the findings from LMICs, studies from HICs found a number of other desired characteristics: the ability to

^{7 7} Doulas of North America (DONA) is the world's largest doula certifying organization. Founded in the USA in 1992, their certification program involves participation in a DONA-approved doula workshop, supplementary reading, training in breastfeeding and basic childbirth education, attending several births to provide support, developing a resource list for their community, business webinar training, an essay, and written references.

<https://www.dona.org/the-dona-advantage/about>

<https://www.dona.org/become-a-doula/birth-doula-certification>

advocate for women with providers (Kerr, 2015);,; a calm presence (Deitrick & Draves, 2008; Spiby et al., 2015; Steel et al., 2013); a caring/compassionate/nurturing personality (Deitrick & Draves, 2008, Darwin et al., 2017; Gruber et al., 2013); a genuine desire to help women in need (Lagendyk & Thurston, 2005); and an interest in or respect for the childbirth process (Altfeld, 2002; Low et al., 2006; Lagendyk & Thurston, 2005).

Sharing certain characteristics with the women birth companions supported is central to both birth companionship models. For instance, being from the same community (Breedlove, 2005; Chalmers et al., 1995; Darwin et al., 2017; Deitrick & Draves, 2008; Gruber et al., 2013; Hofmeyer et al., 1991), speaking the same language (Akhavan & Edge, 2012; Deitrick & Draves, 2008; Kennell et al., 1991; Kozhimannil et al., 2013; Mottl-Santiago et al., 2008), or sharing a racial/ethnic or cultural background (Akhavan & Edge, 2012; Deitrick & Draves, 2008; Gruber et al., 2013; Kozhimannil et al., 2013; Mottl-Santiago et al., 2008) or lived experience, such as surviving a conflict situation or teen pregnancy (Altfeld, 2002; Dundek, 2006), were all characteristics women valued in a potential birth companion. In contexts where spirituality and prayer were essential forms of support, women also wished for their birth companions to share their religion (Kabakian-Khasholian et al., 2015). In Kigoma, Tanzania, prayer surfaced as a vital form of support, but women did not mind if their religious beliefs and those of the birth companions were dissimilar, as long as the birth companions could pray during the period they provided support (AMDD Kigoma Implementation Report, 2019). Similarly, one study that asked women to rank doula qualities in order of importance found that sharing the same background and speaking the same language as their birth companion were least important (Spiby et al., 2015).

Being from the same community, however, ought to be treated with caution as it mirrors the family/friend model, and some women were uncomfortable having companions they knew because they feared the companions would gossip about them back home (Afulani et al., 2018; Banda et al., 2010). Sharing the same language, culture, and lived experiences heightens empathy and increases the likelihood of receiving appropriate and desired care.

2.7.5.5 Training

The training of birth companions, or lack thereof, varied across birth companionship models. Findings further demonstrated that the two main models (family/friend and doula) were packaged differently in terms of training. Most studies that employed the family/friend model showed that most birth companions were not trained (Banda et al., 2010; Kungwimba et al., 2013; Mosallam et al., 2004; Shimpuku, et al., 2013; Tani & Castagna, 2017). These birth companions were not offered any training or guidance on their roles and responsibilities during labor and delivery and were not compensated for their support. However, some birth companions in this category received some form of training to assist them in undertaking their roles of supporting parturients. In Jordan, birth companions were verbally instructed by providers to be supportive, encouraging, and affectionate (Khresheh, 2010), emphasizing more emotional than physical support. In Brazil, birth companions were provided with verbal and written instructions on a number of topics, including compliance with hospital rules and the importance of respecting the privacy of other women delivering in the facility (Bruggemann et al., 2007). In Nigeria, providers gave birth companions information leaflets that described their roles and duties. Providers also verbally described the birth companions' roles to companions who could not read (Morhason-Bello et al., 2009).

There were a few other studies for this archetype where birth companions were trained or oriented in advance. For example, in Thailand, birth companions attended two-hour preparatory classes with the women to clarify roles, and practice supportive techniques (Yuenyong et al., 2012). These sessions were conducted during one of the women's antenatal care (ANC) visits at 37 weeks gestation. The training also included familiarization with the labor process for both the companions and the women. The authors recommended that future programs comprise two prep courses, one focused on information and the other on practice (Yuenyong et al., 2012). Similar findings were reported in the United States where pregnant women and birth companions attended two-hour prep classes a month before the delivery date (Campbell et al., 2006). In Kigoma, family birth companions also received orientation during the women's second ANC visits. Birth companions were expected to attend two sessions prior to the woman's delivery, but they also a final 'refresher' orientation from birth companions stationed at the facilities upon arrival at the facility (Thamini Uhai COGP, 2017). Over time, the program managers added more in-person sessions through the use of Community Health Workers (CHWs), who oriented the companions in their homes. Lastly, in Australia, companion training also occurred during ANC and companions were expected to attend four to six training sessions; however, few participated frequently. These sessions covered more medical information than types of emotional support the women required. Providers thus recommended altering the content of these sessions to better equip the companions, who providers felt lacked the knowledge to support women (Maher, 2004).

In the doula model (including those stationed at the facilities offering short-term services), all birth companions had some form of training. This model, however, varied in terms of duration of support provided to the women. For doulas who offered short-term support, some

of this training seemed brief, paralleling the *ad hoc* training of companions in the family/friend model. In South Africa, researchers simply explained to the companions the forms of support to provide to women (H. Brown et al., 2007; Chalmers & Wolman, 1993; Chalmers et al., 1995). In other settings, training lasted several days or weeks (Campero et al., 1998; Kennell et al., 1991; Thamini Uhai COGP). The training included labor ward orientation (Gordon et al., 1999) or facility policies (Kennell et al., 1991), as well as birth companionship rules and roles (Thamini Uhai COGP). Other training simply enhanced birth companions' existing skills (e.g., training for Lamaze teachers who already had some pre-existing knowledge about supporting parturients, particularly with pain-coping mechanisms) (Cogan & Spinnato, 1988). In other instances, such as in HICs like the United States, doulas underwent DONA certification (or its equivalent) (Dundek, 2006; McGrath & Kennell, 2008).

Doulas that provided long-term support to mothers were mostly certified by DONA (or another accredited program), as was the case with some of the doulas who offered short-term support. However, in some instances, programs developed their own training programs, with some lasting up to a year (Clewett & Pinfold, 2015; Thomson & Balaam, 2016), especially those programs whose support went beyond childbirth to include other broader social issues. Creating individual training programs did not always guarantee success, as other programs experienced challenges. In Chicago, the recruitment of diverse groups of companions made it difficult for project managers to create a training program that was suitable for differences in levels of education, literacy, and interest in clinical and health care topics (Altfeld, 2002).

Although some programs indicated the need to train birth companions on issues particular to high-risk and underserved women, very few studies described training birth companions on managing the broader issues concerning these women such as abuse, addiction, child

protection/the foster care system, and cultural diversity (Akhavan & Edge, 2012; Darwin et al., 2017; Schroeder & Bell, 2005; Spiby et al., 2015). Adequately equipping birth companions with skills to manage these social complexities is important to effectively deliver services to vulnerable women. One program in the United States that targeted socially and/or medically at-risk populations of low-income adolescents found that the companions were insufficiently prepared to work with adolescents, assess women for risk behaviors (e.g., drug abuse, domestic violence), or deal with broader social issues (Low et al., 2006). Doulas constantly reported lack of confidence in handling domestic violence or securing housing and transportation, as they were not trained to manage these complexities. However, some birth companions reported exhaustion and burnout after working with women with intellectual disabilities, despite receiving ongoing tailor-made training to work with this group of women (McGarry et al., 2016).

The evidence confirming the efficacy of these training models is scanty. A couple of studies either directly indicated or provided some evidence of their efficiency. For instance, some women were dissatisfied with the support given, explaining that some of the birth companions were not adequately trained for their roles (Akhavan & Edge, 2012; Coley & Nichols, 2016). In Kigoma, Tanzania, the program managers later brought in a certified doula from the United States to further train their facility-based birth companions on comfort measures such as massaging, playing music, and relaxation techniques (AMDD Kigoma Implementation Report, 2019). Women who delivered after this training took place expressed great appreciation for these techniques, with several stating how much the massages and the music soothed their pain (AMDD Kigoma Implementation Report, 2019). A recent randomized controlled trial by Teles and colleagues (2018) to evaluate the effectiveness of an educational training manual on childbirth and support and check its influence on women's satisfaction showed that birth

companion training has positive influence on the satisfaction of both women and birth companions. Women who were supported by birth companions in the intervention group reported having greater self-control, confidence, knowledge, and satisfaction with the childbirth experience. These women also reported reduced labor pain and fear and evaluated birth companion support more favorably (Teles et al., 2018). In addition, birth companions in the intervention group performed more physical support actions such as massages and breathing exercises. The authors also felt that the training gave the birth companions agency, empowering them to demand and question provider actions, which explained the greater dissatisfaction providers had with birth companions from the intervention group.

2.7.5.6 Period of Support

The period during which companions provided support also varied by archetype. For family/friend models (both trained or not), birth companions provided support mostly during the intrapartum stage (labor and delivery) (Banda et al., 2010; Brown et al., 2007; Kungwimba et al., 2013; Madi et al., 1999). However, there were some cases when companions in this model—the ones who received training—extended their support to the immediate postpartum period (i.e., first couple hours after birth) (Morhason-Bello et al., 2009; Yuenyong et al., 2012). Although these data show that this model offered support during L&D and the immediate postpartum stage, women may have received support during and post-pregnancy at home since the companions were family members with whom they may have lived.

Although most of the family/friend models showed the different stages when women were supported, one study from Kenya found that women had *preferences* on when they wanted birth companions to support them (Afulani et al., 2018). Most women wanted support during labor and after delivery, with a few women wanting support during parturition (delivery).

Unsurprisingly, women felt that the delivery stage was the most sensitive stage, and they expressed that they would feel embarrassed going through the physiology of parturition in front of their companions. In addition, they reasoned that delivery is outside the remit of companions and should be left for providers, as companions had little or no assistance to offer during this stage. As a result, these preferences from women in the Kenyan study determined the period during which companions provided support to them. Providers also played a role in determining the period of support offered in this model. Some providers restricted companions from supporting women (for example, during busy periods or depending on the attitude of the presiding provider) (Afulani et al., 2018; Brown et al., 2007; Diamond-Smith et al., 2016; Diniz et al., 2014; Madi et al., 1999; Shimpuku et al., 2013). In some instances, the period of companion support was shortened even further. Some providers only allowed companions to offer women support during the first stage of labor (Khresheh, 2010; Shimpuku et al., 2013) and others did not permit companions to escort the woman if she required a cesarean section (Morhason-Bello et al., 2009).

The doula models, however, had more protracted periods of support, especially for programs in HICs that worked with high-risk and underserved women. Support in this model occurred during the intrapartum period as well as during the prenatal or postpartum period (or both). Prenatal support varied across studies, with some birth companions commencing support in the final trimester while others started sooner (Breedlove, 2005; Clewett & Pinfold, 2015; Holland, 2009). In other studies, the period of support during the prenatal period was uncertain. The number of visits birth companions varied from one or two prenatal visits before delivery, while others occurred weekly until delivery and others included telephone contacts in addition to the two minimum in-person visits (Coley & Nichols, 2016; McLeish & Redshaw, 2018). Some

of the doulas felt compelled to increase contact through phone calls when the women were close to their delivery date (Coley & Nichols, 2016). Similarly, timing and number of visits defined the period of support during the postpartum period. Women received support for six to 12 weeks post-delivery or one to two visits postpartum. Two studies conducted in the UK showed that birth companions, on average, spent two hours per week (range of 0-10 hours) providing post-delivery support to women (Darwin et al., 2017; Spiby et al., 2015).

Women in this doula model appreciated the longer periods of support from birth companions. The mothers valued meeting and getting to know their companions before delivery because it allowed them to build familiarity and trust (Berg & Terstad, 2006; Breedlove, 2005; Coley & Nichols, 2016; Darwin et al., 2017; Lundgren, 2010). Also, longer periods of support enabled women and birth companions to discuss birth plans and women's wishes, which enabled companions to better advocate for women during labor and delivery (Berg & Terstad, 2006; Hunter, 2012; McLeish & Redshaw, 2018). However, programs could not always guarantee that the same birth companions would be available during the intrapartum stage. While women's reactions to having a different companion during L&D are not well documented, there were studies that reported women's dissatisfaction and discomfort with this arrangement (Akhavan & Edge, 2012; Darwin et al., 2017; Deitrick & Draves, 2008). It is unsurprising that women were displeased with having a different companion during L&D given the evidence that women value getting to know their birth companions in order to establish relationships and trust (Berg & Terstad, 2006; Breedlove, 2005; Coley & Nichols, 2016; Darwin et al., 2017; Lundgren, 2010).

Programs that offered support pre- or postpartum found that women wished the support had started sooner or lasted longer (Akhavan & Edge, 2012; Darwin et al., 2017). However, in some instances it was difficult to discern whether women were more interested in the extended

birth companion support or the material and financial gifts that came with other programs in this birth companion archetype (Clewett & Pinfold, 2015).

Whether birth companion support is more important during one period versus another is uncertain, as the evidence is mixed. However, available literature suggests that overall satisfaction with a birth companion is distinct from satisfaction with support during one period over another. For example, Darwin et al. (2017) found that the positive effects of support during the prenatal and postnatal periods were apparent even if the birth companion was unavailable during the intrapartum stage. Conversely, Akhavan & Edge (2012) and Kerr (2015) reported that women felt support during labor and delivery was very crucial, as meeting the birth companion before labor was not a precondition for satisfaction with support during labor (Akhavan & Edge, 2012). Akhavan & Edge (2012) also found that prenatal and intrapartum support was more important for women who had previously had children, whereas primiparous women were more likely to value postnatal support than their multiparous counterparts. These mixed responses were also reported by Spiby et al. (2015), who found that even five Heads of Midwifery working for the same project at different sites disagreed about which period of support was most important. These findings reinforce the importance of allowing women to make decisions regarding not only who the birth companion should be, but also at which period(s) they want companion presence and support.

Noteworthy, is that birth companion programs were not always able to deliver the intended amount of support . For example, the program model in Darwin et al. (2017) was supposed to provide prenatal, intrapartum, and postnatal support, but only 47.8% of women received support during all three periods. Similarly, Coley & Nichols (2017) and Spiby et al. (2015) both describe instances in which women were assigned birth companions in the prenatal

period, but the birth companions missed the delivery. In some cases, health care workers were responsible for restricting women's access to their birth companions. Some studies from HICs mentioned that providers regulated when doulas were permitted by the woman's bedside; this was usually related to hospital policies restricting visitor admission to family members or capping the number of people a woman can have in her room at one time (Altfeld, 2002; Schroeder & Bell, 2005).

2.7.5.7 Staffing

Staffing issues for birth companion projects occurred mainly in the doula programs. For the Doula - Short Term model, staffing occurred in two ways: companions worked in shifts (either present at the facility or on-call), or programs had primary (full-time) and back-up (part-time or on-call) companions. An inherent issue that emerged in assigning set shifts is that they did not always line up with the time women finished labor. In South Africa, companions were not able to stay at the facility past dark (Chalmers & Wolman, 1993; Hofmeyer et al., 1991), which presumably resulted in some women being left partway through labor. In the United States, doulas could either choose to stay with a woman after their shift ended or let the next doula take their place (Dundek, 2006). One study that used an on-call model found that doulas were sometimes unavailable when called (Gordon et al., 1999).

Whereas Doula - Short Term studies often assigned birth companions shifts, the Doula - Long Term programs tended to assign birth companions specific women to support. With this doula model, the key objective was to ensure that the same birth companion supported the same women across the whole continuum—from pregnancy into the postpartum period. However, this was not always the case if the primary doula was unavailable and back-up companions had to be used (Altfeld, 2002; Deitrick & Draves, 2008). A few programs allocated back-up doulas from

the onset (Darwin et al., 2017; Gruber et al., 2013; McLeish & Redshaw, 2018). However, women did not always meet or form relationships with their back-up doula prior to delivery, which often led to dissatisfaction when the primary companion was unavailable (Darwin et al., 2017). Some programs made efforts to avoid this from happening by using a “shared care” model whereby at least two birth companions supported one woman up to the time of delivery (Clewett & Pinfold, 2015; Kerr, 2015). This model not only aimed to prevent women from being disappointed if one particular companion was unavailable, but it also intended to keep women from becoming dependent on their companions and to safeguard companions from being overwhelmed (Clewett & Pinfold, 2015). While this shared care model was the ideal, the findings revealed that a number of programs did not have enough companions to support all women who delivered (Deitrick & Draves, 2008; Nommsen-Rivers, et al., 2009; Spiby et al., 2015) or to permit companions enough spacing between births to prevent burnout (Schroeder & Bell, 2005).

2.7.5.8 Cost

The cost of a program and its associated expenditures such as investments, supplies, and opportunity costs impact the implementation of an intervention (Damschroder et al., 2009). The cost of implementing birth companion programs are not well documented in the literature; however, there are studies that provide evidence of financial transactions incurred by programs to get the projects up and running. These costs ranged from payment of birth companions to production of materials, and in some cases remodeling of maternity wards to ensure women’s privacy. Payment of birth companions was often stated for the doula models whether they provided short- or long-term support. There were a number of different payment arrangements for birth companions who provided short-term support. These varied from being paid hourly, per

birth, receiving a salary, getting token payments (e.g., nominal allowances or daily meals) from organizations or research institutes, or being paid directly by women themselves. For example, birth companions were paid three sterling pounds per day in South Africa (Hofmeyer et al., 1991); in Kenya, women and their birth companions were given travel vouchers to entice them to travel to health facilities located in remote places, as well as travel and lunch allowances for birth companions for attending monthly training sessions (Hughston, 2018). In Guatemala, compensation for birth companions varied between 150-1600 quetzals (~US\$20–200) monthly. These stipends also varied by facility, as some facilities could afford to pay their companions while others struggled to consistently pay (van Dijk et al., 2013). In Kigoma, Tanzania, birth companions were provided a monthly financial incentive which included a 100,000 TzSH (~US\$50) allowance, 25,000 TzSH (~US\$12.50) airtime stipend, and a mobile phone (AMDD Kigoma Implementation Report, 2019).

Decisions to provide any form of payment or reimbursement can of course have implications for the program's sustainability, even if the payments are minimal. This was a concern among providers in one program in Guatemala (van Dijk et al., 2013) and proved to be a critical issue in a South African study where one facility had not properly budgeted to cover BCs' travel costs, ultimately resulting in the program coming to an end (Brown et al., 2007). Apart from the issues of financial sustainability, there were also concerns about paying for a service that prioritized helping women over financial gain."These fears surfaced in South Africa where researchers were concerned that paying birth companions might attract candidates who were not primarily interested in helping women (Chalmers et al., 1995; Hofmeyer et al., 1991).

Similarly, there were also costs associated with birth companions who provided longer-term support to women. These ranged from providing payments for salaries, training costs, and transport, as well as token payments (e.g., reimbursements for travel, childcare, interpretation services, and external accreditation for training) (Gordon et al., 1999; Kennell et al., 1991; Lundgren, 2010; Spiby et al., 2015; Thomas et al., 2017; Resnick, 2016). In some studies, payments varied according to when support was provided, with the intrapartum stage earning higher allowances. Some studies reported that companions were paid between US\$30–50 for pre- and postpartum visits (Bey et al., 2019; Schroeder & Bell, 2005), while the intrapartum stage earned higher allowances ranging between US\$75–360 (Bey et al., 2019; Gordon et al., 1999; Schroeder & Bell, 2005). Companions were also paid differently based on whether they provided full-time or part-time assistance to women (Deitrick & Draves, 2008). In some instances, allowances were paid monthly, as per diems or based on number of visits provided (Hazard, et al., 2009; Resnick, 2016). However, most volunteer programs did not pay their companions but incurred costs associated with doula training (Spiby et al., 2015). A study by Altfeld (2002) provided insights on the costs associated with doula training. The author posited that doula training costs in the United States around the time of publication oscillated between US\$3,200–3,500 per trainee. She further postulated that, on average, doula program training costs—including salaries and benefits for two full-time birth companions and other associated costs—totaled around US\$80,000 per annum. In some instances, projects encountered ongoing funding problems and failed to train more companions, which became a critical problem as volunteer companions moved on (Spiby et al., 2015).

For the family/friend models, no payment costs were documented, as companions were mostly the women’s kin; therefore, it is probable that relatives did not expect payments.

However, there were other costs incurred for this birth companion model, including production of educational or training materials and the remodeling of maternity wards to improve privacy (Kabakian-Khasholian et al., 2018; AMDD Kigoma Implementation Report, 2019). The Kigoma project in Tanzania reconfigured maternity wards by building dividing walls using aluminum material. Although the specific reconstruction costs are unavailable, the project had to reduce the number of facilities in which Thamini Uhai could implement its birth companion program from 15 to nine, as the cost to renovate all 15 facilities became too steep for Thamini Uhai (AMDD Kigoma Implementation Report, 2019). Other costs included procurement of uniforms and name tags for companions for easy identification by women and providers (van Dijk et al., 2013; AMDD Kigoma Implementation Report, 2019). Brüggemann et al. (2014) also reported similar findings regarding costs associated with resources for companions, such as uniforms, beds, and chairs. The authors stated that most facilities experienced challenges in availing these resources as they came at a price outside the facilities' budgets.

2.7.6 Inner Setting

The CFIR 'inner setting' domain includes the structural, political, and cultural context within an implementing organization (Damschroder et al., 2009). Literature review findings in this domain included space and privacy issues as well as the organizational or hospital policies/culture that influenced implementation.

2.7.6.1 Space and Privacy

Logistical barriers associated with space and privacy potentially impeded facility implementation of birth companion programs even when national policies on birth companions were in place. Space considerations were mostly stressed within the family/friend models in LMICs. In India, Egypt, Syria, and Sri Lanka, limited space was explicitly cited as the reason

hospital policies (or physicians themselves) did not permit BCs in the delivery room (Diamond-Smith et al., 2016; Kabakian-Khasholian et al., 2015; Senanayake, , 2017). Limited space was associated with breaching women's privacy and overcrowding of maternity wards, which led to chaotic work environments (Abushaikha & Massah, 2013; Afulani et al., 2017; Brown et al., 2007; Brüggemann et al., 2014; Senanayake et al., 2017; Yuenyong et al., 2012, AMDD Kigoma Formative Report, 2017). Two studies conducted in Botswana and Mexico postulated that overcrowding in labor rooms may have reduced the biomedical effects of companionship such as decreased Cesaeran sections, and shortened labor duration (Madi et al., 1999; Trueba et al., 2000).

The key concern with privacy infringements centered on the presence of *other* women's birth companions, especially if they were male partners (Brown et al., 2007; Brüggemann et al., 2014; Kaye et al., 2014; Hemantha Senanayake et al., 2017; Yuenyong et al., 2012), as this violated societal and cultural mores of nakedness in certain settings (Maimbolwa et al., 2001). However, in certain instances, privacy issues arose between women and their *own* birth companions. Some women felt embarrassed having a familiar person witnessing certain aspects of childbirth that violate cultural norms, or they simply did not want someone watching them go through the physiology of labor and delivery (Maimbolwa et al., 2001). In Brazil, gendered beliefs about vaginal birth representing "non-feminine" behavior and genital deformation resulted in some women's unwillingness to having companions during childbirth except for health providers (Diniz et al., 2014). Some providers also mentioned that it was against Malawian culture to have "spectators" during childbirth, particularly if they were male (Maimbolwa et al., 2001). Similarly, in Canada, although the participants viewed the birth of their children as an experience to be shared with others close to them, the women also described

birth as a private and personal experience (Price et al., 2007). It is, however, important to note that the witnessing of childbirth by companions being considered a violation of cultural mores is an influence of the outer setting rather than the inner setting. Societal norms and beliefs around what is considered wrong or right are a result of cultural and societal dictates which are exogenous to facility environments.

These space and privacy concerns do appear to translate into real-life implementation barriers, even when policies supporting birth companionship exist. In Brazil, Sri Lanka, and Kenya, the right to a birth companion is guaranteed by law, but implementation of companionship in facilities is inconsistent (Afulani et al., 2018; Diniz et al., 2014; Senanayake et al., 2017). An analysis of the *Birth in Brazil* national survey showed that having an “appropriate environment”—including a chair for the BC (which of course requires space) and sufficient privacy—was associated with successful program implementation (Diniz et al., 2014). In Sri Lanka, implementation depended on the attending obstetrician, despite existence of a national policy that allows birth companions. A survey of obstetricians found that those in facilities with more births per month—which presumably translates to more women sharing the maternity ward at any given time—were considerably less likely to allow companions than those with fewer deliveries (16.7% for ≥ 300 deliveries; 35.3% for 200-300 deliveries; and 75% for < 200 deliveries) (Senanayake et al., 2017).

Other facilities tried to find ways to work around the space limitations. In Brazil, Sri Lanka, and Thailand, some researchers or facilities only permitted female companions (Afulani et al., 2018; Brüggemann et al., 2014; Senanayake et al., 2017; Yuenyong et al., 2012), thereby restricting women’s choices (Bohren et al., 2019). Senanayake et al. (2017) suggested partitioning the maternity wards with low cost materials to increase privacy. However, when

plastic curtains were used for this purpose in Botswana, implementers found that they were sometimes left open as the curtains increased the heat in the rooms (Madi et al., 1999).

2.7.6.2 Organizational or Hospital Policies/Culture

The existence of clear institutional policies supporting birth companions at the facility level is usually associated with implementation (Diniz et al., 2014; Mosallam et al., 2004), while the lack of a facility policy can result in providers assuming that companions are not permitted (Maimbolwa et al., 2001). The existence of national laws or standards supporting birth companions during childbirth did or did not translate to facility policies or actual practice (Afulani et al., 2018; Brüggemann et al., 2014; Kungwimba et al., 2013). In certain contexts, providers or the head of the unit determined whether or not to allow birth companions, regardless of whether a supportive facility or national policy existed (Kabakian-Khasholian et al., 2015; Senanayake et al., 2017). In Brazil, unclear language in the national law and a lack of sanctions for violations have led providers to believe they can choose not to comply (Diniz et al., 2014). Bohren et al (2019) in their systematic review found that some health providers prohibited companionship if women did not have health insurance, if her companion seemed unprepared, or when providers feared that the companion would supervise their work. Implementation was relatively easy in health facilities with an organizational culture of “doula friendliness,” such as some facilities in the United States (Dundek, 2006). Yet in one facility in South Africa with an enthusiasm for companions among providers, implementation ceased due to staff transfers and failure to provide transport money to companions (H. Brown et al., 2007).

Studies from HICs also showed that although health facility policies usually allow birth companions, some facilities limited the number of companions who could be with the women. With a limited number of people allowed in their room (usually two or three), women had to

choose whether to have a doula or some other friend/family member present (Altfeld, 2002; Coley & Nichols, 2016). These rules were not always consistently enforced, as some providers did not count the birth companion/doula in the woman's three-person limit (Coley and Nichols, 2016). These inconsistencies often left women confused and wishing for clearer information on the policy specifications (Altfeld, 2002; Coley & Nichols, 2016; Price et al., 2007).

2.7.7 Outer Setting

The CFIR 'outer setting' domain includes the economic, political, and social context in which the implementing organization is situated (Damschroder et al., 2009).

2.7.7.1 National guidelines and laws on birth companionship

External factors such as state laws or national guidelines influence the implementation of birth companion programs. In most cases, the presence of these statutes should make implementation fairly easy, although this has not been the pervasive norm in most LMICs (Afulani et al., 2018; Rodrigues et al., 2017). However, these legislative commitments can still enable the implementation of birth companion programs. For example, the states of Minnesota and Oregon passed legislation permitting Medicaid reimbursement for birth companion services (Kozhimannil & Hardeman, 2016). Yet, despite this landmark ruling by the two states, implementation challenges still remained, including establishing contractual agreements between the certified companions and providers for payment purposes, creation of payment codes, and establishing reimbursement rates for these codes (Kozhimannil & Hardeman, 2016). These challenges stalled progress in implementation, but notably, these pioneering efforts from the two states provided foundational learning for states that want to follow suit. More importantly, Medicaid reimbursements for doula services increased access to birth companion services for women from underserved communities, and therefore should be encouraged.

Similarly, in 2005, the Brazilian Ministry of Health ratified payments for companions during labor and delivery in the public sector after the government passed a law permitting birth companions (Rodrigues et al., 2017). These expenses included payment of sufficient accommodations and main meals. In 2008, the Brazilian National Health Surveillance Agency also developed some parameters that established ample and safe physical structures for birth companions and providers (Brüggemann et al., 2014). Later, in 2010, the National Agency for Supplementary Health through some normative instruments declared that maternity services in the private sphere should insure all birth companion expenses irrespective of health care plan (Brüggemann et al., 2014; Rodrigues et al., 2017). However, the existence of these legal documents did not always result in the permission of birth companions in facilities, as the authors reported noncompliance from the providers.

As noted earlier under the space and privacy construct (inner domain), most facilities were reluctant to allow birth companions to be with the women during labor and delivery due to fears associated with limited space and privacy. Although these issues were largely an inner domain challenge, in some settings such as Tanzania these challenges were a result of the outer setting, such as national policies that directed the construction of public maternity wards. A feasibility study conducted by AMDD and Ifakara Health Institute found that the construction of government health facilities followed a national standardized plan which did not consider the inclusion of a birth companion in the delivery rooms (AMDD Dar es Salaam, Feasibility Report, 2016). In Kigoma, Tanzania, the government mandated a non-negotiable construction of privacy structures as a prerequisite for introducing birth companions (AMDD Kigoma Implementation Report, 2019).

2.7.7.2 Sociocultural factors

Sociocultural mores regulating childbirth and reproduction can influence who the birth companion is. These belief systems potentially influence communities and providers' attitudes of who the birth companion should be, further restricting women's choices. For instance, in some cultures in LMICs, childbirth is often limited to women as it is considered taboo for males to witness the birthing process (Afulani et al., 2018; Banda et al., 2010; Kululanga et al., 2012; Kabakian-Khasholian et al., 2015). There were concerns that men might lose sexual interest after witnessing their partners go through the physiology of childbirth (Abushaikha & Massah, 2013; Afulani et al., 2018; Kululanga et al., 2012; Sapkota et al., 2012). In rural Tanzania, providers constantly asked male companions to wait outside, while female companions were allowed to accompany women during various stages of labor (Shimpuku et al., 2013).

2.7.7.3 Women's Needs and Resources

Not all women desire or need the same type of support during pregnancy and labor, and a number of programs in HICs appeared to factor this into their implementation models. Spiby et al. (2015) reported how staff members from the birth companion organization and the volunteer doulas used the needs women identified as the foundation of the support they provided. Birth companions were therefore not expected to perform any specific support activities based on their prior knowledge, but instead tailor their support based on the women's personal needs. Among the numerous types of support birth companions might provide during labor (emotional, informational, physical, and instrumental), some models found that informational support was especially valued by first-time mothers in Malawi (Kungwimba et al., 2013) and the UK (Spiby et al., 2015) as well as women with additional vulnerabilities such as migrants, imprisoned women, single mothers, and women with a history of abuse (Akhavan & Edge, 2012; McLeish &

Redshaw, 2018; Schroeder & Bell, 2005). Unsurprisingly, first-time mothers who are migrant women often desire informational support, as they may lack information on birth preparedness, what to expect during birth, or provider expectations in a foreign country. In settings where spiritual support such as prayer was often requested, birth companions were particularly encouraged to offer this type of support (AMDD Kigoma Implementation Report, 2019). One study conducted in Ghana by Alexander et al. (2014) explored the types of support women desired and from whom, before program implementation. The authors found that most women preferred emotional support over any other form of support, and they wanted their biological mothers or their partners to provide it.

In HICs, a number of studies recognized that many of the underserved populations had additional needs that went beyond the standard forms of labor support. Consequently, several longer-term doula models in HICs provided additional support services to women. These were mostly community-based programs targeting migrant women, incarcerated women, teenage mothers, and other high-risk women such as victims of violence or smokers. Additional support took the form of assistance with housing, child support, clothes and supplies for the baby, identification of counseling support services, pre- and postpartum care, complementary therapies or services such as acupuncture or reflexology, and filming or otherwise documenting birth stories for women in prison (Akhavan & Edge, 2012; Altfeld, 2002; Clewett & Pinfold, 2015; Kerr, 2015; McLeish & Redshaw, 2018; Schroeder & Bell, 2005; Spiby et al., 2015; Steel et al., 2013). Programs working with populations that did not speak the host country language also offered translation services through bilingual birth companions (Akhavan & Edge, 2012; Hazard et al., 2009; Mottl-Santiago et al., 2008).

Although current evidence on what support women desire prior to program implementation is minimal, there are several studies⁸ that provide women's descriptions of what form of support they liked *after* their experience with a companion. The mere physical presence of a birth companion during L&D emerged as key across all the different birth companion models. Many women valued having someone continuously present with them, regardless of who this person was or what they did. When interviewed, women from both HICs and LMICs described how the physical presence of their support person(s) reduced insecurity, fear, and loneliness. Women preferred this continual presence of birth companions to the spasmodic support provided by health providers (Afulani et al., 2018; Altfeld, 2002; Berg & Terstad, 2006; Darwin et al., 2017; Holland, 2009; Kungwimba et al., 2013; Lundgren, 2010; Maimbolwa et al., 2001; Price et al., 2007; Schroeder & Bell, 2005; Senanayake et al., 2013). Senanayake and colleagues' (2013) study reported gainful outcomes for women associated with just the physical presence of a birth companion. They further asserted that the majority of these meaningful outcomes were realized regardless of whether or not the companion had received prior training on how to support laboring women.

Other than the physical presence of the birth companions, women also valued the emotional and psychological support provided by companions across all identified birth companion models. This form of support included verbal praise, encouragement and reassurance (Alexander et al., 2014; Banda et al., 2010; Campero et al., 1998; Deitrick & Draves, 2008; Hardin & Buckner, 2004; Holland, 2009; Koumouitzes-Douvia & Carr, 2006; Maimbolwa et al., 2001; Spiby et al., 2015; Steel et al., 2013; van Dijk et al., 2013) as well as spiritual support

⁸ All of these papers were based on qualitative studies, and did not rank one form of support as more important than another. Nevertheless, insights on preferences can be gleaned from how women reflect on the support they have received.

(Kabakian-Khasholian et al., 2015; Kungwimba et al., 2013; AMDD Kigoma Implementation Report, 2019). Emotional support (in the form of spiritual support) seemed to be important for the Family/Friend – Untrained birth companion model from countries with strong religious belief systems. Women who were emotionally supported felt they had more agency to participate in and control the birthing process. Women were also more tolerant of pain and aware of labor progression (for example, cervical dilatation) (Berg & Terstad, 2006; Bohren et al., 2019; Campero et al., 1998; Sapkota et al., 2012)).

Women also appreciated informational support across all four models, particularly how companions explained medical terms (Steel et al., 2013), the birth process (Akhavan & Edge, 2012; Maimbolwa et al., 2001; Kungwimba et al., 2013; Banda et al., 2010), and the different interventions providers administered (Schroeder & Bell, 2005). Moreover, migrant women in HICs who were unfamiliar with the culture of their host country appreciated how companions interpreted and explained medical advice and other birth information (Akhavan & Edge, 2012; McLeish & Redshaw, 2017). One key finding was that the women who valued this form of support were mostly first-time mothers (Kungwimba et al., 2013; Spiby et al., 2015) or women with additional vulnerabilities such as migrants, victims of abuse, imprisoned women, and single mothers (Akhavan & Edge, 2012; McLeish & Redshaw, 2017; Schroeder & Bell, 2005). It is foreseeable that first-time mothers would value information support (possibly due to their inexperience on the dynamics of childbirth) regardless of which birth companion model applied to them.

Women appreciated physical and practical support from their birth companions. Mothers valued being touched and massaged to relieve pain (McLeish & Redshaw, 2017; Mottl-Santiago et al., 2008). In Malawi, Egypt, Syria, and Lebanon, women reported wanting their companions

to provide them water to drink (Maimbolwa et al., 2001) and assistance with moving or getting dressed (Kabakian-Khasholian et al., 2015). It is important to note that most studies described the various forms of physical or practical support that were *provided* to women, but how women *felt* about that support or if they expressed a *desire* to receive that form of support remained unclear. One exception was a paper by Kungwimba et al. (2013), in which the authors describe how first-time mothers wanted to be supported physically and practically by their companions, but the companions refused to help them. Specifically, some of the interviewed women wished their companions had escorted them to the washrooms (practical support) and allowed the women to hold on to them during contractions (physical support). The companions for some women declined to help women with turning, back massages (physical support), and even providing food (practical support) (Kungwimba et al., 2013). While this paper provides an illustrative example of how physical and practical support can indeed be important to women, the recounted experience of birth companions refusing to offer the support women requested should not be taken as representative of most birth companion programs. Providing women with tailored support or designing programs that factor in individualized support to women is important in their acceptability by women and their families.

2.7.8 Characteristics of Individuals

The CFIR ‘characteristics of individuals’ domain is characterized by factors related to the individuals implementing the intervention, including agency, choices, power, mindsets, interests, and affiliations. For this literature review, this domain centered on the attitudes, beliefs, and concerns of key stakeholders involved in implementing birth companion programs.

2.7.8.1 Provider Perceptions on the Importance of Companions

Provider perceptions play a significant role in the implementation of birth companions since providers are gatekeepers of health facilities where birth companion programs will be/are located. Extant studies showed notable variations on provider acceptance of birth companions. Nevertheless, provider acceptance was generally high, signifying that providers believed companions offered valuable support to women (Banda et al., 2010; Deitrick & Draves, 2008; Dundek, 2006; Kungwimba et al., 2013; Maimbolwa et al., 2001). Sometimes, provider acceptance increased after program implementation, indicating that providers might not be fully aware of the value of birth companions before program rollout. In Malawi, health providers saw the importance of companions post-implementation once the companions had provided women with company and reassurance and met women's needs (Banda et al., 2010). Similar findings were also reported in Kigoma, Tanzania, where more providers saw the value of birth companions, particularly those stationed at the facilities after program implementation (AMMD Kigoma Implementation Report, 2019). In LMICs, providers who accepted birth companions often described how companions were useful in providing an extra pair of hands which decreased workloads (Maimbolwa et al., 2001), triaging to providers to examine clients, and alerting providers when they identify problems (Banda et al., 2010; AMDD Kigoma Implementation Report, 2019).

A study conducted in Tanzania revealed how providers acted as “the gatekeepers of companionship, and the work environment influenced providers' allowance of companionship” (Dynes et al., 2019, p. 97). Providers' workloads, job satisfaction, number of deliveries performed, and the presence of a supervisor influenced whether or not birth companions were allowed in the facilities. Providers who worked more hours than 55 hours a week felt satisfied

with their jobs and were more likely to allow companions. The more deliveries performed, the higher the chances a birth companion would be allowed. The presence of an on-site supervisor diminished women's chances of having a companion during L&D. However, chances of being permitted to have a companion increased when women reported labor complications and if they already had a companion with them.

However, despite this general appreciation of birth companions, there were providers who had reservations about the inclusion of birth companions in the health facilities. In Egypt, Lebanon, Syria, and Australia, health providers reported birth companions' unpreparedness as a barrier to the program's success (Kabakian-Khasholian et al., 2015; Maher, 2004). In HIC settings, which are unaffected by unprecedented staff shortages, midwives felt that companions were taking over their roles and replacing them as the chief providers of comfort for laboring women (Cogan & Spinnato, 1988; Spiby et al., 2015; Torres, 2013). Midwives therefore felt the need to safeguard their territory and failed to recognize the significance of companions, assuming roles they believed were part of their remit. In Australia, some midwives reported that unprepared birth companions generated additional work for them, as providers had to shift their focus towards the companion, leaving the mother unattended (Maher, 2004). The midwives from this program added that not only were the birth companions ill-prepared, but women had not selected their birth companions carefully.

In LMICs, some providers were also unwilling to incorporate birth companions into routine maternity services and offered various reasons for their lack of enthusiasm. Some providers reasoned that companions would cause women to be disobedient to provider instructions (Banda et al., 2010; Maimbolwa et al., 2001) or would interfere with care (Kabakian-Khasholian et al., 2015; Maimbolwa et al., 2001). Providers' concerns over

companions causing women to not follow provider instructions were often justified. Some women in Malawi followed advice provided by their birth companions, which contradicted medical practices and provider instructions. This often resulted in confusion among women on whose advice to take. In most cases, they preferred advice from the companion, who was always at their bedside (Kungwimba et al., 2013). Moreover, it is likely that women would opt for advice from their close, trusted family members over advice from providers who, despite their training, were strangers to the women.

Other providers were concerned companions would spread gossip about women's behaviors during childbirth and encourage utilization of potentially harmful traditional medicines and practices (Banda et al, 2010; Maimbolwa et al 2001; AMDD Kigoma Formative Report, 2017; van Dijk et al., 2013). Moreover, providers also felt that companions were not competent enough to support women (Banda et al., 2010), and may witness clinical interventions that they do not understand, leading to unjust assessments of the providers' competence in attending to women (Brüggemann et al., 2014; AMDD Kigoma Formative Report, 2017). Also, some studies reported how providers from LMICs feared for the proliferation of infections following the inclusion of a non-clinical person in maternity care (Brüggemann et al., 2014; Kabakian-Khasholian et al., 2015; AMDD Kigoma Formative Report, 2017). Providers believed that "the presence of an additional non-clinical person may threaten the sterility of the labor room" (Bohren et al., 2019, p. 20). These fears were also raised by women and their partners (Bohren et al., 2019).

2.7.8.2 Other Stakeholder Concerns

Apart from provider concerns over birth companions, some women had reservations about the integration of birth companions into childbirth services. Like providers, some women

felt that birth companions were not skilled enough to provide adequate care to them (Banda et al., 2010; Maimbolwa et al., 2001). Women felt entitled to receive all the care and support they needed from providers rather than companions. However, whether women's fears about birth companions' capabilities were related to expectations about them providing *psychosocial* support or *medical* support remains uncertain. For instance, in Banda et al. (2010), a pre-implementation survey that showed some women who were concerned about birth companions' competence also revealed that 8% of women who saw the importance of birth companions thought companions would "monitor the progress of labor and conduct deliveries" (p. 942). It is therefore unclear which tasks women felt companions were unqualified for: psychosocial support or biomedical care. However, there were a few cases where women felt their companions were not adequately prepared to offer psychosocial support specifically. For instance, in Sweden, one woman received poor treatment from her companion because the doula did not know how to support her (Akhavan & Edge, 2012).

Some women also shared the same sentiments with providers that birth companions would gossip about them once they return to their communities (Afulani et al., 2018; Maimbolwa et al., 2001; AMDD Kigoma Formative Report, 2017). Maimbolwa and colleagues (2001) elaborated on why women feared to be talked about in their communities. Besides women feeling embarrassed, the authors explained how certain behaviors during childbirth might infringe on social norms of childbirth (outer setting), probably affecting how women would be viewed in their societies. In certain parts of Uganda and Madagascar, birthing women are invariably praised for giving birth in silence and showing no signs of pain during labor and delivery (Kwagala, 2013; Morris et al., 2014). The authors reported how failure to subscribe to

these value systems was perceived to negatively affect the physical and mental well-being of the fetus or led to humiliation of the family.

2.7.9 Process

Damschroder and colleagues (2009) describe the ‘process’ domain as characterized by four main activities of implementation process: planning, engaging, executing, and reflecting. The CFIR process domain includes the change process used to encourage adoption of the intervention, as designed, at an “individual and organizational level” (Damschroder et al., 2009). For BC programs, effective ‘use’ of the intervention is not only determined by facility staff, but also by women and birth companions themselves. We have therefore expanded this domain to include change processes aimed at any of these three stakeholder groups. As many of the findings in this domain were common across different BC models, we have not structured this section by archetype.

2.7.9.1 Planning

According to Damschroder et al. (2009), planning is associated with the extent to which tasks and schemes for implementing the intervention are developed in advance prior to program implementation. Planning enables implementers to build local capacity at the individual and collective levels, leading to more effective program implementation.

Although not very many studies described their planning processes before implementation, a few studies provided some information on how the program mapped out a plan that involved several steps, including before implementation. For instance, the Thamini Uhai Kigoma birth companion project program managers included deliberations on program conception, conducted a needs assessment, formative research, pre-implementation preparation, created a Code of Good Practice for guidance, how they recruited and trained companions, as

well as how the remodeled the maternity infrastructure. In addition, the project also raised awareness and engaged in health implementation sessions at Reproductive and Child Health (RCH) clinics as preparation for the launch of the birth companion program (AMDD Kigoma Implementation Report, 2019). The formative research provided fundamental baseline data on the feasibility and acceptability of the intended program in Kigoma. Additionally, the formative research surfaced key data on the desired characteristics of a companion, roles of companions, and who the companion should be, as well as foreseeable challenges and benefits of the companions. These formative data enabled the program managers to refine their program and implementation process in order to increase stakeholder acceptance and use of the program (AMDD Kigoma Implementation Report, 2019).

In the UK, Clewett and Pinfold (2015) reported that their project was an expansion of previous targeted work to support incarcerated women in an effort to focus more on women with multiple disadvantages including violence, mental health issues, and substance abuse. Although the authors did not provide information on the initial program plan, they give data on the evaluation of the project, which included a theory of change and a logic model that could probably shed light on how the program was intended to be. For example, it was important that the program be women-centered, needs-led, flexible, and that it provide 24-hour services through available communication platforms such as use of phones and emails. By taking a women-centered and needs-led approach for underserved women, the program managed to offer more appropriate and needed companion care to these historically neglected groups, leading to increased acceptability and utilization of the program.

2.7.9.2 Engaging Stakeholders in Program Design

Stakeholder engagement involves engaging individuals throughout implementation and utilization of the intervention through several strategies. These range from education, social marketing, training, awareness, and other related activities (Damschroder et al., 2009). Stakeholder engagement is critical in that it builds capacity and raises awareness on the importance of an intervention that might not be noticeable to stakeholders. In South Africa, the researchers delivered an educational packet to maternity staff to promote birth companionship. The packet included instructions on how to select, recruit, and train suitable birth companions, although the facilities were ultimately responsible for deciding how they would implement the program. Out of the five facilities that received the education intervention, four wound up implementing birth companion programs, but each model was different. In Kigoma, as part of the pre-implementation phase, the Thamini Uhai program engaged with key stakeholders such as regional health managers, facility managers, community leaders, and providers in the co-creation of a Code of Good Practice (COGP). The COGP regulated birth companion roles, responsibilities, and behaviors (such as dos and don'ts) before implementation. The COGP also described how health facilities should integrate the birth companions into their system, as well as many other details about how implementation should take place. Creating a COGP was essential for supervision and setting boundaries on what birth companions could or could not do, thereby addressing some of the challenges that emerged in the formative study such as companions potentially encouraging harmful practices (Thamini Uhai, 2017). The program also raised awareness through several platforms such as the media, word of mouth, and community gatherings as well as through announcements during ANC visits. Initially, program awareness was low, resulting in low usage of family/friend birth companions as women only found out

about the program upon arrival at the facility. However, as more women attended ANC facilities and birthed with companions, a notable increase in awareness was reported, leading to increased use of family/friend companions (AMDD Kigoma Implementation Report, 2019).

Stakeholder engagement can create buy-in and ownership of the program, thereby making it relatively easier to implement once frontline personnel are on board. Dundek (2006) narrated how a series of consultative meetings with different stakeholders led to the creation of a culturally competent doula program for Somali migrant women in the United States. The nurses who attended the meetings became the main champions for the program, resulting in the successful implementation of the program. Spiby and colleagues (2015) corroborate Dundek's (2006) findings. Dundek reported how involving women from the onset in program design led to the creation of a program that used the key needs identified by women. This became the basis of the support that birth companions provided, leading to more women-centered and appropriate care. In some settings, however, provider engagement did not always work. In Canada, despite efforts to inform providers about a planned merger of two doula programs, pushback from nurses was nevertheless a barrier to successful restructuring (Legendyk & Thurston, 2005).

2.7.9.3 Orienting Stakeholders

The importance of educating and raising awareness among women, their communities, and even providers about birth companion programs can never be overemphasized if implementation of birth companionship is to be effective (Dundek, 2006; Papagni et al, 2006; Spiby et al, 2015). Current evidence shows that the majority of programs tried to inform women prior to delivery, and the most common way of informing them seemed to be through ANC (Akhavan & Edge, 2012; AMDD Kigoma Implementation Report, 2019; Banda et al., 2010; Clewett & Pinfold, 2015; Kerr, 2015; Kozhimannil et al., 2013; Kungwimba et al., 2013;

Lundgren, 2010; Morhason-Bello et al., 2009; Mottl-Santiago et al., 2008; Spiby et al., 2005; Thomson & Balaam, 2016; Yuenyong et al., 2012). Most programs oriented women during the third trimester (Kerr, 2015; Morhason-Bello et al., 2009; Mottl-Santiago et al., 2008; Yuenyong et al., 2012), but in some instances, orientation started as early as five months into the pregnancy (Clewett & Pinfold, 2015) or anytime the women reported for ANC visits (AMDD Kigoma Implementation Report, 2019). In some HICs settings, use of ANC visits as orientation platforms presented with challenges. For example, one doula study in the United States found that women who received ANC from a physician were less likely to be referred to a birth companion program than women whose maternity provider was a midwife (Mottl-Santiago et al., 2008). At the same time, Morhason-Bello (2009) pointed out that some populations are less likely to seek ANC than others, so conducting outreach solely through ANC might introduce equity issues. However, use of ANC as a connection point seemed more effective in LMICs, as more women reported to have found out about birth companion programs through their routine ANC visits (AMDD Kigoma Implementation Report, 2019; Banda et al., 2010).

Women also commonly learned about birth companion programs through word-of-mouth (Banda et al., 2010; Kungwimba et al., 2013; Spiby et al., 2005, AMDD Kigoma Implementation Report, 2019), while a couple of programs—mostly HIC doula programs—did outreach through childbirth classes (Coley & Nichols, 2017; Gruber et al., 2013; Spiby et al., 2005) or other counseling/social services (Akhavan & Edge, 2012; Coley & Nichols, 2017; Kungwimba et al., 2013). Authors from one study in South Africa recommended public awareness campaigns (Brown et al., 2007); however, three programs that used local media to inform women in Tanzania, Malawi, and the UK had limited success with this approach (AMDD Kigoma Implementation Report, 2019; Banda et al., 2010; Spiby et al., 2005).

Some programs not only advised women about bringing companions but also counseled them on how they should choose a birth companion (Yuenyong et al., 2012). Providers recommended that women select a reliable person who would be available throughout the process, someone they felt comfortable with, and most importantly someone they personally wanted to be their birth companion during L&D (Yuenyong et al., 2012). Some midwives in Australia felt that women had selected unsuitable companions (Maher, 2004), underlining the importance of orienting women on companion selection. In Tanzania, some birth companions failed to come on the delivery dates because of other commitments, or left the mothers at the facilities to go home to cook or cater to other family needs, leaving the women alone (Shimpuku et al., 2013; AMDD Kigoma Implementation Report, 2019).

Availability of family birth companions became even more challenging during the farming season in Tanzania, as birth companions prioritized their farming duties over those of being birth supporters (Shimpuku et al., 2013; AMDD Kigoma Implementation Report, 2019). Selection of a desired birth companion is imperative as some women reported feeling uncomfortable in the presence of their mother-in-law (Banda et al., 2010). In patriarchal settings, selection of a companion might be difficult, as male partners can impose whom they want to accompany their wives. There is therefore a need to encourage male involvement and participation in maternal services to enlighten them on the importance of choices for interventions like birth companionship.

Despite efforts to familiarize women and providers with the program before delivery, there were programs in LMICs where the majority of women were unaware of the programs. Some women did not know they were allowed to have a companion or did not understand the companion could be present with them throughout childbirth (Banda et al., 2010; Diniz et al.,

2014; Kungwimba et al., 2013; Rodrigues et al., 2017). In Brazil, women and some providers lacked knowledge, information, and understanding on the statutory instruments that allowed the use of birth companions, and this often interfered with implementation. There were consistent reports of women being denied a companion by providers. While this resistance from providers revealed the traditional hegemony of health facilities that molded provider behaviors, the authors highlighted that the women's lack of awareness of their rights exacerbated the situation (Rodrigues et al., 2017).

Orienting potential birth companions also surfaced as key to effective implementation of the intervention. In Thailand, birth companions received a tour of the labor ward (together with the pregnant woman) prior to delivery, and were introduced to the delivery staff when the woman arrived in labor (Yuenyong et al., 2012; Deitrick, 2008; Schroeder & Bell, 2005; Gordon et al., 1999; Akhavan & Edge, 2012). Some programs introduced companions to the maternity staff (Campero et al., 1998), leading to established relationships with providers prior to delivery. This resulted in the providers being more supportive of companions' presence during childbirth (Altfeld, 2002). Some authors thus recommended that program implementers consider ways to introduce and integrate companions into the labor unit before childbirth (Papagni et al., 2006; Dundek, 2006).

2.7.9.4 Birth companions role clarity

Inadequate or lack of training, orientation, and understanding of birth companionship can negatively influence implementation of birth companion programs. Studies from LMICs revealed that some women, birth companions, or providers did not fully comprehend what the role of the birth companion was supposed to be. This manifested itself quite differently in LMICs

versus HICs. (The differences also largely reflect Family/Friend vs. Doula models, although some exceptions exist.)

In LMICs, confusion regarding the companion's role occurred in all stakeholder groups—including the companions themselves. Consequently, companions either failed to provide forms of support that they were supposed to, or they took on alternative tasks unrelated to their support role. Diamond-Smith et al. (2016) and Kungwimba et al. (2013) reasoned that companions did not understand their intended roles. In the study by Kungwimba et al. (2013), the authors did not provide information on whether companions were instructed on their roles or not. Thirteen out of twenty women interviewed in this study reported that they had not received the support they wanted. Three of those women reported dismal treatment from their companions, including being shouted at and the companions threatening to leave. It seems as if the birth companions' roles were not clearly articulated to them and this might have contributed to the inadequate care and poor treatment that women received from their companions.

Existing evidence from LMICs also showed that key stakeholders thought the birth companions' roles went beyond providing continuous social and emotional support. Some examples include conducting deliveries or providing medical care (Banda et al., 2010; Maimbolwa et al., 2001; van Dijk et al., 2013); assisting health providers (Banda et al., 2010; Maimbolwa et al., 2001; van Dijk et al., 2013); disciplining laboring mothers or telling them to follow provider instructions (Banda et al., 2010; Kungwimba et al., 2013); and washing sheets/clothes or cleaning the facility (Campero et al., 1998; Kungwimba et al., 2013; van Dijk et al., 2013). These stakeholder perceptions might not necessarily be the program implementers' intentions but highlight how failure to comprehend the utility of birth companions might yield undesired program outcomes, emphasizing the importance of engagement.

Banda et al. (2010) provided useful insights on birth companions' role clarity before and after implementation of a Family/Friend birth companion program in Malawi. The authors asked women, providers, and companions what they expected companions to do before the program was initiated. They then followed up and asked stakeholders about their experiences with birth companionship once the program had been implemented. Perceptions that companions would "monitor the progress of labor and conduct deliveries," "discipline uncooperative mothers," and "abuse women" were more common pre-implementation than post-implementation. However, post-implementation, stakeholders saw to "reinforce midwives' advice" as part of the companions' role.

Meanwhile, in HICs, birth companions were seldom confused about their roles. Instead, it was women and providers who were unsure. Some studies reported that nurses felt threatened by doulas as a result of not properly understanding what their role was (Lagendyk & Thurston, 2005; McLeish & Redshaw, 2017; Papagni et al., 2006). In some cases, programs that targeted disadvantaged populations such as teen mothers found that these women did not always understand what role birth companions played. Notably, the studies that reported stakeholder confusion on companion roles rarely reported how they introduced the program to key stakeholders. Conversely, studies that elaborated on the steps they took to clarify the companions' roles with women, companions, or providers hardly reported experiencing issues with role clarity (Bruggemann et al., 2007; D. Campbell et al., 2007; Spiby et al., 2015; Yuenyong et al., 2012). While it cannot be decisively concluded that a paper's lack of description of its stakeholder orientation process necessarily means that the program was not properly introduced to stakeholders, it seems fair to infer that authors who felt stakeholder

orientation was important (as deduced from inclusion of this detail in their published program description) did not encounter the same role clarity issues that many other studies did.

2.8 Discussion

The majority of women appreciated being able to go through childbirth with a birth companion. Women felt that this intervention could improve their experiences during labor and delivery. There was no common agreement among women regarding whether a known (relative/friend) or unknown (doula/on-call) model is preferred. However, studies in LMICs showed a preference for the former while studies in HICs showed a preference for the latter. Women in HICs might opt for the doula model because they usually have a family member present. For resource-constrained settings where financial challenges are already pervasive, the family/friend model seems more ideal as it does not require any additional costs to pay the companion. However, the birth companions might benefit from basic orientation on their expected roles in order to minimize role ambiguity, which emerged as a key implementation barrier in LMICs. The importance of training or orienting providers was also emphasized in other reviews by Bohren et al. (2019) and Kabakian-Kasholian and Portela (2017), although the last authors reasoned that this training will “improve the acceptance of the intervention mainly by the health care providers” (p. 11).

While women and other stakeholders emphasized experience with childbirth as a key attribute of an ideal birth companion, women need to be encouraged to select someone whom they trust, are comfortable with, and who is reliable. Experience with childbirth is insufficient if the birth companion deprioritizes the importance of being continuously there, or makes the woman anxious or mistreats the mother, as was the case with some companions in Malawi. In addition, encouraging women to choose someone they trust can help minimize fears of being

gossiped about, which made some women prefer an unknown companion who always provided support at a financial cost.

The literature also showed linkages across the CFIR domains. Understanding the connections and where these domains intersect can help identify leverage points where necessary change can be effected. For example, women's preferences for having a family/friend or doula birth companion (intervention characteristics domain) were largely influenced by contextual factors (outer setting domain) such as societal expectations of how women should behave during labor, and whether or not women felt comfortable asking a stranger to provide a certain type of support. Women might find it difficult to ask for physical support such as massages or other forms of touch from strangers if it violates certain aspects of their culture. Moreover, given that some women reported valuing spiritual support in the form of prayer, a woman's religious affiliation could also influence whether she prefers a known or unknown companion, especially in religiously diverse settings where an unknown birth companion might not share her faith.

Additionally, the space issues (inner settings) had a bearing on who the birth companion should be (intervention characteristics domain), as women were expected to have a female birth companion instead of a male companion, thereby restricting the woman's choices. Kabakian-Kasholian and Portela (2017) argue that the implementation of birth companion programs requires commitments to provide the appropriate physical space that respects the privacy of women and their companions. Similarly, the Tanzanian government enforced the construction of privacy infrastructure for the Thamini Uhai program to start in Kigoma. Remodeling maternity wards to ensure privacy requires financial investments at the institutional level but more importantly at the national level (outer setting), as governments will have to include this in their health budgets. Such efforts might take time if significant funding is required. In Kigoma,

Tanzania, Thamini Uhai reconstructed nine facilities using aluminum materials through the assistance of financial donors. This model, though desirable, might be difficult to replicate especially in most SSA countries where national health budgets are extremely low. Institutions and governments can seek cheaper alternatives such as the use of low-cost, locally available materials to separate the wards to ensure privacy.

Sociocultural mores (outer setting) also influenced who the birth companion should be, further minimizing women's options in selecting a companion. These social values have found their way into health facilities and influenced provider attitudes (inner setting), even in institutions where male companions might be allowed. Shimpuku and colleagues (2013) reported incidences where men were asked by providers to stay outside, although it was not clear whether the institutional policy allowed only female companions or not. Such socially constructed customs on who should participate in childbirth require time to change. Yet, evidence shows that a significant number of women desire birth companionship from their male partners. The maternal health community should take advantage of the rising male involvement in sexual and reproductive health and not only limit it to family planning and ANC. Male involvement during childbirth must be prioritized and encouraged even at the community level so that women can have options in choosing their desired companions.

Influencing provider attitudes is essential for the successful implementation of birth companion programs as providers are the frontline personnel in health facilities (Kabakian-Khasholian & Portela, 2017). Provider acceptance (characteristics of individuals domain) was shaped by the broader health system (outer setting domain) and organizational culture (inner setting domain). In LMICs, some health workers valued companions because they reduced provider workloads. This provider appreciation for help from birth companions was not observed

in HICs, most likely because they do not suffer from the same human resource shortages that are common in LMICs. Rather, in HICs, providers expressed frustration over companions taking over the supportive components of care that fall within their responsibility. These sensitivities may arise from a larger trend in HICs of health workers spending less and less time with patients and more time on record-keeping and other administrative tasks. The inner setting (such as the organizational culture and leadership engagement) may also influence provider attitudes (characteristics of individuals). For example, maternity staff tended to be more receptive and accommodative of birth companions in facilities with birth companion-friendly models and supportive leadership on such programs than their counterparts, whose organizational culture did not value or permit inclusion of companions into their systems.

Provider attitudes may also reflect a lack of clarity on what the companion's role is supposed to be, particularly if the program is not communicated to the providers during the planning phases (process domain). Factoring provider sensitization and education activities (including providing evidence-based data) into the planning phases before implementation can help minimize this challenge and lead to more successful implementation (Kabakian-Khasholian & Portela, 2017). In addition, the literature showed how the inner setting influenced provider attitudes in acceptance of the program. Providers acted as gatekeepers of the health facilities, and getting through them proved more important since some of them disregarded prevailing national guidelines or policies on companionship (outer setting). Understanding that each domain can interact with and influence another is fundamental in that it demonstrates how one birth companion model cannot be promoted as the ideal. Rather, birth companion programs should be planned with consideration given to the factors in each domain.

2.8.4 Woman-Centered vs. Provider-Centered Approach

The literature review also demonstrated two competing priorities that program planners need to consider so women can fully experience satisfactory care from their birth companions: women's needs and preferences (outer setting) vs. providers' needs and convenience (mostly provider attitudes – characteristics of individuals' domain). In LMIC settings, there were instances when the needs and convenience of providers were prioritized over those of women, resulting in a provider-centered model. Specifically, when asked about the benefits of companions, some providers reported that companions would assist them in conducting menial tasks, especially in settings where staff shortages are prevalent. In some cases, birth companions described how their role would include assisting providers help discipline uncooperative mothers (Banda et al., 2010). It is uncertain what form this discipline took, especially given the increase in evidence showing provider maltreatment on laboring women. It is also probable that such interpretations of the companion's role will perpetuate a provider- or institution-centered approach rather than a women-centered approach to care, as companions become part of the health facility culture.

In addition to the possibility that birth companions could be used to increase provider control over women, program planners should also consider ways in which companions might use their role to advance their own agenda. In some HICs, some women described how relatives may take control of the birth process and tell the woman what to do instead of letting her choose. Although not necessarily advancing the provider's or the companion's agenda over the woman's, these are other ways in which introducing companions could potentially reduce women's control over their own childbirth experience. It is therefore important that the roles of the companions

and those of providers are drafted during the planning stage (process) and clarified and communicated to all stakeholders during training (packaging – intervention characteristics).

There were some examples of studies in HICs that seemed intent on promoting a women-centered approach. Women seemingly appreciated this program feature for enhancing their satisfaction (Darwin et al., 2007; Clewett & Pinfold, 2015; Koumouitzes-Douvia & Carr, 2006). Limited details were provided in these papers on how these women-centered approaches influenced program implementation or outcomes, but Clewett & Pinfold (2015) presented a logic model with “enablers” that included how birth companions worked at a pace set by each woman, and how these enablers gave women agency to achieve and control the births by themselves.

2.8.5 Program fidelity

Many programs in this review experienced issues with program fidelity. A number of studies reported that companions took on, or believed they would take on, roles beyond providing continuous support to women, such as assisting health providers, disciplining laboring women, or cleaning. These additional responsibilities are not necessarily bad, and could in fact lead to better care for women if providers are resultantly able to examine and treat them more expeditiously. However, they also run the risk of distracting the companion’s attention away from providing the most important role of offering continuous support to the laboring woman. Other studies reported cases where companions failed to provide the types of support women desired, or were prevented from providing any support at all (e.g., when facility staff restricted women’s access to their companion, or when companions were not available when women went into labor). Furthermore, facility-based doula model programs that only staffed one or two companions per shift may also have limited capacity to provide women with continuous support if delivery volumes require the companions to assist more than one woman at a time. Finally, the

LMIC Family/Friend studies found that large proportions of women arrived at the facility to deliver without knowing about or understanding what the companion program entailed. This raises concerns over whether women really got to *choose* who their companion would be, or if they ended up delivering with whoever brought them, regardless of whether that person was someone they wanted present or not.

Program implementation should therefore follow its intended plan if program planners want to attain the clinical and experiential benefits of companionship. Most of the fidelity issues described above seem to have arisen from inadequate orientation of key stakeholders—companions, providers, and women themselves. This underscores the importance of clearly defining what it is companions should and should not do *prior to program initiation*, as well as communicating these roles to all relevant stakeholders (and ensuring their comprehension and buy-in), and monitoring the program continuously to verify that the intervention is being delivered as intended.

2.9 Conclusion

Several constructs falling under the CFIR domains determine the successful implementation of birth companion programs globally. However, these factors varied mostly by geographical location. For example, more *inner setting* constructs such as space and organizational culture dominated as challenging factors in LMICs. In HICs, *characteristics of individuals* emerged as one of the main challenges, as some midwives felt that birth companions were taking their roles. Other factors such as the instigation of national policies can promote the implementation of birth companions, but their influence was largely determined by provider attitudes. Provider preparedness through orientation and actively engaging them in the process is key in shifting provider mindsets to accept the program in their facilities. Role ambiguity also

emerged as a key construct that requires attention before implementation, as this interfered with how companions related with providers and the experience of care women received. Program planners should therefore look at how these different domains interact to influence implementation.

Chapter 3: Theoretical Frameworks

This chapter sets out to illustrate how the key concepts of two theoretical frameworks guided this dissertation. The dissertation employed two theoretical frameworks, namely the Critical Systems Heuristics (CSH) and the Consolidated Framework on Implementation Research (CFIR) for the two main objectives.

3.1 Critical Systems Heuristics (CSH)

The Critical Systems Heuristics framework was chosen as the guiding framework to critique and reflect on the HCD approach as it was applied in the design and implementation of a birth companion model in Dar es Salaam, Tanzania. The Critical Systems Heuristics (CSH) framework was used to help in the structuring and framing of research questions as well as the analysis of data in the reflection of the HCD approach.

Developed by Ulrich (1983), the framework allows problem solvers to explain, elaborate, and critically explore boundary and value judgments of a problem situation and promote reflective practice (Venter & Goede, 2016; de Pinho, 2017). Boundary judgements are how people or groups make decisions on what is relevant to an issue of interest or concern (Faulkner, 2016). The CSH framework comprises 12 boundary questions that are deliberated in two ways, i.e., the normative selectivity mode (what ought to be) versus the empirical selectivity mode (what is) (Buse, 2013; Gates, 2018; Ulrich, 1983; Venter & Goede, 2016). These 12 questions are grouped under four main areas (illustrated in Figure 6 below): motivation, power/control, knowledge/expertise, and legitimacy. The basis of *motivation* denotes where the sense of value and purposefulness of designing the system comes from, who are or ought to be the end users or beneficiaries of the system, and what constitutes or ought to constitute improvement and how this is measured. The notion of *power/control* inquires who is or ought to be the decision-maker,

who is in charge of what is going on, and to what extent do they exercise this control (as in, what decisions can they not control?). The *knowledge/expertise* concept queries the know-how and expertise of those involved in designing the system. Who is considered an expert and what expert knowledge should be sought and from whom? Lastly, *legitimacy* inquires who stands or ought to stand as witness or representatives for those groups not involved in the design of the system? And who should be considered as the legitimate stakeholder to argue for those not involved? Moreover, how and what secures and protects the emancipation of those affected from the promises of those involved, and what worldview is decisive, that is, what various visions of improvement should be weighed and how should they be reconciled? Ulrich (1983) posits that these four key issues make up a claim's 'anatomy of purposefulness' (p. 342). Critical heuristics suggests that these four areas are important for reflective practice and can be applied to problem solving, decision-making, or intervention design (Ulrich, 2005). Ulrich further reinforces that these areas are essential because "without considering them, we do not really understand what a claim *means* and whether or to what extent we should recognize it as valid, that is, as a basis for action" (p. 9).

The CSH was apposite as a conceptual framework for reflection on human-centered design and it was applied in this dissertation for several reasons. Firstly, the four main areas of CSH demonstrate how CSH facilitates social equity, justice, and empowerment (Buse, 2013), all of which are inherent in HCD. Secondly, the framework also enables a deeper exploration into the underlying assumptions related to power dynamics, stakeholder values, knowledge bases, and moral positions and how they affect the perceptions and decisions of different groups (Ulrich, 1983). Thirdly, CSH interrogates the inclusion and roles of stakeholders in intervention design as it purposefully sets all stakeholders' perspectives on equal playing fields irrespective of their

expertise or technical competency (Better Evaluation.org). HCD is grounded in partnering with multiple stakeholders, especially program users, as equal partners in program design and implementation. Lastly, CSH considers the inclusion of multiple stakeholders as essential to HCD and co-creation ethos (Nicholas et al., 2019).

A reflection of HCD which does not explore the power structures, multi-disciplinarity, and consideration of users, equity, and justice will produce an incomplete picture of the actual proceedings of HCD on the ground. By reflecting on the HCD approach using an CSH framework, it was believed that key learnings regarding inclusion, decision-making, power structures, merits, and challenges would be drawn, leading to better application of HCD in global health. The key learnings were later framed into practice recommendations that can guide future users of HCD.

This dissertation employed an adapted version of the CSH framework proposed by Nicholas and colleagues (2019) in relation to co-creative research as illustrated in Figure 7. While CSH is usually employed as a reflective tool at the project level, Nicholas and colleagues applied it at the meta-level to critically reflect on the framing of co-creative work (Boyes, 2019). When applied at a meta-level, CSH questions surface assumptions about inclusion and roles, and can be used by those adopting co-creation to discuss desired standards of the practice (Boyes, 2019). Co-creation is an important characteristic of HCD, and co-creative research bears semblance to HCD as it is an approach to research “that values the expertise and perspectives of those who are likely to be affected by the work and those who use insights from the work” (Nichols et al., 2019, p. 355).

SOURCES OF MOTIVATION

- (1) Who is (ought to be) the client or beneficiary? That is, whose interests are (should be) served?
- (2) What is (ought to be) the purpose? That is, what are (should be) the consequences?
- (3) What is (ought to be) the measure of improvement or measure of success? That is, how can (should) we determine that the consequences, taken together, constitute an improvement?

SOURCES OF POWER

- (4) Who is (ought to be) the decision-maker? That is, who is (should be) in a position to change the measure of improvement?
- (5) What resources and other conditions of success are (ought to be) controlled by the decision-maker? That is, what conditions of success can (should) those involved control?
- (6) What conditions of success are (ought to be) part of the decision environment? That is, what conditions can (should) the decision-maker *not* control (e.g. from the viewpoint of those not involved)?

SOURCES OF KNOWLEDGE

- (7) Who is (ought to be) considered a professional or further expert? That is, who is (should be) involved as competent provider of experience and expertise?
- (8) What kind expertise is (ought to be) consulted? That is, what counts (should count) as relevant knowledge?
- (9) What or who is (ought to be) assumed to be the guarantor of success? That is, where do (should) those involved seek some guarantee that improvement will be achieved - for example, consensus among experts, the involvement of stakeholders, the experience and intuition of those involved, political support?

SOURCES OF LEGITIMATION

- (10) Who is (ought to be) witness to the interests of those affected but not involved? That is, who is (should be) treated as a legitimate stakeholder, and who argues (should argue) the case of those stakeholders who cannot speak for themselves, including future generations and non-human nature?
- (11) What secures (ought to secure) the emancipation of those affected from the premises and promises of those involved? That is, where does (should) legitimacy lie?
- (12) What worldview is (ought to be) determining? That is, what different visions of 'improvement' are (should be) considered, and how are they (should they be) reconciled?

Figure 6: Checklist of CSH Boundary Questions by Ulrich 1983

Source: Ulrich, 1983, p. 11

Focus of enquiry	Nicholas and colleagues' questions
	<i>vs. [a short version of Ulrich's Critical Systems Heuristics questions]</i>
Sources of motivation	Who or what should benefit from deploying a co-creation approach in research, and how?
<i>What makes the endeavour meaningful to those involved or affected?</i>	<i>[Who is (ought to be) the client or beneficiary?]</i>
	What should be the purposes of deploying a co-creation approach in research? (that is, what goals should it aim for in order to deliver to the beneficiaries?) <i>[What is (ought to be) the purpose?]</i>
	What should be the key measures of success for the deployment of co-creation approach in research? <i>[What is (ought to be) the measure of improvement or measure of success?]</i>
Sources of power	Who should be seen as key decision-makers in the deployment of a co-creation approach in research (that is, who should have the authority to change who or what should benefit, what the purposes should be, and how success should be measured)?
<i>Who is in control of what is going on and is needed for success?</i>	<i>[Who is (ought to be) the decision-maker?]</i>
	What components (resources, people, policies, and so on, should be under the authority of the decision-makers in the deployment of a co-creation approach in research? <i>[What resources and other conditions of success are (ought to be) controlled by the decision-maker?]</i>
	What components are essential for delivery of the benefits and purposes, but should not be under the authority of the decision-makers? <i>[What conditions of success are (ought to be) part of the decision environment?]</i>
Sources of expertise	Who, either in addition to or instead of the decision-makers, should be involved in delivering the benefits and goals, in deployments of a co-creation approach in research?
<i>Whose knowledge and experience will be taken seriously?</i>	<i>[Who is (ought to be) considered a professional or further expert?]</i>
	What should count as expertise? (that is, who should be considered an expert and what should be their roles?) <i>[What kind of expertise is (ought to be) consulted?]</i>
	What are the key factors that will guarantee (or increase the likelihood of) success? <i>[What or who is (ought to be) assumed to be the guarantor of success?]</i>
Sources of legitimation	Who or what should be seen as having a legitimate claim that they are affected parties (human or non-human); and how should such parties be involved or their concerns considered?
<i>What will contribute to participants' and affected parties' perception that a co-creative project is fair and just?</i>	<i>[Who is (ought to be) witness to the interests of those affected but not involved?]</i>
	What, in the deployment of a co-creation approach in research, ensures that those who could be affected are able to choose freedom from the constraints, assumptions and agendas of the project? <i>[What secures (ought to secure) the emancipation of those affected from the premises and promises of those involved?]</i>
	Upon what core values and assumptions should a deployment of a co-creation approach in research be based? <i>[What worldview is (ought to be) determining?]</i>

Figure 7: CSH adaptation for co-creative work by Nicholas et al. (2019)

Source: Boyes (2019)

3.2 Consolidated Framework for Implementation Research (CFIR)

The second objective of this dissertation sought to uncover factors influencing the implementation of a birth companion program in Dar es Salaam, Tanzania. Promoting birth companion programs alone as a quality measure in health facilities is insufficient if the factors influencing implementation are not known. The Consolidated Framework for Implementation Research (CFIR) was selected as a suitable framework for this study because of its conceptual underpinnings and focus on describing factors or determinants postulated or proven to influence implementation outcomes (Damschroder et al., 2009; Kirk et al., 2016; Nilsen, 2015; Safaeinili et al., 2020). The framework allows for a more comprehensive and nuanced identification of potential barriers and enablers that may be imperative to address during implementation of an intervention. More importantly, CFIR considers patient (user) needs as a key implementation aspect in one of its domains—the outer setting (Nilsen, 2015). This recognition of patient or user needs is important for this dissertation as the design and implementation of the birth companion program in Tanzania was driven by a human-centered approach, which promotes the needs of users in program design and implementation. Moreover, birth companion programs are multilayered. They therefore require a multifaceted framework such as the CFIR that allows the explanation of how multilevel factors and range of stakeholders can affect program implementation.

The CFIR has been adapted and used to explain implementation factors in maternal health before (Cole et al., 2018; Rankin et al., 2016; Warren et al., 2017). Likewise, the CFIR was used in this dissertation mainly to structure the literature review on birth companionship as well as the analysis of data because CFIR can be used as a guide for data analysis, interpretation, and reporting of findings linked with implementation (Kirk et al., 2016). It was assumed that the

adaptation of the CFIR will give a deeper understanding of implementation factors, thereby improving birth companion programs in contexts similar to the two health facilities in Dar es Salaam, Tanzania.

The CFIR was developed by Damschroder and colleagues (2009) from a compilation of 20 sources derived from 13 scientific disciplines (Damschroder et al., 2009; Safaeinili et al., 2020). The CFIR is comprised of 39 constructs grouped across five main domains (illustrated in Figure 8 below) that influence implementation and implementation success (Damschroder et al., 2009; Kirk et al., 2016).

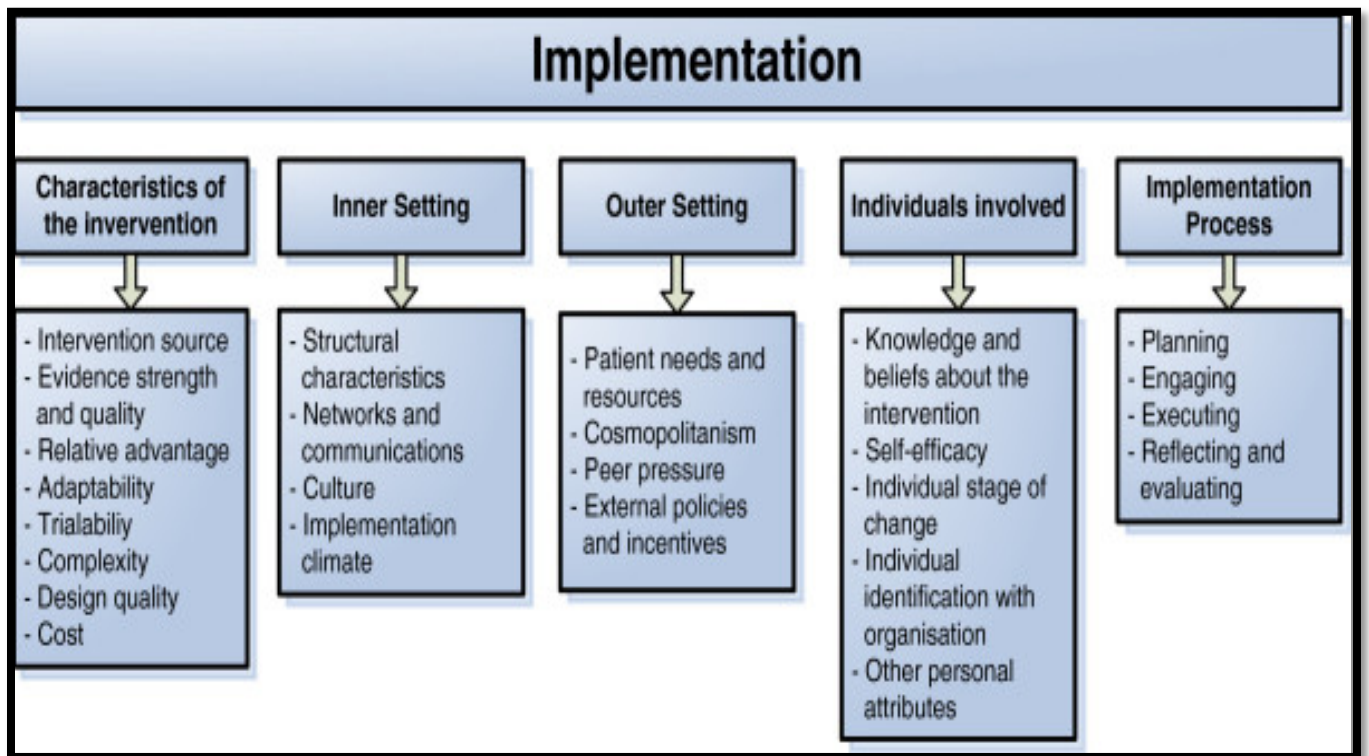


Figure 8: The Consolidated Framework for Implementation Research (CFIR)

Source: (Mc Hugh, n.d.)

Damschroder et al. (2009) describe the five domains and their underlying subconstructs as follows:

1. *Intervention characteristics*: This includes key stakeholder perceptions of the origins of the intervention, such as whether it was locally or externally developed. This domain also includes stakeholder perceptions of evidence quality and strength of the intervention, relative advantage, adaptability, trialability, complexity, design quality and packaging, and cost.
2. *Outer setting*: These are external stimuli that impact intervention implementation, including the degree to which patient needs as well as barriers and facilitators to meet those needs are properly known. The outer setting also consists of resources, cosmopolitanism, or the extent to which the implementing organization networks with other external organizations, succumbs to peer pressure, conforms to external policies and use of incentives.
3. *Inner setting*: These are internal factors of the implementing organization. These include structural characteristics like the years of operation of the organization, networks and communication structures within the organization, organizational culture, compatibility and relative priority of the intervention, goals and feedback structures, leadership engagement, readiness for implementation, and the general implementation climate.
4. *Characteristics of individuals*: These are the individuals' attitudes, beliefs, knowledge, personal attributes. This domain also includes how the different individuals identify with the organization, and the value placed on the individuals by the individuals
5. *Process of implementation*: These are the four key phases of implementation, namely planning, engaging key individuals or champions who have the power to influence others,

executing, and reflecting and evaluating on the progress and quality of the implementation process.

The CFIR is not prescriptive; rather, it is a guide and an overarching typology for its users. Damschroder and colleagues (2009) noted that users of the framework can choose constructs from the CFIR that are most pertinent to their specific studies and use these constructs as aids in explaining research findings. As such, the CFIR was used to structure the literature review on birth companionship as well as the analysis of the data (Damschroder et al., 2009; Kirk et al., 2016).

Chapter 4: Research Design and Methodology

4.1 Research design

This dissertation reviewed two data sets through an implementation research lens since it sought to explore the utility of a widely recognized approach in practice as well as factors influencing the implementation of an intervention. Eccles and Mittman (2006) defined implementation research as “ the scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice, and, hence, to improve the quality and effectiveness of health services” (Eccles & Mittman, 2006, p. 1). Implementation research (IR) utilizes qualitative or quantitative methods, or both, in its application, although qualitative methods are widely used in IR because of its emphasis on experience and human behavior (Palinkas, 2014; Qualitative Research in Implementation Science (QualRIS) group, 2019).

The two data sets reviewed in this dissertation largely employed a descriptive qualitative design approach to explore HCD and understand factors influencing implementation of a birth companion model that was developed using the HCD approach. The first data set, which sought to critique and understand the HCD approach, employed qualitative research. The second data set, which examined factors influencing implementation, largely used qualitative research methodology but had a small quantitative component of exit surveys with women after delivery. This dissertation, however, focused solely on the qualitative components of the study, as the data derived from the qualitative methods helped answer the research questions of this dissertation. The data set to understand the HCD process was collected between December 2019 and February 2020. The second data set was collected between January 2019 and December 2019.

The qualitative research paradigm is characterized by methods that aid in answering questions about participants' experiences, perceptions, feelings, and meanings they attach to phenomena (Hammarberg et al., 2016). Although it is often criticized for lacking predictive power and certainty (Bryman, 2008; Hammarberg et al., 2016), it has utility when going for depth and detailed analysis of phenomena, as it permits the investigation of complex contexts (Mutanga, 2015; Strauss, 1987). Qualitative research is also immersive and iterative in nature and therefore permits a detailed understanding of the dynamics and complexities of everyday life (QualRIS, 2019). These characteristics of qualitative research were salient for this dissertation, particularly given the composite and interactional attributes of several factors that influence implementation of birth companion programs and the complexity of HCD application in global health. More importantly, qualitative design values the context in which the study is situated to gain a comprehensive understanding of the social world (Mutanga, 2015). Understanding both the implementation factors and reflection on the HCD process requires a detailed comprehension of the context in which the program is implemented and the HCD process is undertaken. Qualitative design methodology has been used successfully in maternal health in the development of tools using the HCD approach in Uganda and Nigeria (Salgado et al., 2017) and in the development of MNCH programs using HCD in Ghana, Sierra Leone, and Nigeria (LaFond & Davis, 2016; Kanagat & Lafond, 2018; Davis & Lafond, 2016). Similarly, qualitative research approaches have also been used to explore facilitators and barriers to implementation of programs in mental health (Whitley et al., 2009) and primary health (Malham et al., 2017; Sims-Gould et al., 2019).

4.2 Methods

4.2.1 Data Collection to reflect on the HCD Process

The first data set was collected to critique and reflect on the utility of the HCD approach in the design and implementation of a birth companion program at Tandale Health Center and Mwananyamala Referral Hospital in Dar es Salaam, Tanzania. More specifically, the first data set explored the power dynamics, decision-making processes, inclusion, and other key learnings encountered during the process. The methods and the participants involved in this data set are illustrated in Figure 9 below.

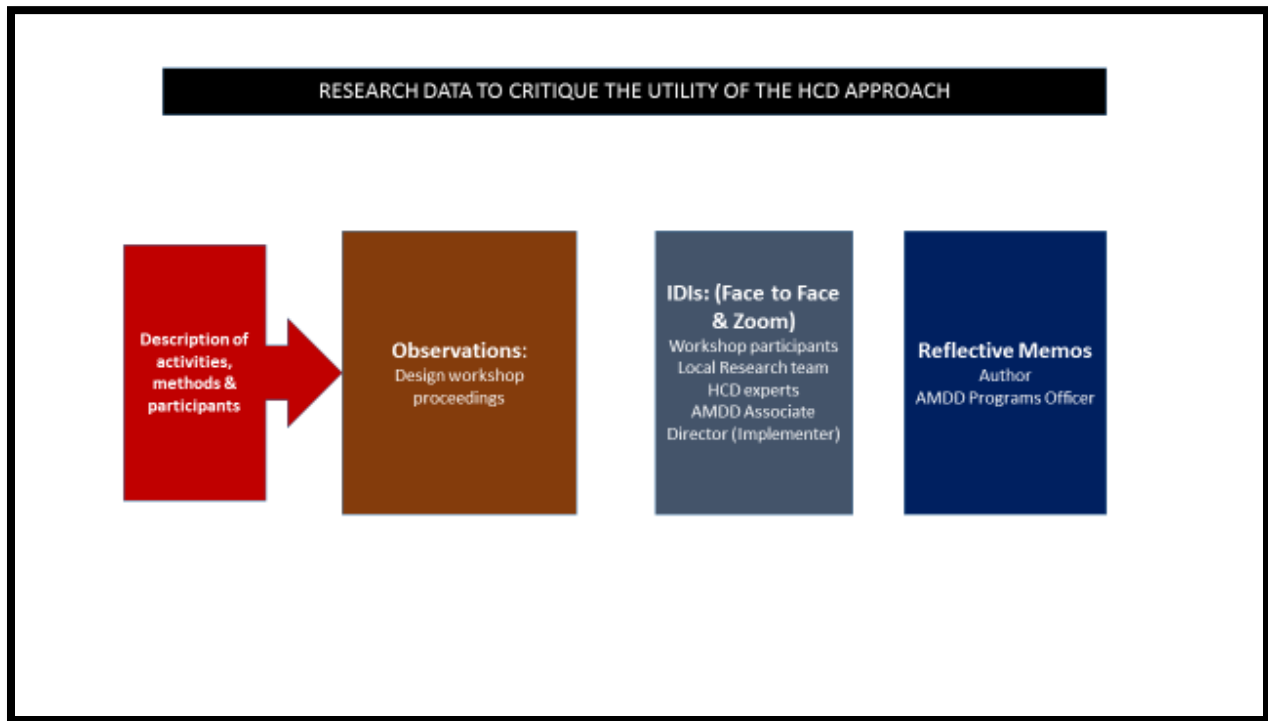


Figure 9: Data Collection on utility of HCD approach

4.2.1.1 In-depth interviews

In-depth interviews (IDIs) were a key methodological resource for this research data set as they allowed a detailed understanding of the participants' experiences with the HCD process from a personal perspective (DeJonckheere & Vaughn, 2019). The interview guide contained mostly questions adapted from the CSH framework but also contained other questions that probed on other key learnings of the HCD process. The *priori* questions from the CSH framework allowed for a more focused exploration of the HCD process, particularly questions on power, decision-making, and inclusion. Although the interview guide directed the interviewing process, researchers were open to other emerging issues as the interview developed. Additionally, the in-depth interviews allowed for further probing and questioning, resulting in clear and rich narrative accounts of the process.

These interviews were conducted face to face (n=7) and online using the Zoom platform (n=6) and occurred in the participants' own settings. Seven participants who were interviewed face to face were interviewed in their own offices, while the other six participants were interviewed online from their homes. The online interviews, though challenging due to internet issues in some instances, proved valuable and cheaper as they allowed data collection with participants from different geographical locations at a low cost. Online interviewing also allowed for follow-up with participants for clarification on ambiguous issues.

Three of these interviews were conducted in Swahili by one of the local researchers, audio-recorded, transcribed, and translated into English by a research assistant. The author conducted four face-to-face interviews in English with the other remaining participants. The author also conducted virtual interviews in English via Zoom with the local researchers (n=3), the design experts (n=2), and the AMDD Associate Director, who, in this case, was the

implementer, totaling 13 interviews. The interviews were transcribed by the author and a research assistant.

4.2.1.2 Observation of the Workshop Proceedings

During the ideation workshops, data to explore how the HCD workshops progressed were collected through observations. More specifically, the author observed how the participants related to and interacted with one another and the materials provided during the process, and how local facilitators (who also made up the research team) interacted with the HCD experts. During the observations, there were also opportunities for the author to interact with participants and ask questions. Answers were recorded as researcher notes and were also included in the final analysis of the data. The observations offered valuable data that participants may have been unwilling to share in an interview, such as some of the palpable tensions that occurred during the workshops.

4.2.1.3 Reflective/Field Notes

Throughout the duration of the three phases of the HCD process, the author kept a journal in which she noted down activities and events observed and informal discussions that occurred during the process (Kawulich, 2005). The author also used reflective notes on the HCD approach provided by an AMDD staff member. The notes documented feelings and reflections on the HCD approach as it was applied in the birth companion pilot. While reflective notes are subject to research bias, they provided important data on context, non-verbal cues from participants, and informal discussions that assisted in supplementing other available data.

4.2.2 Data collection process for HCD process

The second data set used secondary data collected by AMDD from different participants during the three phases of the HCD approach, namely the inspiration, ideation, and

implementation phases. The data were collected by AMDD as part of the three-stage HCD process that guided the design and implementation of a birth companion program at Mwananyamala Referral Hospital and Tandale Health Center. The main goal of AMDD was to co-create a birth companion model that responded to the context and needs of women, considered health provider expectations and concerns, and adhered to and observed Tanzania's health system requirements. The AMDD research objectives that informed the data collection process were as follows:

1. To determine which birth companion model would be feasible and acceptable in the Dar es Salaam context, and what steps must be taken to introduce this model in public health facilities.
2. To establish whether the resulting intervention increases respectful maternity care (RMC) and improves women's experiences of care during childbirth.

As the HCD process unfolded, it provided information for the second objective of this dissertation that sought to understand the factors influencing implementation of a birth companion program. Several factors affecting the implementation of the birth companion model surfaced through an investigation of which birth companion model would be feasible, acceptable, and the steps taken to roll out the model. Although these factors were not the key objective for AMDD research, they were relevant to this dissertation and hence were analyzed using the CFIR framework as a guide.

AMDD used several methods to collect data during the three phases of the HCD process. These methods are presented in Figure 10 below.

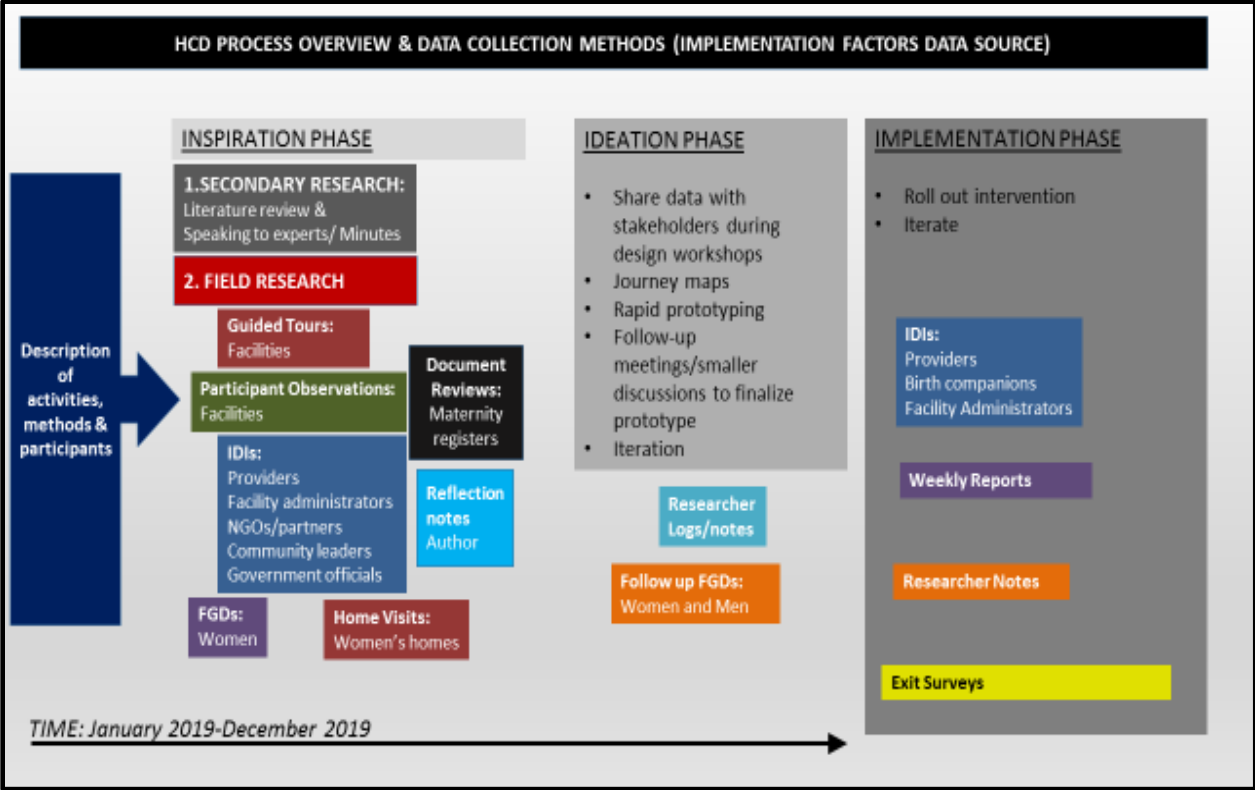


Figure 10: Overview of HCD process and Data Collection

4.2.2.1 Inspiration phase

During the inspiration phase, AMDD conducted a detailed data mining exercise of existing global literature on birth companions to gain a better understanding of what current models exist, how they were designed, and how they were implemented. This resulted in a literature review that helped structure the questions for the interview guides, guided tours, and observations. The AMDD research team also conducted meetings with experts from the MoHCDEC and other partner organizations to get a sense of the context and perceptions of birth companions. The local research team documented the minutes of these meetings, which were used in this dissertation as they provided valuable information on stakeholder perceptions on birth companion programs. AMDD also conducted field research which investigated the needs

and lived experiences of all potential “users” of the program. The field research explored the users’ home and work environments as well as their concerns, fears, hopes, and preconceptions of birth companion programs. AMDD identified women, their families and communities, health care providers, and facility administrators as users of the birth companion program and core participants in the HCD process. The specific objectives of this phase were twofold:

1. To explore the needs, expectations, and experiences of women as they interact and come into contact with the health system at Mwananyamala Referral Hospital and Tandale Health Center.
2. To explore the health providers’ work environments, resources, interactions with women, and perceptions regarding implementation of a birth companion program in their facilities.

AMDD employed several qualitative methods illustrated in Figure 10 above to understand women’s needs, expectations, and experiences. Women were asked during focus group discussions (FDGs) and during home visits. The focus group discussions were useful in that they permitted the researchers to probe into the women’s thoughts, feelings, and general perceptions, resulting in rich narratives of their experiences and expectations. The research team also immersed themselves into the lives of the women through home visits, which enabled researchers to observe how women and their families live and interact with one another, what support systems are available, and who in the woman’s network provides support and could potentially be a birth companion. During the focus group discussions and home visits, researchers also used photo elicitation exercises to stimulate women’s thinking, feelings, and memory. Visual images spark deeper components of human consciousness compared to words, and therefore elicit more and different information that enriches the interview/discussion (Glaw

et al., 2017; Harper, 2002). As a result, the photo elicitation exercise allowed the research team to delve deeper into issues including how women wanted to be supported and by whom (which also uncovered issues around privacy, confidentiality, and cultural pressure). During the home visits, women engaged in an influence mapping exercise which helped the research team understand the decision-making pathways associated with childbirth and potential companions from their social networks. Influence mapping diagrams assist in exploring and visually illustrating how different individuals influence decision-making (Mayers & Vermeulen, 2005).

The local research team also used in-depth interviews to explore health providers and facility administrators' perceptions of birth companions as well as to understand the work environments of both facilities. The research team also used guided tours and observations to understand the experiences of health providers as they interacted with their environments and women who accessed facilities. The author sat for four to five hours observing at both facilities (although unfortunately no women came into the ward during the Tandale observation). These methods provided a rich understanding of the physical infrastructure and layout in both facilities, how providers navigated their work space, and what the cultural norms were within the facilities. The immersive methods also revealed how providers normally interacted with women in the maternity ward. Lastly, the researchers conducted a document review process and looked at maternity ward registers to track where women who visited both facilities were coming from. The data from the registers assisted the team in identifying potential antenatal clinic sites for awareness-raising about the program. Table 2 below shows the data collection methods.

Table 2: Data collection methods during the Inspiration Stage

Data collection method	Number
FGD with women	2
Home visits	2
IDI with health providers	5 + 2 administrators
IDI with community leaders	2
Facility tours	4
Maternity ward observations	2
Maternity ward register review	2

The Tanzania research team conducted the data collection in Swahili, and audio-recorded for reference in case they needed clarification on the interviews as the interviews were summarized as field notes. One researcher conducted the interviews in Swahili, while the other researcher summarized the interviews in English concurrently. The summarized interviews were then shared with the author for technical editing on grammar and coherence. The author then shared again with the local research team to ensure her editing was consistent with the interview data. Any misalignment with the interview data was subsequently corrected by the research team before storing the summaries into the research database.

4.2.2.2 Ideation phase

The ideation stage consisted of reflections and synthesis of data collected during the inspiration stage so as to frame insights that informed the design of the birth companion model. The research team and the design experts refined these insights into an “experience pathway” or “journey map”—a timeline illustrating the woman’s journey on her current experience and

interactions with the health system from ANC through PNC. The experience pathway underscored critical contact moments referred to as touchpoints. The touchpoints included “pain points” (negative encounters that caused emotional or physical pain) and “opportunities” (any aspects of the childbirth environment or experience where birth companions might be able to help or provide support). The journey map provided consolidated evidence of the value of having companions, which was further analyzed to provide more data on factors influencing implementation. The research team also gathered additional data using five FGDs with women (segmenting Muslim and Christian women, first-time mothers, and expectant mothers) and men to share the ideas generated during the workshop and elicit contributions to the development of a potential birth companion model. The women and the men provided additional ideas on the overall benefits and challenges of a birth companion program, as well as specific inputs relating to some of the issues raised during the design workshop, such as whom they would want as a birth companion, how they would want to be supported, and what privacy meant to them. These data were also included in the second data set and were further analyzed to address the second objective of this dissertation. The FGDs were conducted by the Tanzania research team in Swahili. Extensive field notes were taken and summaries were written in English and followed the same editing process previously discussed.

4.2.2.3 Implementation Phase

This stage involved the piloting of the agreed upon birth companion model that emerged from the design process. The model was launched over an eight-week period at both facilities with ongoing iteration and refinement. To better understand women and birth companions’ experiences, the research team interviewed 75 women using structured exit interviews throughout the piloting phase (although these were not included in this dissertation).

Additionally, 37 birth companions were asked in a mini survey to share their experiences of being birth companions. All interviews were conducted by the Tanzania research team in Swahili, and responses were entered into an electronic database in English for all team members to review. These interviews with birth companions provided additional data on factors influencing implementation and were included in this dissertation. Additional data included in this dissertation include weekly reports on the implementation proceedings from the research team as well as research notes documented by a research assistant in English.

4.3 Study Location of the HCD process

All three stages of the HCD process for this birth companion program occurred in Dar es Salaam, Tanzania. The implementation sites for the outcome birth companion model were two health facilities in Dar es Salaam, Tanzania: Mwananyamala Referral Hospital and Tandale Health Center. The HCD process centered on these two facilities, therefore most data collection occurred within and around these facilities. During the inspiration stage, data were collected from health providers and facility administrators from the two health facilities. Data were also collected from women and community leaders living within the two facilities' catchment areas.

During ideation, HCD experts and the local research team met in Tanzania at the ICAP offices and synthesized data collected during the inspiration stage in preparation for the design workshops. The design workshops were held at Protea Courtyard in Dar es Salaam, Tanzania. Development of the prototypes that were later implemented occurred mainly at the ICAP offices in Dar es Salaam, Tanzania with ongoing iteration and interaction with design teams (a group of health providers from both facilities who were selected to spearhead the co-creation and implementation of the birth companion model) from both facilities.

Once a birth companion model was developed, the local research team, HCD experts, and the AMDD staff piloted the model at the two facilities. The two urban health facilities were purposively sampled. Firstly, maternal mortality is higher in urban areas of Tanzania than in rural areas (MMR: 432 vs. 336/100,000 live births) (Levira & Todd, 2017) despite the fact that urban areas have better access to facilities and drugs, suggesting many problems may be rooted in poor quality of care (QoC) (Levira & Todd, 2017). Secondly, the two facilities were purposively selected because their characteristics met some of AMDD's specific objectives. Mwananyamala was selected because it is one of the referral facilities in Kinondoni, which experiences high volumes of deliveries. Tandale Health Center was selected because it is a low-level health center in Kinondoni municipality that refers to Mwananyamala Referral Hospital. It was essential to include a lower-level facility that feeds into Mwananyamala to ensure consistency in the provision of birth companionship across the two facilities.

Mwananyamala Hospital is a regional referral hospital located in the Kinondoni District, serving a catchment population of 2,226,692 (Marwa & Anaeli, 2020). The hospital has a 264-bed capacity, with 63 of those beds in the maternity ward. Of these 63 beds, 26 are in the antenatal ward, 16 in the delivery rooms, and 21 in the postnatal wards (Mwananyamala Facility Guided Tour Report, 2019). Between 800-1200 deliveries occur at the hospital monthly. It receives women from all over the Kinondoni district and from outside its catchment area. As a referral center, the hospital does not provide antenatal care services but caters mostly to women who have been referred from satellite facilities due to pregnancy-related complications. The facility, however, also receives many women who self-refer, leading to high volumes and congestion at the maternity ward (Mwananyamala Facility Guided Tour Report, 2019).

Tandale Health Center is also located in Kinondoni District and serves a catchment population of approximately 29,846. It is one of the satellite centers that refers complicated cases to Mwananyamala Hospital. According to the facility records, the maternity ward has eight beds, three in the antenatal ward, two in the delivery room, and three in the postnatal ward. As a health center, Tandale provides ANC services to women and their partners from around its catchment area including Manzese, Mabibo, and Tandale. Between 100-120 normal vaginal deliveries (NVDs) are performed at the facility monthly, although the providers manage a few cases of vacuum-assisted deliveries (Tandale Facility Guided Tour Report, 2019).

Data collected to reflect and critique the HCD approach were drawn from participants from the two facilities, district level managers from Dar es Salaam, the local research team, the AMDD program director, and the HCD experts who took part in the HCD process in Tanzania.

4.4 Selection of participants

4.4.1 Selection of participants for reflection of the HCD approach

The author purposively selected a group of participants in order to understand and critique the HCD approach as it was applied in the development and implementation of a birth companion program in the two health facilities. All participants were purposively sampled and 13 participants were included in this data set. Purposeful sampling techniques were suitable because they permitted the researcher (author) to deliberately engage a population that provided specific information because of their knowledge and experiences of the phenomenon that was under investigation (Creswell and Clark, 2011). It was imperative to include participants who had participated in the design workshops and those who were part of the design teams in the two facilities.

The 13 participants included the three local research team members, one program director from AMDD (the implementing team), the two design experts hired by AMDD (Sonder), and seven participants who participated during the ideation and implementation stages. Prior to data collection, the initial plan was to conduct 15 interviews with workshop participants and six interviews with the three local researchers, two design experts, and one AMDD manager so as to reach a sample size of 15 or above as recommended by Beaux (1981). However, it was difficult to get a hold of some workshop participants such as doctors and district level managers due to the demanding nature of their work. Nevertheless, the author decided that the 13 participants were adequate based on Guest et al., who statistically demonstrated reaching saturation within the first 12 interviews (2006).

4.4.2 Selection of participants for the HCD Process (factors influencing implementation)

During the inspiration stage, AMDD purposively recruited the following groups of study participants: [1] women who had given birth at Mwananyamala Hospital and Tandale Health Centre in the past year; [2] health providers who worked in the labor, delivery, and postpartum wards; [3] community leaders; [4] and members from the council health management team (CHMT). Participants were also purposively selected during the ideation stage to participate in the workshops that led to the creation of a birth companion model that was implemented at Mwananyamala Referral Hospital and Tandale Health Center. These included health providers, the health facility administrators (managers), women, district health managers (CHMT), and community members (which included community leaders). Some of the providers were the same providers who were interviewed during the inspiration stage. The women who

participated in this phase were categorized into four groups: first-time mothers, first-time expecting women, Muslim women, and Christian women.

4.5 Ethical Considerations

The National Institute for Medical Research (NIMR) in Tanzania and the Institutional Review Board (IRB) of Columbia University in the City of New York approved the pilot study. Further modification of the Columbia and NIMR IRB were sought to receive permission to interview and observe other participants not covered in the initial IRB submissions, such as the design teams and researchers.

All research participants were informed of the purposes of the research before obtaining their consent to participate in the study. Study participants for this study were 18 years of age or older. Participants were also informed that they could drop out of the study, without any prejudice or any harm inflicted on them by researchers. All participants' identities remained confidential during the duration of the study. Data were stored confidentially on secure, encrypted computer endpoints at Columbia University Mailman School of Public Health.

4.6 Validity and reliability

This dissertation's evaluation criteria were based on the epistemological assumptions of qualitative research rather than the precepts of quantitative research. As such, alternative terminology was used to describe concepts of validity, reliability, and generalizability associated with quantitative research (Noble & Smith, 2015). This dissertation employed the alternative criteria provided by Lincoln and Guba (1985) cited in Noble and Smith (2015) to demonstrate rigor within the qualitative paradigm, namely truth-value, consistency, transferability, and confirmability.

The research team, author, and AMDD program staff ensured the consistency (reliability) of this study by collecting data using multiple methods. Data were triangulated, and inferences were made on the different data sets to see if parallel conclusions were drawn (Yin, 2014). Furthermore, the author kept a reflexive journal documenting insights, interpretations, and reactions during the time she was in Tanzania. Lastly, the author established consistency through an ongoing discussion of emerging themes with the research team members to reach a mutual agreement or challenge any assumptions (Noble & Smith, 2015).

Reflexivity, peer debriefing on emerging themes, and data triangulation established the credibility or truth-value (internal validity). The author also sought and read additional literature that deepened her understanding of the implementation sites' context. Translation of data from Swahili to English was done by a team of experts fluent in both languages such that no original meaning of the data was lost. The research team leaders in Tanzania, competent in both languages, cross-checked the transcripts to confirm or refute the accuracy of the translation. The author also increased validity through clear recording of interviews and ensured high-quality transcription and translation by enlisting skilled transcribers and translators.

Although external validity is difficult to establish in qualitative studies, the strategic selection of cases increased the transferability (generalizability) of this study (Yin, 2014; Flyvbjerg, 2006). Flyvbjerg (2006) argues that random sampling precludes the achievement of gleaning the richest and highest quality data on a given phenomenon. Through a rigorous focus on "strategic" cases, complete enlightenment of phenomena under investigation is probable, enabling researchers to draw inferences from this single case about other settings (Flyvbjerg, 2006; Gerring, 2004; Yin, 2006). Also, detailed descriptions of the two health facilities and the study participants were provided by the author of this dissertation. Future researchers may draw

similarities from the setting and participants to see if they can infer findings from this study into their own settings.

4.7 Data Management

4.7.1 For reflection of the HCD Approach

Data collected to reflect on the HCD process in Tanzania were audio-recorded and stored on a password-protected computer. A research assistant transcribed and translated into English all interviews conducted in Swahili. All interviews conducted through the Zoom platform were stored in a cloud and transcribed by the researcher (author) and a research assistant. All data were de-identified, and the author provided pseudonyms for real names to protect the confidentiality of the respondents.

4.7.2 For the HCD process that informed the factors influencing implementation

All interview data collected during the inspiration stage were audio-recorded and downloaded onto password-protected computers. However, due to funding limitations, data were not transcribed verbatim; instead, one of the local researchers wrote down the key points of the interviews, translated them from Swahili into English, and summarized them into notes. In some instances, the researcher included some quotes to enrich and provide more nuance to the notes. Data collected from FGDs during the ideation stage were also summarized into notes and translated into English from Swahili. Data collected from birth companions during the implementation stage were transcribed verbatim and translated into English. All research field notes, photos, reflective notes, meeting minutes, guided tour reports, observation reports, and weekly reports were documented in English by the research team and the author. All data were stored in password-protected computers and a Dropbox cloud accessible only to the research team.

4.8 Data Analyses

Data analysis was twofold as the author analyzed two different data sets. The author first analyzed the data set for the AMDD study (HCD process), which aimed at creating and piloting a birth companion model that met the needs and expectations of the targeted users. This data set was then analyzed by the author as secondary data to meet her objectives of investigating factors influencing implementation of the birth companion program in both facilities. The author then analyzed the data that critiqued the HCD approach, as data for this objective was collected a bit later than the data set for implementation factors. The analyses are therefore presented according to the order in which the data were analyzed.

4.8.4 Data Analysis for factors influencing the implementation process

The author used the framework analysis to analyze data gathered to understand the factors influencing implementation. Ritchie and Spencer (1994) developed the framework analysis, which is increasingly utilized in social and health science research as an analytic approach (Parkinson et al., 2016; Ritchie & Spencer, 1994; Srivastava & Thomson, 2009). Framework analysis is also commonly used for qualitative data in implementation research (QualRIS, 2019). This analysis employed the CFIR as an analysis framework, which has been widely used to analyze data in public health (QualRIS, 2019). The analysis followed the stages proposed in the framework analysis: familiarization, identification of a thematic framework, indexing, charting, and mapping and interpretation (Ritchie & Spencer, 1994; Srivastava & Thomson, 2009).

Firstly, the author familiarized herself with the data by going through the field notes, summarized interviews, transcripts, observation reports, reflective notes, and products from the imagine workshops (i.e., journey maps). Throughout this process, the researcher kept a notebook

in which she wrote down her preliminary thoughts and impressions of data, which aided in the coding later on. Afterward, the researcher pulled up 10 transcripts (summarized notes) and did a line-by-line coding to identify emerging themes (Dare, 2018; Parkinson et al., 2016). These emerging themes arose from a priori themes guided by the pre-identified CFIR framework. However, the researcher allowed the data to dictate the themes by using the notes taken during the familiarization stage.

Secondly, the author deductively charted the identified concepts and themes against the CFIR domains and constructs, leading to a more systematic data classification. During this process, the researcher kept an open mind regarding any emerging themes that would not fit within the CFIR framework. However, all themes had been identified earlier during the familiarization phase, and the framework phase aptly fit into the CFIR. This is because the CFIR is a broad framework with several sub-constructs under its five main domains, making it a comprehensive framework that can fit numerous themes. Thus, the CFIR remained as is without including any additional constructs that are not part of the standard CFIR domains and constructs.

Thirdly, the researcher engaged in data indexing, which involved organizing the data into the CFIR domains and constructs. This involved the systematic application of the CFIR to each data source, i.e., interview transcripts, observation notes, field notes, etc. (Ritchie & Spencer, 1994). The researcher went through the text from all data sources, highlighted a portion of the text, and decided which domain and construct to assign the text (Parkinson et al., 2016).

Fourthly, after indexing, data charting occurred, which involved summarizing the data by CFIR domains and sub-constructs from the transcripts and notes. Data summarization involved striking out repetitive themes and combining similar themes to a category that shared a standard

domain, while at the same time retaining the original meaning and feel of the participants' words and observers' narratives (Gale et al., 2013). This process was done to reduce redundancy and repetition of themes that infer the same meaning. Once the data had been summarized and categorized, the researcher added illustrative quotations or excerpts from the notes to enrich and support the respective domains and sub-constructs.

The last stage involved mapping, understanding, and interpreting the data. This involves pulling together the data's chief characteristics and interpreting it as a whole (Gale et al., 2013; Parkinson et al., 2016; Srivastava & Thomson, 2009; Ritchie & Spencer, 1994). To do this, the author used the constant comparison approach by comparing the different themes across the domains and sub-constructs. This enabled the identification and establishment of relationships, identification of leverage points for intervention and practice, and development of explanations (Gale et al., 2013; Parkinson et al., 2016; Srivastava & Thomson, 2009; Ritchie & Spencer, 1994).

4.8.5 Data Analysis on the reflection of the HCD approach

Data analysis to reflect on and extract key learnings from the HCD process as it was applied in the development of a birth companion model was twofold. Firstly, it was guided by the CSH framework and therefore employed a framework analysis approach to understand power dynamics, who the targeted audiences were, and decision-making pathways. The framework provided a priori codes for the aforementioned themes, but also made it possible to critique the data as it enabled an assessment of "what is" (what actually happened) versus the ideal (what ought to be). This comparison made it possible to identify whether the HCD process (as it was conducted for the birth companion program) stuck to its core characteristics, especially regarding

empowerment, justice, and equal decision-making according to the characteristics that surfaced in the review of the evolution of HCD.

Secondly, the author engaged in a thematic analysis of the transcripts to identify other key learnings from the data, external to the CSH framework. The thematic analysis involved all the steps discussed for the framework analysis⁹ as there are similarities between framework analysis and thematic analysis, except that the author did not use an a priori framework. The final code list from the thematic analysis included inductively-derived codes. Both the inductive codes and the themes that emerged from the comparative analysis guided by CSH were later combined, mapped, and interpreted to describe the learning experience from utilizing HCD in program design and implementation.

These analyses for both data sets were computer-aided using QSR NVIVO® software for qualitative analyses version 11. The author also frequently discussed most of the themes with the Tanzania research team, AMDD staff, and one HCD expert involved in the project. This deliberation with the team assisted in clarification of themes until consensus was reached.

⁹ Some authors consider the framework analysis a variation of thematic analysis (QualRIS, 2019).

Chapter 5: Findings

5.1 Findings on the reflection of the HCD Approach

This section of the dissertation shows the key findings on the application of the human-centered design approach in creating a birth companion model in Dar es Salaam, Tanzania. Tables 3-6 provide summaries of some of the findings associated with decision-making, power dynamics, and inclusion of targeted users during the creation of the birth companion program. Using CSH as an analytical framework, the findings of this section were summarized under the “IS” mode of the four main categories and the 12 boundary questions that constitute the framework. The “OUGHT” mode is the ideal mode of what the HCD approach ought to do. The author critiqued the "IS" against the “OUGHT” to evaluate the HCD process by using a table format replicated from Ulrich (2009). The descriptions of the 12 CSH boundary questions were, however, reproduced and adapted from CSH of co-creation by Nicholas et al. (2019). This analysis helped in answering the research questions below:

- a) How and where were the needs and desires of intended users captured and considered during the whole HCD process? [The *source of motivation, source of expertise* and *source of legitimacy* boundary sections from the CSH framework helped in answering these questions.]
- b) How were final decisions made, by whom, and for whom? How was consensus reached? [The *source of power/control* boundary section from the CSH framework helped in answering these questions.]
- c) What lessons were learned from the utilization of the HCD approach in program design and implementation of the birth companion program in Dar es Salaam,

Tanzania? What were some of the challenges and benefits experienced in the utilization of the HCD process?

Source of Motivation

Table 3: CSH Source of Motivation Summary

		Social roles	Role-specific concerns	Key problems
Sources of Motivation	“Ought”	<p><i>Beneficiary</i></p> <ul style="list-style-type: none"> • Women are the primary users of the birth companion project. • Other key stakeholders also affected by the project and those likely to be important in using insights from the intervention. • Making beneficiaries equal partners in the co- 	<p><i>Purpose</i></p> <p>The goal of co-creation and HCD is to create collaboration and synergy among different stakeholders. That is the bringing together of perspectives to achieve some purpose in ways that will deliver benefits to intended users.</p>	<p><i>Measures of success</i></p> <p>The degree to which the participants value working together in creating a birth companion model that is contextually feasible and acceptable.</p> <p>Stakeholder perceptions of what constitutes success or an improvement brought about by the outcome of</p>

		<p>creation of the birth companion program to provide them with the opportunity to shape and benefit from the program.</p>		<p>having an HCD-inspired birth companion model.</p>
“Is”	<ul style="list-style-type: none"> ○ Women were the targeted beneficiaries of the birth companion program. ○ Health providers became an important group as they were the contact persons with the women and worked in facilities 	<ul style="list-style-type: none"> ○ Different stakeholders worked together to co-design a birth companion model that would improve the experience of care for women during childbirth at 	<ul style="list-style-type: none"> ○ Participants valued the collaborative work they did together especially during the workshops ○ Acceptance and appreciation of birth 	

		<p>in which the program would be situated.</p> <ul style="list-style-type: none"> ○ Women and providers were all included in the co-creation of this birth companion program. Their views and opinions shaped the creation of the birth companion model implemented in the facilities. 	<p>the two facilities. These included providers, district health managers, community leaders, men, women, and a program manager from a technical working group.</p> <ul style="list-style-type: none"> ○ Providers and women did not meet in one setting to co-design because of the power differences that existed between the 	<p>companion services by stakeholders</p> <ul style="list-style-type: none"> ○ Institutionalization of the birth companion program by both facilities ○ Co-creation of a companion program that was feasible and catered to user needs ○ Improvements in privacy ○ The strengthened relationship among stakeholders
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			<p>two groups. The design experts recognized this power dynamic and created spaces to capture women’s needs and their feedback, which were included in the design solutions.</p>	<ul style="list-style-type: none"> ○ Implementation of birth companion program with few resources and no renovations
	<p>Critique “is” against “ought”</p>	<p>Although women were the primary users, providers became the key stakeholders who developed and implemented the model in their facilities.</p>	<p>The methods used in the creation of the model enabled the synergy of perspectives of both providers and women.</p>	<p>Participants involved in the design workshops appreciated how they all collaborated in creating a birth companion program</p>

	<p>Women's voices were captured and included in the prototypes, but women did not directly participate in the design workshops. This was a shift from the usual way of doing HCD as providers and women did not sit in one design workshop to co-design the solutions.</p>		<p>that was feasible in their institutions.</p>
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Who should benefit from using an HCD approach in program implementation, and how?

AMDD defined the “users” as women, their families and communities (as potential birth companions), health care providers, and facility administrators. However, when asked, all respondents recognized the women as the primary users of the birth companion program in Tanzania, as they were the ones who gave birth unaccompanied in the two health facilities. Women’s voices and contributions were sought throughout the three phases of the HCD process; however, they did not actively participate in the actual co-design of the birth companion model. It was clear during the beginning of the data collection process that health providers held several fears and concerns about introducing a non-clinical person into their sterile environments that operated on international safety and privacy guidelines. As a result they became the key participants in the designing of the program.

“I think the end-user is ultimately the mama who is giving birth... and then the providers’ experience became very important because the providers’ fears could have prevented the whole thing from happening, so unless we addressed the provider’s fears we could not get to first base.” HCD Expert 1

“Ideally there should have been a little engagement from them [women] to really hone in on their preferences but I think the reality on the project was that they weren’t the stakeholders that needed to be convinced the most, so I think a lot of time went into engaging the health facility staff because they were the ones who were kind of the weak link, the ones who were unsure of the process, unsure of the design process so they became priority because we just needed to get them on board, and I think that the assumption was that no matter how this gets implemented, it will be a better experience for the mums than what they currently have so in that way as you build the prototype you

have to make some sacrifices and as you refine the prototype you ideally bring the mums back in and get their feedback.... as you got limited budget, limited time, limited will to implement something, I think there was need for some kind of a strategic decision to focus on the health workers because they were the ones who were more concerned with the idea so their engagement was important.” HCD Expert 2

Sources of Power

Table 4: CSH Sources of Power Summary

		Social roles	Role-specific concerns	Key problems
Sources of Power	“Ought”	<p>Decision maker</p> <p>Adopting a co-creation/HCD stance requires that decision-making is shared with other stakeholders. It is necessary to intentionally and continuously ask who the decision-maker is.</p>	<p>Resources (including policies, people)</p> <p>Access to and authority over resources should be subject to open deliberation among decision-makers and project planners.</p> <p>Transparency is essential and irrespective of who owns the resources.</p>	<p>Decision environment</p> <p>What resources, conditions, or components of the process the decision-makers should not control, from the viewpoint of those not involved.</p>

	<p>“Is”</p>	<p>There were several decision-makers in this program depending on situations.</p> <ul style="list-style-type: none"> ○ Financial decision-making was mostly done by the implementing organization, AMDD, based on the availability of funds. ○ Health facility providers and managers made certain decisions based on what they considered to align 	<ul style="list-style-type: none"> ○ There was transparency from the implementing team from the beginning that they did not have finances to remodel facilities. Though the facility managers (especially at the hospital) claimed to have agreed to this financial situation, it was noticeable in 	<ul style="list-style-type: none"> ○ Health facilities are bureaucratic entities that operate with strict rules and regulations such that there were certain situations in which they were unwilling to compromise, despite these situations stemming from what women wanted or desired (for example, the use of phones in the facility). ○ The restricted physical layout of the facility and the prevailing cultural norms on nakedness prompted providers
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		<p>with set protocols and guidelines in their respective facilities.</p> <ul style="list-style-type: none">○ Design experts controlled the workshop proceedings and methodology.○ Security personnel controlled who gets access to the facilities during non-designated visiting hours.	<p>some of their statements that they expected the restructuring of the maternity wards. In some cases, providers indicated the desire for the construction of a new ward.</p>	<p>to only allow female birth companions.</p>
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	<p>Critique “is” against “ought”</p>	<p>There were times when there were tensions throughout the process as several people made decisions that were not necessarily unanimous or liked by others.</p>	<ul style="list-style-type: none"> ○ The implementing organization, though willing to deliberate openly on the finances, had no funding for the restructuring of the facilities as their budget had reached its limits. 	<ul style="list-style-type: none"> ○ Health facility managers and providers had much control over how the model should look, despite some of their decisions going against the nature of the needs of women and their birth companions. Much of it stemmed from systemic factors such as the structure of the facilities, international guidelines on infection control, and facility culture.
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Who is in charge of what is going on and is required for success?

Tensions were noted throughout the process, as several people made decisions that were not necessarily unanimous or liked by others.

5.1.1 Providers' needs vs. Women's needs

There were instances when providers' expectations were prioritized over women's needs. For example, women consistently raised the need for and importance of having a phone with them to communicate with their families. During the inspiration stage, women expressed that they would not mind compromising with facility staff not to use the smartphones that can take photos and videos. However, the health facility managers remained obstinate on the "no use phone policy." Ultimately, providers included a no phone rule during the development of rules for birth companions. One birth companion violated this regulation, and providers immediately asked her to leave without warning:

"We have contracts that they sign after we show them the responsibilities and regulations, and it states that when she breaks the rules or regulations, she is terminated from the service she was providing and asked to leave the hospital. We stand by the contract. So the in charge of that particular time will report that she [birth companion] was either caught with a phone, taking a video or taking pictures. We have a procedure that will be followed, and she [birth companion] has to leave the Hospital." In-Charge, Mwananyamala Hospital

One facility manager and a district health manager also stated that these decisions, which might seem to go against women's needs, are created at national level by the Ministry of Health. Facilities must comply, lowering the decision-making powers of the target audience:

"The client can not be the final decision-maker, so to make something to run smoothly, all medical care is guided with guidelines provided and produced by the Ministry of Health." Facility Manager 1, Mwananyamala Hospital

"That one should be done by the managers because after all the good ideas and suggestions the managers are between the community and the policy so there should be no conflicts between the government policy and the community needs, so the manager is the bridge, the mediator, and also he will take feedback to the community that you requested one, two, three, and four, but one-two is possible because of this and this."

District Health Manager

It was also clear that providers wanted to be in charge of the childbirth proceedings as they constantly indicated during the inspiration and ideation stages that they would want rules and guidelines in place before implementation. Some of these guidelines, such as "birth companions, should not interfere with the nurses and doctors' responsibilities," were continuously reiterated by providers. It was evident that providers felt they were ultimately responsible for laboring women once they got admitted to their facilities. One facility manager clearly stated that despite understanding women's needs, the health providers had the final say:

"I think that [tension] can not be avoided because freedom without limits is not freedom at all... This is a hospital, not someone's house; it can not be run whichever way someone thinks without protocols. There has to be ways and standard operating procedures, and they must be in alignment in what we have currently in terms of infrastructure and the kind of staff we have because those are the real implementers of the process so if you put them aside I think that will mean you are bound to fail. Women have their priorities, but if they are not aligning to the hospital and providers' priorities, that might be a bit hard."

The real decision-makers are the providers because at the end of the day they are the ones with the professional authority while the companion has the social authority than professional.” Facility Manager 2, Mwananyamala Hospital

When asked about women’s agency and birth companions advocating for the women’s choices, the same facility manager and one district health manager stated the following:

“The doctor or the midwife has the professional authority and liability for the life of the mother and the child in labor, not emotional supporters.” Facility Manager 2, Mwananyamala Hospital

“I think if there is good information about the birth companion she can take on her duties without interfering the medical activities, then we will be good because the final decision of the health of the mother is in the hands of the health care provider so if everyone takes on their roles all will be good and without complaints.” District Health Manager 2

5.1.2 Context as a deciding factor

The current working environment at both facilities prompted providers to make final decisions on the gender of the birth companions. The majority of women indicated that they would want their male partners as companions. While health providers did not have problems with male companions, the limited space in both facilities affected the privacy of the wards. This compelled providers to only allow female companions, except in one case at Tandale where providers allowed a male birth companion when the labor ward was empty. One facility manager expressed the following:

“Us as the hospital, the management team and I personally would not allow men to come here with our current settings. If it were a separate room for everyone, I would allow because we cannot allow eyes to see, and it would not be comfortable to let someone see

somebody else's wife deliver. They don't deliver with their clothes on; they have to push, and they will take them off. Sometimes I even feel uncomfortable when the students see the women, I think some are too young to see all that, but our education system lets them and it's ok." Facility Manager 2, Mwananyamala Hospital

This finding is explained in detail under the factors influencing implementation inner settings domain.

5.1.3 HCD Experts vs. Local Researchers/Facilitators (context and public health experts)

During the ideation stage, palpable power tensions were also felt during the design workshops as the design experts and local researchers (who were context and content experts) clashed over the mode of delivery of the workshops. The design workshops were fast-paced, and participants were asked to generate ideas within short time frames by the HCD experts. However, some of the local researchers who also took on the role of workshop facilitators felt that this was not the traditional way of facilitating workshops because participants were not given a chance to exhaust all their thoughts and ideas:

"The time during the workshops was too short to be realistic... if we are talking about empathy as a key component in HCD it often means you need to be a good listener, and by the time you become a participatory action facilitator you are emphasized to be a good listener, talking less and listening more... and if we are talking about HCD as a participatory approach, then empathy is associated with listening, it is associated with absorbing the story from the person you want to support and help at the end of the day. You need to get it all and not in pieces, so if you do not have enough time, then you are going to rush and miss quite a lot of things." AMDD/ICAP Local Researcher 1

The local researcher also felt that rushing participants (some of whom were high ranking officers) was not part of the Tanzanian culture, and he had difficulty trying to tell these participants to stop, in accordance with the design team's instructions. The AMDD lead program manager also recognized these tensions:

“No I think ultimately the team really did a great job, but I think the issue that I believe I have brought up in one of the documents is the real tension between what is called the African model of giving space to everyone around the table or putting the most senior person first and letting them exhaust every idea. I found that was really challenging and I think I know from multiple side conversations that our team was deeply uncomfortable with that.” AMDD Associate Director

5.1.4 Power dynamics during deliberation of ideas

During the imagine workshops and ongoing iteration exercises with providers, participants were asked to narrow down the ideas that were generated during the workshops. This process involved much deliberation and voting for the ideas to be prototyped, tested, and later implemented. Participants voted in front of each other and used red dots to indicate their choice, as illustrated in Figure 11 below. The author observed no power tensions during these exercises. However, it is essential to note that the groups included in these deliberations varied in seniority at the workplace, and this might have influenced how stakeholders made decisions. The groups included district health managers and facility managers who usually make decisions for the lower-level providers.



Figure 11: Workshop participants voting during idea selection

These power differentials later surfaced after the creation of design teams to steer the implementation process in the facilities. Design teams were comprised of mostly nurses and did not always have the important decision-makers (doctors and facility managers) on them. This was reported as follows in one of the design team meetings by a nurse:

“We missed the doctors on the design team; we did not always have the capacity... to make the decision on the design team.”

The inability of nurses to make decisions in health facilities was also expressed by one of the design experts who reflected on the nurses’ minimal decision-making power in most health projects she has worked on, including the Dar es Salaam pilot:

“One of the things that we are finding over and over again is that nurses don’t really think of themselves as decision-makers even though they are making significant decisions based on data all the time. If you ask them about the decisions that they make they say that they don’t make any decisions, and one of our findings is that when people come and evaluate them and see how things are done at the facility, they are looking for deviations from protocol, and if they find deviations from protocol, that’s a mistake, and they get punished for mistakes. So there is a negative connotation for deciding things for yourself because if someone finds out that you are making decisions for yourself, you are most likely not following protocol and that’s punishable. So nurses are not expected to make decisions. Doctors it’s a different story, doctors have protocols, but they are not evaluated on the protocol but on the health of the patient.” HCD Expert 2

This inability by nurses to make decisions about the pilot project, however, stopped once the facility managers encouraged the teams to make decisions that will make implementation easier at the facilities.

Sources of expertise

Table 5: CSH Source of expertise summary

		Social roles	Role-specific concerns	Key problems
<p>Sources of Knowledge/Expertise <i>Whose knowledge and experience should be taken seriously?</i></p>	<p>“Ought”</p>	<p>Expert Program staff and design experts should identify a variety of expertise and practice and should engage with them and plan on how to work together in the co-creation of a program (multi-disciplinary).</p>	<p>Expertise Numerous sources of knowledge and expertise should be considered. Valuable expertise may evolve as the initial group of collaborators (program staff and design experts) recognizes that crucial knowledge is absent in the program.</p>	<p>Guarantee</p> <ul style="list-style-type: none"> ○ Consensus among experts ○ The extent of diversity among stakeholders/decision-makers ○ Level of commitment to the HCD process, stakeholder participation,

			political support, transparency of intention and interests, and the experience and intuition of those involved
“Is”	Different voices were brought into the process from the start of the program until implementation. During ideation, participants were recruited for the workshops based on a structured guideline of	<ul style="list-style-type: none"> ○ Women as the ones who have the experience with childbirth ○ Providers as practice experts (mostly from the maternity wing) 	<ul style="list-style-type: none"> ○ Certain groups were not represented whose voices would have been critical during the initial process such as the OB/GYNs,

		<p>what expertise these voices brought to the table. The recruitment of the different experts was deliberated and finalized by the design experts and the local research team. The implementation team and design experts engaged the providers and offered technical support on how best to implement the program together.</p>	<ul style="list-style-type: none"> ○ Community leaders as context experts ○ District health managers as context experts 	<p>security personnel, and social welfare officers.</p> <ul style="list-style-type: none"> ○ Level of commitment varied based mostly on incentives and leadership motivation. ○ There was great appreciation by the implementation team (program
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				<p>staff and local researchers) of the high level of expertise and intuition of the design experts.</p> <ul style="list-style-type: none">○ The design experts queried transparency of intention, as facility leadership during certain times in the process showed passivity and apathy.
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<p>Critique “is” against “ought”</p>	<p>We missed some voices in the initial stages of the process; for example, we did not consider the views of birth companions before implementation. We also failed to include the security personnel, OB/GYNs, and the social welfare officers in the early stages of the program.</p>	<p>We later recognized that we missed these essential voices along the way.</p>	<ul style="list-style-type: none"> ○ The flexibility of the HCD process enabled us to incorporate and notify these essential stakeholders.
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Who, in addition to or other than the decision-makers, should be involved in the process?

Prior to initiating the HCD process, the local research team and the AMDD staff involved in the project identified most of the critical voices that helped in the design and implementation of the birth companion programs at the two facilities. These stakeholders included women, providers, district health managers, and community leaders. As the HCD process progressed into the ideation stage, the research team included one project manager from an organization that had implemented a birth companion program in rural Tanzania to participate in the design workshop. The research team and the AMDD program director felt that the program manager would be an important voice of experience and expertise. After completion of the design workshops, men's perspectives were also sought as they were considered to be critical in household decision-making, including childbirth issues. Women and providers were considered the "voices of experience," and they were the experts in providing more accurate information on childbirth. However, despite involving all these key stakeholders, certain voices should have been included earlier in the process, such as potential birth companions, security teams, social workers, and the OB/GYNs. One district health manager said the following about excluding birth companions:

"If I could advise, you need to explore more from the community, especially mothers, and if you talk to the older women accompanying mothers to get the real picture of how they are feeling. In like a very simple questionnaire of how they are feeling, who are they escorting, what do they feel they need to do, but you can't when you come with the mother. The interview could be so simple to explore the feeling sometimes you can base on the model and miss out other things." District Health Manager

During the inspiration stage, the author realized and documented that the security team at Mwananyamala Hospital was strict in controlling people who accessed the facility, even

enforcing a visitor dress code. The omission of this voice in the process later presented challenges, as security personnel chased birth companions from the hospital. This finding, although it highlighted important people excluded from the process, also uncovered the poor communication system across the different departments, especially at Mwananyamala Hospital.

Sources of legitimation

Table 6: CSH Source of Legitimation Summary

		Social roles	Role-specific concerns	Key problems
Sources of legitimation	“Ought”	<p>Witness</p> <p>Warrant the visibility and give voice to issues (or people) that have a legitimate right to be considered, and if not considered, will undermine the legitimacy of the birth companion program.</p>	<p>Emancipation</p> <p>Consider ways in which HCD and the birth companion program does not constrain participants and others affected and identify ways of improving these constraints.</p>	<p>Worldview</p> <p>A worldview that embraces the diversity of opinions and perspectives by being open and tolerant of other perspectives.</p>

<p>“Is”</p>	<ul style="list-style-type: none"> ○ The voices of women from Mwananyamala and Tandale catchment areas were captured during the discovery/inspiration phases and through follow-up discussions during the ideation stage. ○ We asked providers to identify the different types of women they serve at both facilities through an activity called segmentation. Providers identified and deliberated on the women’s needs and potential companions. 	<ul style="list-style-type: none"> ○ The design experts did not include women in the same workshops with providers and health managers, as they reasoned this would create a power dynamic between the two different groups. ○ The facility managers created design teams based on the team members’ commitment and willingness to implement the birth companion program in their health facilities. 	<ul style="list-style-type: none"> ○ Women’s voices and those of providers were all morphed into the prototypes that were developed. ○ Providers, however, had more opportunities to deliberate on the prototypes and provide feedback to the design experts and implementers.
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		<ul style="list-style-type: none"> ○ Providers identified the social welfare officer as the contact person for birth companions and women to report any mistreatment by providers. ○ Design experts and the local research team worked with the health facility managers to create internal design teams that would be the contact team to represent the providers, give feedback, and assist with implementation of the program. 	<ul style="list-style-type: none"> ○ The design team was given a monthly token for being the steering implementation team in the facilities. 	
<i>What will contribute to participants and</i>	Critique “is”	<ul style="list-style-type: none"> ○ Despite identifying different types of women who could benefit from the program, there 	<ul style="list-style-type: none"> ○ Talking to women separately and creating space for them to talk freely 	<ul style="list-style-type: none"> ○ The design solutions that emerged from the process incorporated

<p><i>affected parties' perceptions that the co-creation/design project is fair and just?</i></p>	<p>against “ought”</p>	<p>were certain social groups whose views were not sought—for example, specific populations such as commercial sex workers and the disabled. Representatives from organizations working with these social groups should have represented these women.</p> <ul style="list-style-type: none"> ○ Providers identified the social welfare officers as contact persons if women experienced problems with the providers. However, the developed guidelines did not include how women would access this social 	<p>managed to get their needs across without hesitation or fear of something they would generally consider superior and in charge of their health. Women could openly talk about sensitive issues such as disrespect and abuse without fear.</p> <ul style="list-style-type: none"> ○ Design teams often felt unsupported by other providers. The design team described how the lack of diversity in the teams interfered with implementation, as certain 	<p>most of the women's needs. However, providers were uncompromising on specific requests from women, such as the use of phones in the ward.</p> <ul style="list-style-type: none"> ○ Women and birth companions were never consulted after the creation of the prototypes to provide feedback on the model later implemented.
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	<p>worker. Also, when the local research team later spoke with the social worker, she raised many concerns that had already been addressed, such as space privacy, roles of companions, and infection control demonstrating a lack of communication across departments.</p>	<p>departments that were supposed to help them with implementation refused to take ownership. Most of these providers who were not part of the design team were reluctant to participate in the implementation because they did not get incentives as “motivation.”</p>	
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Who is (ought to be) witness to the interests of those affected but not involved?

During the ideation workshops, participants were asked to identify the different groups of women that access their facilities.

The following groups in Table 7 were identified:

Table 7: Types of pregnant women who access the two health facilities

WHO ARE THE MOTHERS COMING TO YOUR FACILITY?			
Mothers with low education level	Teenage mothers	Mothers with no relatives	Mothers with HIV
Mother's with complications	Mother's with disabilities	Deaf mothers	Mothers with addiction

Participants were able to identify the different challenges that each category of mothers faced and who a likely birth companion would be. Participants also identified the health facilities' social workers as contact persons in case women encountered problems with providers during program implementation. However, during prototyping and implementation, we did not seek representatives from some of these social groups to provide their opinions on how women could be supported. Moreover, the birth companionship guidelines that were tested and later implemented did not offer information on how these social workers would be accessed.

Apart from the a priori themes from the CSH framework identified above, other significant findings surfaced from the data, and these were classified as challenges and benefits of the HCD approach.

5.2 Challenges

There were challenges other than the ones described above that threatened and rattled the HCD process. These included difficulty in articulating the HCD process, the culture of incentives, and delays in funding.

5.2.1 Difficulty in articulating the HCD process

Although the implementing team generally understood that the HCD process involved the three stages discussed earlier in the introduction, some team members struggled with conceptualizing how the stages connected and fit together to lead to the development of the prototype:

“I think where I really stumbled was at the workshop. I think it was really difficult for me and still is for me to really conceptualize how all of those pieces fit together and I understood the outcome, I read it in the documents and I understood individually most of the activities but I felt like for me it was just this wild jumping from sequence to sequence I think it was unnecessarily rapidly put together. You know our team knew for a long time that this was happening and I think they dropped the ball on a lot of things like the direct quotes from the women the thing that to me would have made much more sort of real.”

AMDD Associate Director

The researchers also expressed these sentiments as they initially struggled with understanding the HCD process and how it differed from the usual participatory action research that they were familiar with. There was a desire from the local researcher to do things in the traditional sense of conducting research, which did not align with design research.

Palpable tensions were also observed during the workshops as the program manager who is a public health practitioner struggled with the language and ambiguity of the HCD process. One of the design experts acknowledged that she felt the tension and explained why this tension existed:

“A lot of my observations is that designers aren’t necessarily like if you compare the global health people, designers are not very good at the articulating, we are not really good at paying attention to the language, and in global health, there are so many rights and wrongs of terminology that you are supposed to use, and everything is very exact and very carefully defined. And for us, for people coming naturally from the design world, what we thrive on is an environment full of uncertainty and where the edges aren’t so hard and one thing blends into the other. So it is like the kind of work culture, global health and design sometimes don’t play nice with each other... Our communication styles are very different because we are always looking to leave enough space for ambiguity. But I think with more academic practices and with global health, you have to get everything right, and so there isn’t that room for ambiguity.” HCD Expert 2

5.2.2 Culture of incentives interfered with ownership and buy-in

This challenge had a binary effect. Firstly, it interfered with the implementation of the birth companion model (outcome of the HCD process) especially at Mwananyamala Hospital, and this was discussed at length under the implementation challenges. Secondly, this challenge threatened the success of the HCD process because of the effects of incentives on stakeholder ownership and buy-in. Other providers who were not part of the design team and did not receive any incentives regularly referred to the project as “your project and not ours.” The HCD

approach seeks to engage stakeholders and create space for every stakeholder to share opinions, find solutions, and test them together. However, some of the health providers who were not included in the HCD workshop showed less commitment to supporting the pilot activities (e.g., enrolling women during prenatal care) because of the notion that the project was owned by ICAP or the identified design team.

5.2.3 Delays in funding led to financial constraints that impacted the process

Due to funding delays, the effects of this challenge was threefold:

- i. Prevented the design experts from starting at the very beginning with the research team and the program managers

Design experts missed the data collection phase because of delays in the release of funds to pay them. When asked how this exclusion from the inspiration stage might have affected the process, both the design experts mentioned that the method by which data was collected and documented made it difficult for them to bring the data into the workshops:

“There is a designerly mindset around HCD research; you want that research to be actionable. We are never always collecting data to know interesting themes; we are collecting research for action. Therefore as we are collecting, we are deciphering it into a way that’s easily accessible in the workshop environment. In this case, we really just had three days to do that. From here is all the research data, how do we bring it into the workshop, how are we going to make everyone in the workshop be able to engage with everyone whom you collected the data from over the months. To me that was really difficult.” HCD Expert 1

The design experts also stated that this delay in involving them in the process interfered with the capacity building exercise with the local researchers. The researchers were going to

facilitate the workshops since the workshops were conducted in Swahili. Researchers were trained within five days, a process that usually takes the experts two weeks. Both experts complained of the fast-paced training. Design experts were not sure if the facilitators had acquired enough skills to facilitate the workshops; thus, the first few hours during the workshops were filled with uncertainty:

“We were training people on the job without knowing really what they were saying. Sarah¹⁰ and I were walking around, and from our experience of facilitating workshops, we felt the energy in the room. So for me, I could observe a group, and I could see somebody facilitating and I could see that they were struggling a bit. I could tell that the energy wasn't right, but I did not hear what they were saying, so that was difficult.”

HCD Expert 2

Not including the design experts during the initial phases had a notable influence on how the project design intent was defined and understood by the providers and their facility managers. The design team explained how it was important for a collective and clear understanding between the stakeholders and the program staff (researchers and program managers) of the motivation/intent to design. Due to the time limits, the design team skipped this critical step as they believed that the researchers had adequately built the intent with facility heads and other key stakeholders. However, it later manifested during implementation that the program staff and the stakeholders articulated the intent differently, as some key stakeholders showed hesitance in piloting the study:

“And the other thing that was really difficult was that we had originally designed this project to start with an intent visit. Us coming to Tanzania for a week and meeting with

¹⁰ Not her real name

heads of facilities and other key stakeholders to study and understand what their agenda was, was important. But we cut that because everybody thought that had already been done very well by the local researchers in advance. I think it was also difficult because we hadn't spent much time in the facilities. We hadn't sat down with each of those important stakeholders and really understand what intent mean for them...we didn't know in the end whether the hospital had a really clear intent to implement. And you know they were hesitant to start a pilot because it was a big investment of their resources and without an intent to implement... I felt like we were still trying to align to intent well into the start of the pilot phase.” HCD Expert 1

ii. Affected with ownership and buy-in from health providers

Apart from the culture of incentives influencing buy-in, one of the design experts felt that the lack of a financial commitment by program managers to make some changes at the facilities also contributed to poor ownership and buy-in. She reasoned that since the program managers approached the facilities with a project in mind, it was inevitable for the stakeholders there to have expected some form of compensation despite being told by the program managers that there was no budget for any structural changes:

“Not to say that every project needs a budget, I am not implying that at all. I think there are plenty of successful projects that don't have budgets and don't have any additional incentives, but from my experience, those are usually quite successful when they come from within, so to come in from outside and expect people to make changes without compensating changes in any way. I think it's very difficult to sell.” HCD Expert 2

iii. Led to shortened time to execute the process including implementation

The financial obstacles also caused significant delays in starting the ideation and implementation stages. The design team had to squeeze three distinct steps (intent, insights, and idea creation) into one workshop given the time challenges, and the team and participants found this process rather intense. Furthermore, the timing of implementation was cut short due to the end of the grant. This negatively affected the recruitment of birth companions, as providers oriented women about the program upon arrival. In addition, the truncated time for program implementation also affected the opportunity to learn more about the program, especially how stakeholders felt, factors influencing implementation, and possible scale-up. One of the local researchers stated the following:

“These delays did not only affect us as implementers on this side to have an opportunity to learn more about the HCD process at a reasonable pace, but also it has denied our direct and indirect beneficiaries to really see the value of the project. Everything has been done in a very shorter version.” Local Researcher 1

5.3 Benefits

5.3.1 HCD as a problem-solving approach through adoption of a creative mindset

There was a consensus among participants that the HCD process triggered their creative abilities and made it possible for them to think of solutions to address identified problems. One of the invited stakeholders included a program manager from an organization that implemented a birth companion project in rural Tanzania using traditional approaches. He stated that he had a great appreciation of HCD as the process was “very involving and expanded one’s creativity.” He further mentioned that HCD made one think “critically and fast” and, more importantly, that it made him realize that they “always had the solutions but did not realize that they had them” before getting involved in the process. He also appreciated how the participants managed to

generate the solutions within a short time frame. Various stakeholders identified several challenges, and the workshop participants identified several ways of addressing them. All these concerns and how they were addressed are summarized in Table 8 below.

Table 8: Challenges identified and how they were addressed

Concern	Specifics of Concern	How were these addressed
Privacy	Companions would hear and see other women and violate their privacy.	The teams focused on intimate privacy, recognizing that partitions could not be built. There were consent forms drafted that a birth companion signed saying she would not share what she saw or heard, the mothers were covered by their own Kitenge/kanga, and as often as possible curtains and screens were used.
Confidentiality	(i) The fear that birth companions would disclose patients' information and confidential facility information to the community. (ii) If a woman did not want a companion because she had an undisclosed health issue/disease or was nervous about anyone	(i) Teams created and introduced a booklet of rules and roles for birth companions. Providers gave the women and companions the booklets to read. The providers also reminded the birth companions on the rules and roles during patient registration. (ii) A separate consent process was set up at admissions. The woman and her companion consented separately. At that time, the woman could

	<p>knowing her birth experience, the stakeholders wanted to protect her confidentiality. Some women indicated that they did not want their companions to be present during discussions around medical history because they did not want their companions to know their health status, age, or health history.</p>	<p>say, privately, if she felt comfortable with a birth companion.</p>
<p>Congestion</p>	<p>Fear that the introduction of a companion would cause congestion in the wards.</p>	<p>The teams spent time moving beds, testing chairs/stools between the beds, and adapted to each of the facility settings:</p> <ul style="list-style-type: none"> • Mwananyamala Hospital: had a slow start with designating only four beds at ANC and three delivery beds for women who were accompanied by birth companions. • Tandale Health Center: Had three beds and gave the companions a chair/stool to sit next to the bed. After one hour of delivery, the birth companions were allowed to go home

		because of space shortages in the postnatal ward.
Infection Prevention	Providers feared that the introduction of a layperson without protective clothing could potentially cause a spike in neonatal infections.	<ul style="list-style-type: none"> • The stakeholders created a very low-cost ‘uniform’ for the birth companions: plastic apron, disposable shoe covers, gloves, and hair cover to help reduce any contamination. Providers instructed birth companions to wash their hands with antiseptic liquid soap provided by the facility before and after supporting women. • Stakeholders also developed very specific ‘rules’ about what a birth companion could and could not do (e.g., touching liquid – blood/vomit/defecation) that were part of the consent process as well as posted on the walls.
Birth Companion Role Slip	Stakeholders feared that the birth companions would overstep their roles and try to take on clinical tasks or extend their assistance to other laboring women other than their own	<ul style="list-style-type: none"> • The developed consent forms and guidelines for the birth companion roles explicitly stated that birth companions were not to do any clinical work or serve as liaisons to other women and families.

	(nurses wanted to maintain that role for other patients).	
Phones in Wards	Facility staff were concerned that the birth companions would bring in their phones to take photos and record the birth process or overall treatment of the mothers for potential use against the providers.	<ul style="list-style-type: none"> Providers prohibited the use of phones in the wards. The guidelines and rules clearly stated the phone restrictions, and providers also explained the rules to women and their birth companions at the antenatal clinic, Reproductive and Child Health sessions, admissions, and at the labor ward.

5.3.2 HCD as a unique experience that is different from other traditional design approaches

When asked about their experience with the HCD process, providers and key stakeholders who attended the workshops described it as something new, exciting and that changed their understanding of how data gathering, workshops, and design in public health are done. Notable differences were identified between HCD and participatory action research (PAR) by the local research team, which consisted of researchers with vast experience in PAR. The researchers compared their past experiences with PAR and felt that HCD provided an approach that offered desired outcomes compared to PAR:

“Before I was thinking human-centered design exactly resembled the participatory research, but after being involved with the human-centered design, I saw some quite big differences between the participatory and human-centered design.... When you start

implementing using participatory action research whatever you have decided on either the male or female group or the youngest group you will implement what you have decided on, and there will be no changes made because you have already decided as a group, but with the human-centered design you come up with solutions but as you implement and see other challenges that have emerged you again rethink and keep looking for solutions unlike the participatory if you have decided you have decided but with human-centered, you can go back and design again. The other thing with the participatory action research.... you go already with the ideas and the objectives but for the human-centered design you design with and involve everybody, you don't go there with something in hand just a plain paper and you go design together from scratch.”

Local Researcher 2

“With HCD at every point you engage the community, you raise a new idea and then go back again, you analyze, you test it again until you reach a desired solution; with participatory action research we plan, we stop, and then we set the ideas and strategy of how we can implement the program or the intervention.” Local Researcher 3

One programs officer felt that this iterative nature of HCD not only allowed researchers and implementers to learn about their target audience continuously, but enabled the target audience such as the design teams to experience and reflect on the intervention:

“I think the idea of considering what will work for users is universal, but the ongoing iterative approach to changing the model as you go is unique to HCD. In a sense, it's sort of like the participatory approach has been extended/put on steroids. Not only are we collecting user inputs in the beginning, we continue to do so throughout implementation as well. I've always felt like IDIs/FGDs are somewhat limited as a data

collection method because all you get are people's initial reactions/thoughts. Given more time to think something over, they might come up with different responses. (The initial responses are also important, of course, but they may not be everything.) So using Design Teams to get continuous feedback effectively extends the participatory approach, so we're not only learning about what people think during one IDI or one design workshop but on an ongoing basis, allowing them time to experience the intervention and reflect on it."

Reflective notes from AMDD Senior Programs Officer

Some participants felt that the HCD methods allowed everyone to participate and "say something" without necessarily having to speak, therefore enabling even shy and quiet participants to share their ideas. One of the local researchers, who is a co-author of a book on PAR used in the region and an in-charge from Tandale Health Center, said the following:

"So I think that one thing that is a huge lesson that I am taking from the process overall is how HCD taps ideas from people. We are used to this kind of interaction where you ask a question and I respond, but the use of stick notes in HCD imposes an obligation to the participants that you must write something...many people attend so many workshops but some of the people are silent, they have the silence character so they keep quiet. It doesn't mean that they don't know, they have very good ideas but they are created like that, they are not vocal in front of many people." Local Researcher 1

These sentiments were also echoed by the facility in-charge at Tandale Health Center:

"That style of as noting down things on papers we used made us all participate and get involved." In-Charge, Tandale Health Center

One of the local researchers also felt that asking people to write down their ideas broke down the power hierarchies that exist within certain organizations, which inadvertently may cause other people not to say anything during workshops:

“Sometimes the hierarchy of different people and authorities tend to make some of the people to retain what they have until they hear from their bosses or seniors or people perceived by everybody to be very knowledgeable, so they keep their idea. But the use of sticky notes was very unique because now you are asking everybody to say what they know. The stick notes will not be collected while they are empty, something has to be written... The use of sticky notes was very different and unique, I had never used it in my experience of PAR.” Local Researcher 1

Some stakeholders appreciated the collaborative nature of HCD, particularly how it enabled them to be part of the process in developing a birth companion model that works for them in their own facilities. Providers from both Tandale and Mwananyamala health facilities reported the following:

“What was interesting was the method that was used because it was a hundred percent participatory and not initiated by the organizers that arranged the workshops. The participants spoke about their problems and how to solve them and lastly had an action plan, it was very interesting.” Facility Manager 1, Mwananyamala Hospital

“The difference I have seen is that with this project is we have designed most things together, we discussed so many things concerning the birth companion like who should it be, where they will pass through. Other projects come up to you with a guideline you should follow, and that is how most projects operate, they plan and just bring it to us; that’s why most challenges that arise are hard to solve. But with this, we have been

together...you were then back to ask if we are facing challenges and how we can solve them together. We like this.” In-Charge, Tandale Health Center

Other providers valued how the approach enabled them to identify their unique challenges and come up with solutions that worked very well in their facilities:

“It was participatory every one participated in their own way, and the good thing was that we designed by ourselves. Thinking that we will receive the birth companions but what about privacy? Then we discussed and found solutions by ourselves that privacy might not be an issue since we have curtains and maybe we would prepare like two beds; we were all involved according to the area of specialization we were from. We all participated very well... It was like we were all students and at the same time, teachers.” In-Charge, Mwananyamala Hospital

5.3.3 There is a value add in including a design expert in the HCD process

Local researchers and program managers felt that bringing in design experts to facilitate and guide the process was essential in the design and implementation process and changed the trajectory of the way the process unfolded. However, hiring design experts comes at a cost. For this study, the service of two design experts cost approximately US\$60,000 and an additional US\$15,000 in travel costs. Despite these costs, the local research team and program managers jointly agreed that having design experts on board helped in working through the providers’ fears and also ensured the successful delivery of workshops, prototyping of tools, and implementation of the program. Both the local research team and the program managers reported how they were unsure of how the next steps following the inspiration stage were going to unfold since none of them had experience with the HCD process before, and saw the experts as saviors of the project:

“ The HCD experts acted as rescuers of the project as professionals of the human-centered design in guiding us, facilitating and giving us the direction that after this [inspiration stage], we do this; otherwise, we were hanging not knowing where we were going.” Local Researcher 2

The local research team and the program managers also appreciated that one of the design experts stayed in Tanzania to work and design the model with the stakeholders. This phenomenon is rare among HCD experts who come from HICs:

“I do think if it’s your first time only, you need someone who is an expert and who knows what they are doing. I think Cate [design expert] was extremely valuable throughout this process in many ways but I think one thing that will be important for you to know and document down is how she fundamentally did this differently than most every other human-centered design firm we talked to right? Like she came, and she lived there. You know that is not at all like the other proposals we got like fly in for a week, go home, design, fly back in for a week to share the ideas, go home, design, come back to, you know what I mean? Like, she was present over a long period of time, so it was not really the model that is globally being used.” AMDD Associate Director

Before introducing the design experts, the program managers and researchers enrolled in an online course on HCD offered by ACUMEN to gain HCD skill sets that they believed would be transferrable in the design and implementation of the birth companion program in Dar es Salaam. This exercise proved ineffective as participants failed to fully grasp the skills and the mindset to successfully implement the HCD process for the Dar es Salaam pilot. Participants raised frustration in how the online class was one-sided because the organizers did not provide feedback on participant progress and performance. Additionally, participants felt that the online

platforms did not provide enough support and resources that would fully equip HCD novices with the skills necessary to apply HCD to the project. When asked, all participants reasoned that HCD is a very tactile process that required more practice on the ground rather than learning it through online courses and field manuals:

“Actually, it is too theoretical for something like this that needs hands-on. I am glad that we got it and opted for this alternative of hiring experts.” Local Researcher 1

One researcher felt that the program might not have been successfully implemented had the program staff resorted to online learning without engaging in practical learning with the experienced design experts:

“Reading literature alone is not enough. If you get someone that has already implemented it, it could be very easy than reading literature and implement because you might miss something which is important. And when you don’t have the experience, it could have been difficult implementing by reading the literature alone. I don’t think we could have accomplished everything we were supposed to do.” Local Researcher 2

5.4 Key Learnings and Discussion of Findings

This dissertation sought to understand the decision-making pathways, particularly the power dynamics, the inclusion of users, and how their needs and desires were included in the process. Also, the dissertation explored the lessons learned from the delivery of the HCD process for the birth companion program in Dar es Salaam, Tanzania. This section discussed these variables and extracted key learnings on their implications for practice and research.

5.4.1 How the voices of users were captured and included in the design process

In health settings across LMICs, provider and patient interactions are characterized by information and power asymmetry. It is therefore critical for designers and program managers to

recognize these differences prior to utilization of the HCD process. In this study, women's voices were captured during the inspiration and ideation stages through focus group discussions and home visits. The design experts made a conscious decision to separate women and providers during the design workshops mostly because of recognition of the power imbalances between the two groups. While providers attended design workshops, women contributed to the process through separate focus groups discussions following the design workshops. This arrangement presumably dismantled the power disparities between the two groups and enabled design experts and program staff to bring these ideas together in developing a viable solution. This approach deviated from the commonly suggested approach by HCD practitioners of bringing different stakeholders into the same design workshops to co-create health interventions. The findings showed that collaborative engagement and user contribution in design can take different forms, yet still produce desired outcomes. Through the HCD experts' assistance, it was clear that imaginative thinking and adaptations of the design process are critical in responding to contexts where power differences among stakeholders exist. By tailoring the process to suit the prevailing power differences, the design experts highlighted the flexibility of HCD *methods* rather than its intended *outcome* of user inclusion and satisfaction. Local adaptations of specific phases of HCD in health facilities were reported by Donetto et al. (2015), who modified the phases as opportunities and challenges arose. The authors also emphasized that design is "first a philosophy and only second a method and methods need to evolve" (p. 235).

The findings also revealed that in complex paternalistic health settings, HCD is a strategy of compromise, as not all of the primary users' (women) needs were prioritized by the providers. The findings illustrate how HCD helped women to have a better experience of care compared to what they previously had. Although it was universally agreed by all stakeholders that women

were the primary users of the birth companion program, AMDD program staff and design experts made fundamental decisions for providers to be at the core of the design and implementation of the project. Health providers were the gatekeepers of the maternity wards where women birthed; thus, it was important to get them on board first for optimal implementation to occur. Global literature on birth companion programs illustrated that health providers were not always keen to introduce a non-clinical person into their “guarded” environment. The findings in this dissertation corroborated findings from earlier studies, which showed provider reluctance and fear of having birth companions in their wards. Because of this unwillingness, the design experts and program managers decided that providers would lead the development and implementation of the birth companion model in both facilities while making sure that women’s voices and needs were also captured and included in the creation of the model. Providers taking over the process has been reported in the UK in health facilities despite active engagement of patients. Participants explained how they collectively discussed challenges and solutions, but when it came down to deciding on what exactly to design, that decision-making authority remained with the frontline managers and the nursing managers (Donetto et al., 2015). Similarly, in Australia, patients complained that the process seemed to benefit the providers and make them more visible than patients since they outnumbered the patients (Iedema et al., 2010).

These findings demonstrate how co-design in complex health facilities is feasible to a certain point before reverting back to the hierarchies dominant in health settings (Donetto et al., 2015). This is why malleability in HCD matters: the recognition that provider unwillingness was going to be the main barrier to program implementation led the design experts to rearrange the process, but it still managed to yield outcomes that catered to women’s needs and expectations.

5.4.2 Power dynamics and decision-making in HCD

Although one key attribute of HCD is its potential capacity to disrupt power and hegemony of program managers and give program users agency over the design and implementation of the intended intervention, the findings from this dissertation showed that it is not always feasible. Several accounts from the providers showed that they were not willing to relinquish power in certain cases to give women and their birth companions control over the birth process. Facility managers and providers, therefore, carried the ultimate power in determining how the implementation would be conducted and having the final say once the program started running. Women constantly expressed the desire to carry their phones into the maternity wards to communicate with their loved ones or take photos of the newborn. Yet, health facility managers and providers staunchly denied this request from women, and women had no control over this decision. This provider resistance likely stemmed from the increasing evidence of provider abuse and disrespect of women during labor and delivery. Tanzania is one of the countries that has provided this evidence (Mselle et al., 2019; Sando et al., 2014, 2016), and this may have spurred provider fear as phones can be used to audio- and video-record events in the facility, leading to litigation and action taken on the providers. Although providers reported that they understood that women's needs were primary, they indicated that specific needs were not supposed to supersede facility and provider instructions. Much of this authority came from (a) a culture of control that prevails in most health facilities, (b) existing national protocols on proper conduct such as infection control, and (c) providers having professional mandates and liability over the lives of women and their newborns.

Providers' emphasis that the role of birth companions was only to offer social support to women and their reluctance to negotiate certain needs underscores how healthcare settings are

governed through power hierarchies that are not easy to dismantle. Donetto et al. (2015) explained this succinctly when they said that “inherent to co-design are notions of equality, equal contribution and mutual respect that are proving difficult to establish in healthcare contexts where traditional roles of provider and recipient of care are clearly demarcated” (p. 241). Health providers are also liable for the life and welfare of their patients; thus, this professional and ethical responsibility influences their decision-making. Providers must consider the effects of granting the patients’ needs over the provider’s professional judgment to save a life. One facility manager described how doctors make life-saving decisions—for example, ordering a C-section in the case of obstructed labor—which might not be what the woman wants, but is necessary. This dissertation demonstrated that a power shift in health facilities with deeply embedded systems of control is challenging to obtain. However, there were notable shifts as women advocated for the covering of their private parts during delivery and exams, creating a notion called “intimate” privacy. Providers relinquished this control and allowed women to be covered during delivery.

Power differentials also manifested between nurses and doctors as nurses struggled to make key implementation decisions in the absence of doctors or senior management, regardless of the assumption that the HCD process empowered the nurses to make decisions. The collaborative element of the co-design workshops enabled doctors, nurses, and district health managers to work together without noticing the power hierarchies. However, the power asymmetry resurfaced once the nurses returned to their work environments, further reinforcing the bureaucratic system that often prevails in government health facilities. Nurses likely felt comfortable making decisions during the workshops because there were no consequences associated with poor decision-making during mock exercises compared to the actual

implementation. As previously stated in the findings, nurses are evaluated on their adherence to protocol, and a deviation from the usual procedures has negative repercussions, therefore underlining their unwillingness to make decisions during implementation. Similar findings were reported in the UK in a breast cancer study where service providers still needed to consult the usual decision-makers for change to be implemented (Farr, 2018). In Ghana, program staff working on a program to improve MNCH could not make final decisions without first checking if the message content created during the workshops was consistent with the government and other health-based organizations' message protocols (Kanagat & LaFond, 2018).

These challenges are not new, as global health practitioners have raised concerns with design language and application of certain design methodology as it applies to health (Groeneveld et al., 2018; Holeman & Kane, 2019a; Moody, 2015; Panditi-Rajani, 2016). These challenges can be addressed through effective program planning where program planners allocate time for design experts to thoroughly explain and teach HCD and design research to public health practitioners before program initiation. IDEO used this approach to address these methodological gaps in Nigeria, Ethiopia, and Tanzania when they evaluated an A360 adolescent health program using the HCD approach (Doyle et al., 2019b).

5.4.3 The composition of design teams matters

Another significant finding that emerged from this study was how design teams responsible for pushing the implementation forward require a great balance of individuals on the frontline of implementation and those who are key decision-makers. This study revealed how design teams comprising only nurses had challenges in rolling out the program as they found themselves incapacitated to make decisions in the absence of facility leadership or doctors. These

findings further underline the existence of authoritarian systems in health facility environments. Moreover, the findings highlighted the different facets and configurations of power operating in health facilities in Dar es Salaam. In these two facilities, doctors had the power to effect change even when they were not departmental heads such as nurse in-charges. In addition, there was no decentralization of power in these two facilities such that in-charges in the maternity wards could enforce change. Providers and their managers worked together seamlessly during the design workshops, and for a moment the power hierarchies were non-existent. However, things changed once nurses got back to their workstations and their inability to make decisions resurfaced. This finding demonstrated that in certain settings, power disparities still exist and will probably take a while before democratization occurs.

5.4.4 Stakeholder Involvement and Ownership

Multi-disciplinarity and bringing several voices together is fundamental in HCD, yet also still complex to achieve in practice (Donetto et al., 2015). As noted earlier in the findings, many voices that could have contributed to the process and made implementation easier were omitted. In health settings such as Mwananyamala Hospital with several departments that are interconnected to achieve a common goal, bringing everyone on board is expensive, especially when the participants need to be incentivized. This challenge could have been addressed through effective communication across departments; however, the study revealed the broken communication system across the departments. Facility leaders need to take advantage of departmental meetings to communicate and engage other staff members and provide them with the opportunity to share ideas, even when these staff members do not participate in design workshops. Facility managers working for a UK Cancer project successfully engaged their lower-level staff by communicating the project and collecting ideas from them, although these

staff members did not participate in the co-design groups (The King's Fund, 2011). This finding also emphasizes the importance of leadership engagement in HCD, as leaders play critical roles in staff motivation and ownership creation. More importantly, management needs to frame and change the messaging from “their project” to “our project” when introducing interventions to their staff to improve ownership. This mindset of owning projects needs to be built during program intent and should continue throughout the process. Once ownership is established, programs are likely to continue and become sustainable once program staff leave.

Also, the culture of incentives that is prevalent in Tanzania threatened the success of HCD, particularly ownership. In an environment saturated with NGO involvement where health workers are financially rewarded to perform tasks, getting provider buy-in and ownership is difficult to attain. This tradition of incentives is difficult to break especially in health settings suffering from severe staff shortages and where providers are poorly remunerated. Ongoing staff rotations and staff turnover further created gaps in ownership, as new staff had to be oriented to the project. Co-design studies in health facilities in Nigeria and Uganda also reported how staff rotations threatened to derail the HCD process due to discontinuity in ownership (Salgado et al., 2017).

5.4.5 Importance of HCD experts and local capacity building

HCD in global health is a fairly new concept and a number of public health researchers are unfamiliar with its delivery in health settings, as was the case in this dissertation. The findings clearly illustrated that implementing HCD without prior practical experience in complex bureaucratic environments, particularly with a limited budget, is extremely challenging. Other practitioners in the field echo these sentiments and agree that “HCD is indeed not an easy task” (Steen, 2011, p. 46). HCD activities were new to the local research team and the AMDD

program staff, despite the majority of them having significant experience in global health and participatory action research. The study findings illustrated the importance of engaging design experts, as a delay in their engagement created several challenges which could have been prevented, ensuring a smoother process and better implementation. While online platforms and field manuals provide valuable knowledge, it was clear from this study that the local research team and AMDD program staff lacked the skill set to navigate the complex health facility settings. Indeed, designers have a designerly way of knowing (Cross, 1982) and are a necessary investment for composite and intricate projects like this birth companion project. Denend and colleagues (2014) emphasize the importance of partnering with experienced designers as well as “local power structures” (p. 39) for effective adoption and utilization of HCD. The authors, however, argue that the design experts do not necessarily need to be highly educated but should be experienced enough to transfer skills to non-experienced designers. For this project, the local team and AMDD staff appreciated and saw the value add of having qualified and experienced design experts as part of the team.

Adequate planning, finances, and time should therefore be invested by program managers to hire HCD experts, as they come at a significant financial cost. This project also benefited from having one of the HCD experts stationed in the country for an extended time and helped in equipping the local team with HCD skills. Not only did the HCD expert transfer skills to the local teams, but she also familiarized herself with the local context, contributing to the development of birth companion models that respected the local culture. Local governments and funders should invest in practical training of local teams in HCD to build capacity at the local level. There are several benefits to building capacity on local teams. Local teams are not only

familiar with the local context, but they also can be more cost-effective as they do not require additional expenses such as international flights and accommodations.

Despite these challenges, the HCD approach demonstrated several benefits and strengths, including giving stakeholders an opportunity to design and create an intervention suitable for their own settings, sparking creativity, giving participants a voice, and enhancing the relationship between providers, birth companions, and women.

5.4.6 HCD as a spark for creativity and innovation

Throughout the initial stages of data collection, it was clear that providers had a preexisting birth companion model in their minds that made sense to them. When asked about suggestions for how the program should be launched in the two facilities, the common response was that the maternity wards had to be remodeled. The majority of these stakeholders were not confident enough to even try piloting the project without building or constructing something to ensure privacy. These provider expectations confirmed the findings from the literature that showed most programs restructured the facilities before implementation began (Kabakian-Khasholian et al., 2018; AMDD Kigoma Implementation Report, 2019). However, during the design workshops and continuous iteration with the providers, the design process became “a catalyst for teams to work creatively and unlock innovation” (Johnson et al., 2019). Providers realized they had the solutions all along and that each solution was unique and feasible for the respective facility.

The fast-paced process stimulated participants to think broadly about possible solutions, pushing boundaries and challenging them in their thinking. Providers and program staff managed to implement the birth companion pilot in a high-volume hospital and health center without any reconstruction of the facilities. Providers realized that they could make use of the existing

materials in their environment to create or enhance privacy. For example, to address visual privacy at Mwananyamala Hospital, the providers and the local research team suggested removing a few beds in the labor ward to create more space as it was hardly fully occupied compared to the antenatal ward. The teams also made use of the existing curtains separating the beds to enhance privacy. At Tandale Health Center, providers used the movable screens to create privacy between beds. This presented a positive counterpoint to the prevailing beliefs that implementation can only be successful after reconstruction of maternity wards.

The findings from this dissertation also demonstrated that the HCD process gave every participant a voice to share their ideas and concerns through use of methods that broke down power imbalances and enhanced equality. Asking participants to write down their ideas on post-it notes ensured equal participation, even from those participants who are shy or afraid to speak their opinions in public. This action allowed every participant to contribute and established a sense of involvement and being part of the process, compared to the traditional approaches where the most vocal and powerful participants push for their ideas. For most participants in the workshops, this fast-paced and collaborative engagement was new, and it made them realize their capacity to develop solutions to their own challenges. From a CSH and HCD perspective, getting all voices to jointly co-design is particularly crucial in light of the power differences that exist in the majority of health facilities.

Another significant implication of this research is providers' appreciation for how HCD offered them the opportunity to develop their own birth companion model without the donors or program implementers' external influence and control. These findings suggest the importance of including program users and other key stakeholders in program planning rather than imposing interventions on them. More importantly, in environments where concerns with interventions

that come from outside are rampant, stakeholder partnership becomes critical to minimize resistance and enhance trust and ownership. An experimental and iterative approach such as HCD was well-suited to manage these valid fears that providers presented with. It was clear that health provider buy-in and readiness to try this out could only be achieved through ensuring them they could prototype tools, test them, and if the tools for the model did not work, they could tweak them until they were fully satisfied. Making the providers co-designers helped in lowering the risks of resistance by not making it an imposed program. The process permitted them to test the prototype, evaluate it, and gradually build out the contours of the solution before rolling it out. And even once implementation began, the iteration continued and the providers were told that they were welcome to make changes that made the model more feasible and applicable to their environments.

5.5 Findings for Factors Influencing Implementation

The findings were categorized according to the CFIR domains and constructs. Each theme was connected to a CFIR domain and construct. These themes were discussed as either barriers or facilitators to implementation of the birth companion program at both facilities.

5.5.1 Intervention Characteristics

5.5.1.1 Intervention source

Theme: The intervention's perceived source influenced providers' acceptability and feasibility of the program in the local context.

AMDD initiated the idea of implementing a birth companion program in Dar es Salaam, Tanzania based on increasing evidence of the efficacy of the intervention and its potential to minimize disrespect and abuse of women during childbirth. Although the then Tanzanian

Director of Nursing & Midwifery Services and facility heads took to the concept of birth companions very well, other providers and key stakeholders were diffident about it. There was real hesitance as participants felt that AMDD/ICAP was bringing in a foreign concept that only worked for high-income countries, or in countries with more space and privacy in hospitals. One facility manager articulated this as follows:

“Ahhh, This birth companion project, when it was initially introduced, when they brought the idea to us, to be honest, we found it a very strange idea; we thought it was something very difficult to introduce in our community. This is because we found that this is not something we were used to and that we just used to see such things on TV being practiced by the Whites in their countries. So we thought that there would be many challenges in implementing this and we were very worried.” Facility Manager 1, Tandale Health Center

Another respondent felt that intervention was not part of African culture, especially having a non-clinician “watch over you”:

“... Because this intervention is a change, it’s not African culture. You know when it comes to African providers to be supervised with someone non-clinical, it is not easy, but by engaging together as we introduce it and we will educate ... so that everybody tries to understand the idea.” Facility Manager 2, Mwananyamala Hospital

5.5.1.2 Relative advantage

Theme: Stakeholders’ perceptions of the benefits of implementing a birth companion program influenced acceptability.

Stakeholders raised different views on the perceived benefits of birth companion programs before and after program implementation. The perceived benefits before

implementation seemed to override the perceived challenges, as evidenced by the consensus among most stakeholders to implement the program. By far, the most commonly cited benefits were how the birth companions would provide different types of support to the women, such as encouraging and comforting women, giving them food, helping them exercise, assisting with luggage, carrying babies, and escorting them to the toilet. Health providers also felt that the presence of the birth companion would be beneficial to them as well. For example, the birth companion would alert health providers if the woman's condition changes, act as a witness, and reduce their workload. Providers acknowledged that often they deprioritized the importance of supporting women and focused on clinical work such as assisting someone who is about to deliver:

“There are times when providers are overwhelmed with duties and may fail to support women. For example, if one woman is pushing and the other one needs the nurse to give her porridge. In such situations, the health provider will rather concentrate on the woman who is in labor and is pushing rather than the one who needs assistance with feeding.” Paraphrased Notes, Labor Ward In-Charge, Tandale Health Center

Others stated that they would love to support women, but their overwhelming clinical responsibilities made it impossible to do so:

“You must massage her, saving her tea, giving hope that she will deliver safely, and she doesn't have to be worried. But due to big numbers of patients and compared with the few number of staff, to be honest we do that rarely though we would love to do that.”

Enrolled Nurse, Tandale Health Center

As a result, providers felt that birth companions would provide emotional and other forms of support to women, hence emphasizing the need to implement the project:

“I find the BC intervention having so many benefits. Starting with the benefits to the woman herself, in many instances in our public health facilities women have been delivering only in the presence of medical personnel, without having someone else around known by the woman. The woman finds herself surrounded by only strangers with no one familiar to her; something which is not psychologically sound. Although they have been delivering safely, but sometimes they lack and miss the emotional and psychological and psychosocial support. All the time, we the medical personnel tend to focus and concentrate only on medical interventions—that they need to be examined, ensure that they deliver safely, ensure that they don’t go into complications etc. and we end there! We completely disregard the emotion side of the woman’s need. The birth companion project brings about an extra aspect which fills in this gap.” Facility Manager 1,

Mwananyamala Hospital

Stakeholders also perceived that the presence of companions would reduce the prevalence of disrespect and abuse in facilities. One facility in-charge said the following:

“I expect a lot because I have realized a mother coming with a birth companion will improve our services mainly on our side as nurses. The labor department has more complain in the community, such as we have been bitten, I delivered on the floor, I had to give money. You see? But having a birth companion will change all this because a mother has her birth companion and the service providers won’t misbehave they cannot instead they will be responsible. So I expect that that the services will improve.” In-

Charge, Tandale Health Center

Some women also thought that nurses would not disrespect or treat them poorly in the presence of a birth companion. Others felt that provider demands and requests for drugs would

be reduced. Women seemed skeptical at provider requests for drugs and assumed that the providers were selling the drugs to make money. One woman reported bribing a provider with 20,000 TzSH so that the provider would be nice to her. Women felt that such incidences would decline once birth companions became part of the maternal health system.

5.5.2 Inner setting

5.5.2.1 Implementation Readiness:

Theme: Space limitations in the maternity wards influenced feasibility of the program in the current health facility settings.

During facility observations, it was apparent that the current maternity ward settings at both facilities (especially at Mwananyamala Hospital) presented a challenge of introducing an additional person into the space. The maternity wards are small and struggle to accommodate the high volumes of women who use these units. At Mwananyamala Hospital, the antenatal ward (which accommodated women in labor and other pregnancy-related complications) was always full, with several beds accommodating more than one woman. For the period of the doctors' rounds, the room became congested as medical students came in to assess women as part of their training. At one point, six medical students and one senior doctor surrounded one woman who had developed a pregnancy-related complication.

There were three fishbone diagrams on the walls of the delivery room at Mwananyamala Hospital showing the challenges that providers face in their day-to-day operations at work. The issue of inadequate space and how it interfered with providers' daily duties emerged as a key challenge on the fishbone diagram. Although the fishbone diagram was used as a problem-solving technique, the spatial challenges seemed like an impossible challenge for providers at Mwananyamala to address as no solution appeared on the diagram. At Tandale Health Center,

the issue of space also surfaced as providers expressed how the limited space would threaten the privacy of women once companions were introduced into the maternity wards. However, from observation, the antenatal and labor rooms at Tandale Health Center were less crowded, as the center receives fewer women in comparison to Mwananyamala Hospital.

All stakeholders—providers, community leaders, women, and district managers—corroborated these findings. The participants all raised concerns regarding both facilities' capacity to accommodate birth companions given the current physical layout. It was difficult for them to imagine how a birth companion could fit in the existing facility structures as congestion and overcrowding were already extant challenges:

“Space is not enough to allow birth companion enter in labor ward especially during the high peak season of deliveries.” Facility Manager 1, Mwananyamala Hospital

“The one escorting is willing to help, but the environment is not conducive.” District Health Manager

“Assume you have seven people in the labor ward, that is, three women, one provider and three birth companions, the small room will be too congested such that it will be impossible to even turn around. We have one toilet which is shared by providers and women, what will happen when birth companions are in?” Enrolled Nurse, Tandale Health Center

Some providers saw the limited space impacting on the welfare of birth companions:

“The birth companion project is a good idea, and it will reduce complications that could occur in the labor ward. My concern is on what will happen when the patient (a woman) could extend days in the facility? Will the birth companion be able to stay for all extended days or they will be shifting, if that is the case again space will be a challenge

when the patient extends days.” Participant 1, Mwananyamala Hospital Management Team Meeting

In addition, during implementation, the welfare of the companions also surfaced, as companions had no place to rest, shower, or buy food:

“One birth companion said she had spent a night there and hadn’t eaten anything, she was tired, needed to eat, needed to take a bath.” AMDD/ICAP Local Researcher 2 Notes

During implementation, 37 birth companions were interviewed; five of these companions from Mwananyamala Hospital complained that they were exhausted after spending over 13 hours assisting the women. The companions mentioned that they needed to find a place to rest after spending the night on a chair. Two of these companions were found by the researchers lying on the waiting benches, exhausted.

Apart from the space limitations affecting birth companions, these space constraints were also associated with privacy challenges, which, according to the majority of stakeholders, made implementation difficult. Providers described how limited space would lead to overcrowding, and potential a breach of confidentiality as birth companions might get access to other patients’ medical information. Mwananyamala Referral Hospital had thick plastic curtains dividing the beds for individual privacy. However, most of the curtains were short in length, and opened easily. During a focus group discussion with first-time mothers, the women reported that it was easy for them to see what was happening on the neighboring bed. Throughout the observations, women at the antenatal ward constantly lifted the curtains up and hung them on the upper rails of the bed, leaving women exposed. A follow-up discussion with the providers and the women revealed that the wards are too hot, and women lift them up for air circulation. Although there

are a couple of fans in the wards, they hardly reduced the heat, leaving women with no option but to lift up the curtains. One of the facility managers supported these observation findings:

“The wards are not that private; we only have a few curtains which are sometimes not very well placed, they could get kicked, and the mothers can easily be exposed. I wish we had cubicle rooms so that the companion for patient x will take care of patient x alone because I know Tanzanians, I know us.” Facility Manager, Mwananyamala Hospital

Before implementation, providers also expressed concern over birth companions seeing other women going through labor and delivery, thus infringing on their privacy. During the design workshops, participants stated that the visual and audio privacy of women should be considered. They suggested that construction of privacy infrastructure should consider both audio and visual privacy before implementation.

Some women also expressed similar concerns of privacy violations particularly when other birth companions would see their private parts during childbirth. This often resulted in stakeholders suggesting a female companion, although the male partner emerged as a popular companion choice. One district health manager stated the following:

“At Mwananyamala the rooms are too small and open, no specific door and the privacy is not good, so it is better to have a female birth companion.” District Health Manager 2

In a follow-up focus group discussion with first-time mothers from Mwananyamala catchment area, some women indicated that they would want their husbands to be companions. However, the current physical layout at Mwananyamala would not be appropriate for male companions. They stressed that it was improper for men who are not providers to see another man’s wife naked. They all agreed that female companions were ideal for the current situation and they did

not mind being seen by other women's companions as 221sa n221221 they were female. When asked, men also described having other men see their wives as a serious privacy violation:

"I would not feel OK for other women to see my wife naked." Male Respondent, Tandale Catchment Area

During implementation, space issues manifested in other forms, as efforts to ensure the privacy of women were largely addressed at both facilities. The inability to accommodate birth companions during the whole experience from delivery until post-delivery emerged as a challenge at both facilities, leading to disrupted support. At Tandale, it was not physically possible for the companions to stay with the mothers post-delivery due to inadequate space in the postnatal unit. Providers allowed companions to stay during night births but they had to leave in the morning to create space for others. Once companions left the facility, their duties ceased and they had to follow the facility's visiting regulations just like any other visitor. At Mwananyamala Hospital, challenges often surfaced when the mother or the neonate developed complications requiring specialized care such as surgery or admission to the Neonatal Intensive Care Unit (NICU). Providers restricted birth companions from accompanying and supporting women in the operating theatre and the NICU due to fear of infections.

However, the facility did not make provisions for the birth companion to sit or lie down while they waited for the mothers, despite the design team raising the issue several times during design meetings as something to address. Companions were stranded, as no prior arrangements were made by the hospital to accommodate them. Senior leaders—who are influential in decision-making and making sure ideas are implemented when it comes to allocating rooms at the facility—were absent at the meetings, exacerbating this challenge.

5.5.2.2 Organizational Culture/Policies

Theme: Existing facility regulations that discourage entry of relatives into the maternity wards create a culture of intolerance of non-clinical persons by providers.

Throughout the time of data collection, neither facility had a policy that allowed the participation of birth companions in childbirth. Instead, what existed were very stringent and inflexible facility rules that ensured no one other than laboring women and health personnel had access to the maternity wings. At Mwananyamala, the entrances of both the antenatal ward and the labor room have red-colored signs (to emphasize restriction), showing that both wards are off-limits to anyone other than laboring women and hospital staff (see Figure 12 below). There were also signs written in bold Swahili that restricted relatives from entering the maternity ward (see Figure 13 below). Health providers were quick to stop a few female relatives who missed the signs and decided to escort their patients to the reception area. Health providers strictly enforced the “no entry” regulations and were always alert to ensure that no one other than the patients or hospital staff entered the wards. When asked why they did not allow relatives to accompany their patients at least to the reception area, providers stated that this would lead to overcrowding, and violate privacy. They also stated that this could lead to other undesirable consequences, such as relatives gaining access to confidential information of other patients.

Given this “no visitor allowed policy” that was deeply entrenched in the organizational culture, getting the providers to envision non-clinical persons readily accessing the maternity wards took time. During implementation, the culture of enforcing rules and feeling discomfort toward non-clinical persons often manifested as readiness to punish or discipline misconduct.



Figure 12: Picture showing signs restricting visitors' entry into the maternity ward at Mwananyamala Hospital



Figure 13: Picture showing a notice barring the entry of relatives in the maternity ward at Mwananyamala Hospital

Translated: Notice: Relatives are not allowed to enter this maternity ward: By Administration

Theme: The prevailing punitive culture in health facilities influenced providers' acceptability of the project.

Health facilities operate with rules and regulations, and violations of these rules are often associated with punishment or discipline. There exists a punitive culture in the health facilities, whereby terms such as 'rules' and 'expulsion' were used to describe the way guidance was communicated. Despite the research team's efforts at the beginning to change the term 'rule' to 'guideline,' they found that this was a hard mindset to change. In instances where birth companions overstepped the guidelines, the providers spoke of 'expelling' birth companions for violating the rules. Providers were intolerant of any violations of the set rules, even when some of the violations resulted from human nature. For example, companions felt compelled to clean up vomit to clean the mother, or desired to take pictures of the new healthy baby to share with the family. This punitive culture made implementation challenging, as providers asked birth companions to leave the wards for violating rules. One health provider who was the Design Team's focal person and one of the heads at Mwananyamala Hospital said the following:

"The bigger problem was that we would catch them with their phones taking pictures. With that we don't have a discussion they just leave. If it is late at night, we could hold them until the morning, but most of the time it's morning or during day time. So they leave right away. Either at the antenatal or postnatal ward/" Design Team Focal Person, Mwananyamala Hospital

"On the other side of challenges, we have seen that some of the women are too eager and too keen to communicate with their family information about the outcome of the newborn delivery before providers have approved. Now this is sometimes not a right thing because one may overlook some of small things such as...one may confuse sex of the baby, instead

of saying a she baby while it is sometimes not correct.” Facility Manager 1,
Mwananyamala Hospital

A provider from Tandale Health Center reiterated these sentiments:

“We will make a decision to either terminate her services or delete the pictures or chase her out and continue with the mother without her birth companion.” Reproductive and Child Health In-Charge, Tandale Health Center

The effects of this phone rule violation were significant, as one local researcher mentioned how this infringement nearly caused the program termination:

“...he [facility manager] asked the birth companions to stop, and it took us quite a lot of time negotiating and discussing again until he said OK, let’s continue.” Local Researcher

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5.5.3 Characteristics of Individuals

Theme: Knowledge and beliefs about birth companionship influenced stakeholder acceptability of the birth companion program.

5.5.3.1 Providers

The notion of providing emotional support to laboring women was not new to providers, as all of them indicated this was included in their midwifery training. Providers, however, reported that applying this skill was difficult because they were overwhelmed with other clinical duties, although one provider mentioned that sometimes providers are merely too lazy to perform this non-clinical task. Understanding the importance of this intervention from their training seemed to heighten provider acceptance of the birth companion program despite other challenges discussed. Most providers reported on the benefits of having companions, including comforting mothers, assisting with exercises, reducing workloads, feeding women, and carrying the babies.

However, none of them mentioned the documented clinical health outcomes of the intervention. Nevertheless, the general belief on the efficacy of the intervention manifested in positive responses from most providers and managers, influencing its acceptability and implementation:

“... It’s our interest that clients receive the best health care here at Mwananyamala, so they don’t live to remember that they got the worst experience here. We are not there yet and we don’t know what they think but we think having a person even when I was young I remember wanting my mother to be there even laying on her lap as I was taking an injection. It doesn’t make the injection less painful but more bearable so I think it is the same with the pregnant mothers.” Facility Manager 2, Mwananyamala Hospital

“...Without first speaking like a health provider I am also a parent and a community member. I have been taking my family to the hospital, and the most discouraging thing is when you are asked to go out when your family member is being attended, and worse enough is when you don’t get enough time to get the feedback and sometimes it’s painful when you don’t have the opportunity to help your client or family members when you see them struggling for help like needing water to drink, and the nurse would say oh am coming.” District Health Manager

All of the interviewed providers and health managers saw the importance of the the birth companion despite initial concerns on issues such as infection, privacy and confidentiality. The providers stated how birth companions would increase the quality of care women received in both facilities. The majority of the providers also mentioned that the birth companions would assist them in watching over the laboring women, alert them when the women’s conditions changed, and carry the babies, among other duties. This potential additional help was welcomed

by majority of providers as they felt that the birth companions' assistance will reduce provider workloads.

Providers who had birth companions during childbirth were more supportive of, and advocated for, birth companion programs. One provider described how she valued her husband's support and comfort when she delivered at a private facility in Dar es Salaam.

5.5.3.2 Women and other key stakeholders

The majority of women saw the importance of birth companions, especially during labor, but several women stated that they would not want to have a birth companion during delivery. During the focus group discussions, women had concerns about being watched by a companion giving birth and feared what birth companions would say about them. One woman from a home visit could not fully comprehend the need for a birth companion in a health facility full of health providers. She stated that relatives were incapable of assisting women in labor and reasoned that it was the duty of the providers to offer her any form of assistance:

[Paraphrased] *"I do not need any support from relatives in the delivery room because the nurses are there to support me."* Woman, Home Visit, Mwananyamala catchment area

She went on to mention that being with a companion could increase labor pain when the companion spoke comforting words. When asked if she had had support in her previous births, the woman mentioned that she had never given birth before, therefore her conclusions of pain increasing when one is supported were not based on experience.

Theme: Provider fears of increased risk of transmission of infections through the introduction of a non-clinical person with no prior training on infection control influenced acceptability.

According to a majority of providers, the introduction of a birth companion in the maternity ward would result in unprecedented spikes in neonatal infections. However, the

providers did not have any prior evidence to substantiate this claim. Providers from both facilities feared for the proliferation of infections following the introduction of birth companions into the maternity wards, particularly in the postnatal ward. They reasoned that the neonates' weak immune systems increased their risk of infections from companions who they assumed were potential reservoirs of pathogens. Two health providers reasoned:

[Paraphrased] *“Relatives are not allowed to enter in the postnatal ward because newborns' umbilical cords are not well dried; it is easy to get an infection. In the past relatives were allowed to enter in postnatal ward and neonatal sepsis increased, then facility decided to stop relative to enter in postnatal ward.”* Antenatal Ward Medical-In-Charge, Mwananyamala Hospital

“Introducing non-clinical people into the postnatal ward might cause infection to newborns as they still have low immunity as some relatives might come with infectious diseases like TB.” Provider, Mwananyamala Hospital

These concerns were further raised during the workshops by providers and other health managers from the region, and they all agreed that this was a significant challenge with implementing the proposed intervention in their facilities.

5.5.4 Outer Setting

5.5.4.1 Patient needs and Resources

Theme: Current physical and human resources constraints influenced provider perceptions on the feasibility of implementing the program at the facilities.

This finding was closely linked to the issue of space and privacy. A majority of stakeholders shared the perception that both facilities did not have adequate and appropriate spaces to accommodate birth companions. Common responses included that there was a need for

enlarging the maternity wing to build cubicles or build a new maternity ward with space considerations for birth companions, or that there were insufficient number of toilets.

Other providers raised concerns over the severe staff shortages in the facilities. They reasoned that for the program to be effective, additional staff would be required to accommodate the needs of the birth companions and the women. This challenge emerged during a follow-up meeting with the health providers at Mwananyamala Hospital. When asked what the hospital could do to accommodate birth companions' demands, the staff wrote the following:

“There should be enough staff to work with birth companions, for example, three birth companions calling one health provider or two health providers will cause commotion.”

Provider, Mwananyamala Hospital

Theme: Appreciation of patient needs increased provider empathy and influenced their acceptance of the intervention.

Health providers acknowledged the need for having birth companions for the sake of the patients. This prioritization of women's needs, especially from the facility leadership, played a key role in the implementation of the program. Health leaders at the facilities articulated women's needs as higher priority than their institutional fears, as illustrated in the following statement:

“Previously, I thought it [the birth companion] would be like a watchdog seeing what we do, but well, what is my interest? It is for the interest of the client, and I want the best for the clients, and I think having a companion if it worked for me as a child, why would it not work for other people or me as they are having their babies.” Facility Manager 2,

Mwananyamala Hospital

During the facility observations, one health provider stated that she had seen how women wanted to be with their relatives and vice versa, especially first-time mothers. She described how the relatives never wanted to leave the premises and continuously asked for providers' phone numbers so that they could call and check on their patients. She stated that this always pained her but she had to follow the facility's "no entry" policy, hence she appreciated and valued the potential of introducing a birth companion project at the facility.

Some providers also saw the program's potential in decreasing disrespect and abuse, as women constantly reported that they were treated poorly by providers:

"What I think is that we should continue because even these complaints about carrying the luggage and being left naked, I think the relatives will also be helping and witnessing if the pregnant women are really beaten. I expect it to be positive and we wish to continue." ANC In-Charge, Mwananyamala Hospital

Theme: Consideration of women's preferences helped in creating a birth companion model that met their needs

Women were asked to describe how they would or would not want to be supported by their companions. Most women reported that they would want their companions to encourage them by saying comforting and sweet words to them. Women also wanted their companions to provide information about what to expect during childbirth. Mostly first-time mothers who said they were unfamiliar with the birthing process raised this desire for informational support. They complained about how providers did not provide information or guidance on the process. Other women wanted assistance with carrying the baby and luggage, exercising, massaging, and providing them with tea or food. The majority of women also reported that they did not want their companions present during registration when providers took their biodata or health history.

Most Muslim women and first time mothers (mostly Christian) stated that they did not like it when providers asked them to be naked during examinations and delivery. Muslim women even suggested that there be specific gowns for delivery. They were willing to find money to purchase this gown if providers gave them instructions during ANC. The women seemed open to low-cost ideas that promoted covering their private parts. Similarly, when asked what privacy meant to them, first-time mothers responded that it meant being in a private space where other people could not see them and, more importantly, having their private parts covered. During the workshops, providers acknowledged that asking women to undress fully was not a standardized regulation. They admitted creating the norm that eventually became standard practice. Providers agreed not to ask women to strip naked during delivery and this led to the concept of intimate privacy.

The majority of women—both Christian and Muslim—were not concerned about audio privacy. They stated that they had no problems being heard as all of them were going through the same pain. Women also reasoned that the current physical space and layout of the labor rooms at both facilities do not allow male companions, despite some of them desiring companionship of their male partners. They then suggested a female birth companion, as husbands were not a realistic option considering the societal and cultural taboos of men seeing other men's wives naked. However, the impact on women's choice of not being able to choose a male companion was minimal, as the biological mother emerged as the most preferred choice by the majority of women.

Considering all these preferences, the model that later emerged met most of the women's needs. For instance, birth companions did not participate in registration, thereby protecting women's information. Women also had the option to choose or decline birth companion services.

The final model incorporated women’s desired support into the companion’s roles, while providers’ guidelines included respecting women’s privacy and confidentiality of their health data. This is illustrated in Figures 14 and 15 below.



Figure 14: Guide for facility staff to support birth companions

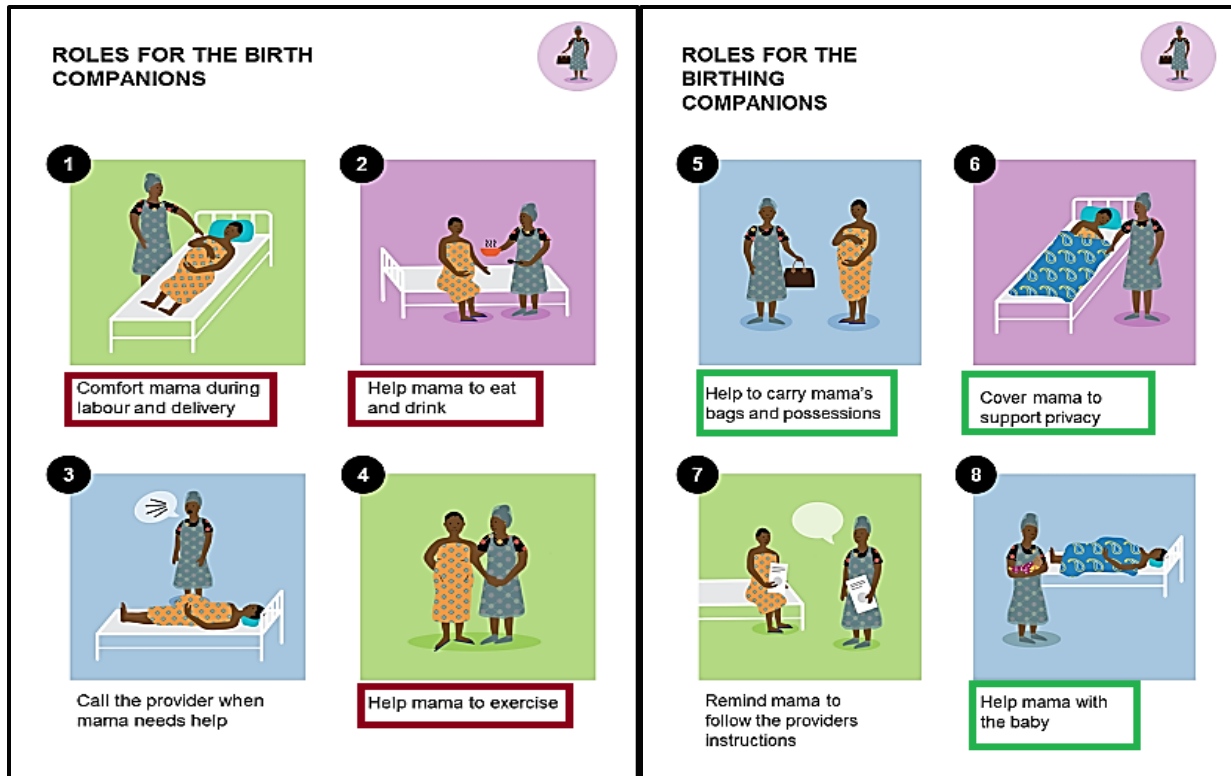


Figure 15: Roles of Birth Companions

5.5.4.2 External policies and incentives

Theme: Culture of NGO-funded compensation influenced provider buy-in and project ownership.

Providers expected financial “compensation” for participating in meetings with the program staff, researchers, and design experts. Failure to compensate the providers often resulted in provider apathy and lack of enthusiasm in the project. The Government of Tanzania has a directive that researchers or organizations doing work in the nation must pay government workers for any gathering that takes them away from their regular jobs. This policy has led to most non-governmental organizations (NGOs) compensating providers even for activities within the facility routines:

“About incentives, it is a government regulation, that anybody, particularly government employees, and if you are taking them away from their working station, you will have to provide some form of compensation. If you are not taking them away for a full day you have to provide them a sitting allowance... But when you are doing the activities within the workplace (for example most of our activities were happening within Mwananyamala Hospital), the regulation does not instruct those who are initiating the activity to pay the attendees because it is considered that they are still in their workplace. However, with the culture of NGOs working with civil servants, particularly in the health sector, you find that organizations will provide some form of incentive even if they are working with service providers within their workplace such as lunch or soft drinks. Unfortunately most providers do not prefer to have lunch or drinks. They prefer the money...you give them the cash and they decide what to spend on that. As a result, it has become a culture and many of the local organizations do expect it....service providers will always prepare themselves for some form of token, so this has become a culture, but not written anywhere within the government regulation.” Local Researcher 1

For the period of program piloting (implementation), the implementation team—which included the local researchers, one HCD expert, and the AMDD program director—partnered with facility design teams to ensure a smooth program implementation. This supposed additional role for providers necessitated a financial reward. Consequently, compensating providers who made up the design team made it more challenging to get the buy-in and support of providers who were key in execution of the project activities but were not part of the design team (i.e., not compensated). Although the providers seemed keen to take part in the program, the culture of ‘being paid to do’ stalled their support and willingness to facilitate and implement the program.

Without compensation for their time in meetings or for monitoring the program and addressing issues or challenges, providers were reluctant to support the pilot. This was acutely felt when there were new staff members who were not aware of the pilot. Often times the new staff would not inform mothers about their right to bring a birth companion because they were not being compensated to do so. The fact that several NGO initiatives were running concurrently in the facilities and were compensating the providers for their attendance, filling out additional logbooks, etc. made it even more challenging to get provider buy-in. This was well articulated by one of the design experts:

“It took me by surprise that suddenly we were paying everyone to participate in meetings, and well, I think it’s very problematic because we know we had people coming to the meetings for the wrong reasons. All their concern was signing up for payments, and they really were not engaged in the meetings, so I think it became something that we had to work against, rather something that was actually helping us in our interest. We were trying really hard to build ownership, but at the same time we were using incentives which undermine ownership, so it was difficult.” HCD Expert 1

5.5.5 Process

5.5.5.1 Engaging

Theme: The involvement and engagement of key stakeholders in the process yielded higher levels of collaboration and buy-in.

Engaging all key stakeholders in the project was a crucial step to get everybody on board, regardless of whether they participated in the main design workshop or not. Before program implementation, the local research team established fundamental relationships with key ministerial, district, and facility leaders, and this resulted in the leaders’ willingness to implement

the program in the selected facilities. The research team elaborated and expanded on the benefits of birth companionship 236sa n intervention to promote quality of care for mothers in health facilities. Through these deliberations, a majority of these high-level stakeholders became champions for program implementation in the two health facilities. Some participants expressed their enthusiasm and readiness to implement during stakeholder meetings:

“I think it is a good project to implement, and to me, it has indeed delayed to start. Majority of us like the project. If the private health facilities are doing well on that it is possible for public health facilities as well to implement this innovation. The policy is not restricting us to implement the birth companion; it’s us, the providers who are not practicing birth companion in the facilities due to our own reasons. We were limiting ourselves, it is like we were covering ourselves in a blanket, birth companionship is very important.” Participant 14, Kinondoni Council Health Management Team Meeting

“This is a good project and should have started earlier than now.” Participant 4, Kinondoni Council Health Management Team Meeting

“We are lucky as Mwananyamala Hospital because we will be the first facility to implement the BC project in Dar but also BC will reduce long labor and indirectly maternal mortality so the benefits will cut across to both mothers and providers. I need to assure my colleagues that all questions that they have on the project will be good if they will go and ask within their small department groups and see what they can do.”

Participant 3, Mwananyamala Hospital Management Team Meeting

Including the Regional Health Management Team (RHMT) members early and getting their support proved fundamental as they immediately issued an acceptance letter to conduct the pilot at Mwananyamala Hospital and Tandale Health Center. The potential of the intervention to

reduce maternal mortality, decrease disrespect and abuse, and increase facility deliveries inspired the RHMT staff. Incidentally, the then Director of Nursing and Midwifery Services became a champion of the program and accelerated the acceptance of the program at the Ministerial level:

“We tried to look for buy-in from the government side, and fortunately very early at the beginning of this project, we were able to get a champion from the ministry, and this was the Director of Nursing and Midwifery services in the Ministry of Health in Tanzania, Mr. XXXX...He was our champion because he quickly bought our idea and it was very easy for him to buy the idea because this was the time evidence on disrespect and abuse was very abundant... He said yes this is the thing that I want. He even took the initiative to convince the Minister of Health himself and the ministry bought the idea so there was a quick from the political will through him and this helped us quite a lot to start together with the government, so we were very fortunate.” AMDD/ICAP Local Researcher 1

Engaging providers from the beginning of the program and situating them at the center of the design process proved useful as providers appreciated that they were developing the program according to their priorities and requirements. This helped in building ownership and ensuring providers felt valued as stakeholders who are capable of coming up with solutions to their challenges. The following statement elaborates this finding:

“Other projects come up to you with a guideline you should follow, and that is how most projects operate, they plan and just bring to us; that’s why most challenges that arise are hard to solve.....We like this.” In-Charge, Tandale Health Center

Theme: Failure to engage other key stakeholders resulted in challenges during implementation.

Failure to involve other important stakeholders during program planning and execution resulted in significant challenges in the implementation of the project. During engagement

meetings, reflections on what was decided during the design workshops usually alleviated any remaining doubts or made those unfamiliar with the program aware of its existence. Although security personnel were not part of the health provider team, they played vital roles as enforcers of security and mandated rules and regulations of the health facilities. During the facility observations and tours, it was evident that the security team at Mwananyamala was very strict in their execution of duties compared to the security team at Tandale. In addition, one of the workshop participants raised the importance of including the security officers as they are the facilities' first line of contact with visitors:

"...but if we also had the group of the security guards. If you could conduct even mentorship because they are the first person they contact so at least if they had some information I don't think they got the information. They will not let them [birth companions] in." District Health Manager 2

However, during program execution, the implementing team failed to engage the security team. The effects of this omission were felt, as some birth companions were asked to leave the premises because the security guards did not know who they were and were not aware of the project:

"And now since the woman had been moved from the postnatal ward [to NICU], it means that the birth companion cannot remain inside the postnatal ward; she has to come out. When she comes out, she has to find a place to sit; she can then find a bench somewhere in the premises, sits there, the security officer who is responsible for that area would go and ask her what are you doing here? When she tells the security officer that I am a birth companion, I was taking care of my patient, and the baby has developed complications, and they have been moved to NICU, and I am not allowed to go; the security also doesn't

understand this story. So birth companions have been chased away in the middle of the night by the security officers because they were not engaged.” Local Researcher 1

One of the local researchers’ notes also confirmed this challenge as she stated that the security personnel’s unfamiliarity with the program at Mwananyamala Hospital caused security staff to prevent companions from entering the facilities outside visiting hours. She noted:

“One woman [birth companion] went outside of the gate to get food; by the time she came back, the security officer said no. The birth companion then called the focal person of the design team, so she explained to the security officer, and she was let into the gate.”

Local Researcher 2 Notes

Other groups erroneously omitted in the process were the Obstetricians and Gynaecologists (OB/GYNs) and the Social Welfare Officer (SWO), leading to low or no ownership of the program from these groups. During the workshops, participants suggested that the SWO be the contact person for birth companions and women in the event of grievances regarding providers. The design team and the implementation team initially failed to include her in the program process. However, when she was finally approached, the SWO expressed concern about the feasibility of the program within Mwananyamala Hospital settings. Because the OB/GYNs and the SWO were not involved early, they again raised the challenges already addressed during the design workshops and iterative discussions, stalling implementation until everyone was satisfied (Weekly Report Notes). One research team member explained the effects of not initially including OB/GYNs in the process:

“Maybe I can say for the OB/GYNs and Obstetrics, you know XXXX before you do something you need to inform someone about what you are going to do. Like if you want to implement something at Mwananyamala, we should have gotten enough information

from everybody regardless of their professions and involved the others that did not attend the workshops. Maybe in those initial engagement meetings, we could have found a better way of informing them before we started with the prototypes in the facility.” Local

Researcher 2

Ideally, design teams would have representation from all levels of the medical hierarchy to enhance project ownership as well as to identify challenges and come up with feasible solutions everyone believes can be implemented within their facility context. However, this proved difficult, as design teams from both facilities did not include representatives from different departments. Some participants voiced concern over lack of representation on the design teams, and this led to ownership being centralized among nurses and health management:

“The problem I have seen is that the design team is made up of the same profession... Having people of the same profession is a challenge it looks like the birth companion is only for the nurses and the head management of the hospital... It is not balanced; maybe if we would have a lab technician, pharmacist, of course, could be more nurses, but also two doctors leave alone the patron and head doctor but maybe from the maternity department, a medical attendant, even just one. It broadens the discussions according to the specialization of each member but this looks like an idea of certain people, for their own issues and ethics... It’s just nurses alone; that is why it’s hard in recruiting because at the antenatal not only are the nurses recruiting but doctors also, they will be like I think you can talk to this woman about your birth companion project. They don’t say “our” they use “yours.” Focal Person Design Team, Mwananyamala Hospital

In some cases, despite efforts by the implementers to engage everyone, an ever-changing staff (due to turnover, revolving visitors or trainees, and department rotations) made sustained

engagement nearly impossible. There were ongoing staff rotations from one unit to another within the hospital, coming and going of interns in and out of the hospital and across different units/departments, and staff taking leave days. This turnover meant engagement and awareness-building efforts became endless, and it led to a disconnection between staff “who know and those who do not know” about the project. One of the researchers reported this as a challenge to implementation:

“We also had a challenge with the interns because they are there for a short time, and they go, and others come in, so if we could find a way to inform them, it would have helped.” Local Researcher 3

Although staff turnover and failure by program staff to include other key personnel in the process were real challenges to implementation, the process also exposed weak communication lines in the facilities (an inner setting issue), especially at Mwananyamala Hospital. Facility managers could have communicated with various departments during staff meetings or via community-wide emails to make the intervention known.

5.5.5.2 Execution

The study also revealed the importance of allocating enough time for execution of implementation. Implementation at both facilities occurred six weeks prior to the program end date. This resulted in limited time to raise awareness and for women to recruit birth companions upon arrival at the facilities.

5.6 Discussion

The CFIR provided a useful tool to comprehensively understand the factors influencing implementation at Mwananyamala Hospital and Tandale Health Center. It enabled the identification of factors that threatened implementation barriers such as organizational culture, space limitations, culture of incentives, and poor communication skills. The CFIR also enabled identification of facilitators to implementation such as utilization of the HCD process that enabled active engagement and co-partnering between providers, mothers, and their communities to develop a feasible and acceptable birth companion program for the two facilities. Through the application of the CFIR, the inner and outer settings as well as the process domain manifested as the key domains critical to the design and implementation of the birth companion program at the two facilities.

5.6.4 Inner setting

Before program launch, space limitations emerged as a key barrier to implementation as the majority of stakeholders struggled with imagining the feasibility of the program in high-volume facilities such as Mwananyamala Hospital. Mwananyamala already suffers from congestion as women in the Antenatal ward share hospital beds. Space considerations have been reported as a main challenge in several facilities in LMICs (Abushaikha & Massah, 2013; Afulani et al., 2018; Brown et al., 2007; Brüggemann et al., 2014; Senanayake et al., 2017; Yuenyong et al., 2012; AMDD Kigoma Formative Report 2017). Stakeholders felt that space limitations threatened the privacy of women and their confidential health data. Even though providers were concerned about birth companions seeing other women during childbirth, the women were more concerned about the birth companion's gender, as they did not have problems with female companions seeing them naked. As a result, these space challenges created another

problem by limiting women's choice of companion, as stakeholders agreed that male companions were not an option in these settings. Existing evidence from other LMIC studies also report similar findings of this "female companions only" model to protect women's privacy (Afulani, et al., 2018; Brüggemann et al., 2014). The inequities created by this model due to privacy challenges remains an issue that requires additional efforts. Efforts to mitigate this inequity in other settings include provision of individual labor rooms and pro-male birth companion policies (Kululanga et al., 2012). Individual labor rooms do not have to be expensively constructed—screens or thick curtains made from local fabrics can be used. Tandale Health Center showed that it was possible to have male companions during childbirth through use of available screens to promote privacy.

Mwananyamala Hospital's inability to have every woman supported, however, demonstrated that these space challenges persist, particularly in high-volume facilities. Therefore, efforts to minimize self-referrals to regional hospitals and make health centers more desirable as birthing centers within Dar es Salaam and beyond are urgently required. Additionally, other space challenges that manifested during implementation included facilities' failure to provide accommodations for birth companions whose patients delivered overnight and experienced birth complications. Efforts to combat space issues for birth companions included providing a chair for the companions in the delivery room and postnatal ward at Mwananyamala, but these proved inadequate in cases of complications such as admission to the NICU or operating theatre.

Through collaborative efforts and use of the HCD approach, some of these space challenges waned. Tandale Health Center took advantage of the small numbers that access their facility to allow birth companions. In addition, they used the screens that they use during vaginal

examinations to create a private space for the laboring woman and her birth companion. At Mwananyamala Hospital, they decided to start with small numbers and moved around the delivery beds to create more space for the birth companion, at the same time using existing curtains as separators. These findings highlight⁵ the importance of imaginative thinking and identification of enabling factors within one's environment to initiate change.

The findings from this dissertation also showed that internal organizational cultures and standard operating procedures influenced how implementation played out. The two facilities operated on guidelines that penalize violations of set rules, including any infringement of rules set by providers. Facility heads and providers did not compromise on violations of rules and regulations by birth companions. Companions were immediately expelled from the wards, resulting in interrupted care for the women. This finding emphasizes how institutional policies and culture are an important domain to consider during implementation. In other studies, providers and unit heads wielded more power on whether or not to allow birth companions, regardless of whether a national policy exists (Kabakian-Khasholian et al., 2015; Senanayake et al., 2017). This finding illustrates the hegemony of health facilities and raises concern about the extent to which birth companions and women have agency and can advocate for more satisfying birth experiences.

It is also noteworthy that leadership engagement and support, or lack thereof, significantly influences implementation as the design teams struggled to make decisions in the absence of doctors and facility leaders. Additionally, lack of active involvement of leaders may have contributed to provider apathy and lack of interest in the program. Several providers, including OB/GYNs who are key personnel in childbirth, were unaware of the program as it was not communicated to them by facility heads. Not having the support of OB/GYNs threatened the

successful implementation of the program, as they did not identify with the program yet were principal staff in implementation and decision-making. Active leadership and top management support have been shown to promote implementation success and make interventions more likely to be routinized (Greenhalgh et al., 2004). In Ghana, leadership involvement and participation fostered the implementation of a task-shifting strategy (Gyamfi et al., 2020). In situations where ownership and buy-in are fundamental, as was the case with this birth companion program, exploring the intersection between active leadership participation and incentivization of workers is worth further exploration.

5.6.5 Outer Setting

The culture of incentives that has grown out of existing government policy and has been proliferated by international NGOs threatened the successful implementation of the program. This external policy influenced provider attitudes and buy-in. Providers who did not receive any financial reward or incentive were detached and uninterested in the program as they viewed this as additional work, negatively influencing implementation. Financial incentives for health workers have surfaced as core factors to health worker motivation in some LMICs (Willis-Shattuck et al., 2008) and are powerful in boosting providers' morale especially when provider salaries are low (Hongoro & Normand, 2006).

5.6.6 Intervention characteristics

The perceived benefits (relative advantage construct) of implementing a birth companion program in both facilities emerged as a key factor in stakeholder acceptance of the program. Stakeholders saw the benefits of having companions in the facilities as the majority of them saw how this intervention would improve women's experiences. Notably, stakeholders saw companionship as a potential strategy to reduce disrespect and abuse. Tanzania has provided

evidence of disrespect and abuse in their facilities (Mselle et al., 2019; Sando et al., 2014, 2016), which may have raised stakeholder enthusiasm and acceptance of the program. Larger-scale trials should be undertaken in the future to investigate the association between birth companionship and reduction of disrespect and abuse. Such studies are likely to provide proof of concept for policy that will likely raise acceptance of birth companion programs in LMIC facilities.

5.6.7 Process

Externally-created interventions, specifically those developed without a clear process in the decision for adoption in local contexts, can be more challenging to implement unless they are developed to suit the needs of users and other stakeholders on the frontlines (Bruce, 2014). Some facility leaders described their initial hesitance to accept the birth companion program in their facilities. They perceived the intervention to be externally influenced and therefore not feasible in Tanzania. In addition, the providers held several fears and concerns over the feasibility of including a non-clinical person in their facilities. Bohren and colleagues (2019) in their review of factors influencing birth companion programs presented a logic model in which addressing probable areas of provider resistance positively impacted implementation. The HCD approach enabled providers and women to create a birth companion program that met their needs and priorities. More importantly, the providers—who comprised the group that was most difficult to convince implementation was possible—valued that the program design and implementation was not led by program staff but providers. This approach allowed the dismantling of providers' fears and resistance areas, enhancing feasibility and acceptability of the program. These findings illustrate that stakeholders are not passive recipients of care; instead they interrogate the feasibility of these interventions in their contexts, even when these programs are backed by

evidence. From a practice perspective, these findings propose a need to increase and promote stakeholder involvement and partnership in the development of interventions that target their health and environments. Additionally, application of HCD might be a useful approach in introducing a complex intervention in an equally complex environment such as health facilities where human lives are at stake. For implementation to be successful, it is crucial to leverage stakeholders to identify their own challenges and solutions as well as test those solutions until they are apt for implementation.

Failure to engage certain key stakeholders created implementation challenges, reinforcing the importance of getting as many voices on board as possible. Although some stakeholders such as security staff did not need to participate in the design of the program, it was critical to communicate the introduction of birth companions into the health system. This finding emerged not only as a process issue, but also revealed the poor communication networks (inner setting), especially at Mwananyamala Hospital.

The time allocated for execution of birth companion programs is essential for optimal implementation. Birth companion programs require significant time to raise awareness, train birth companions and providers, as well as prepare women to adequately choose their birth companions. The rushed approach this study took interfered with awareness, as most women arrived at the facility oblivious to the program. In addition, women were told to ask whoever had accompanied them to become their birth companions, which raises the question of whether the person who escorted the woman would have been the preferred choice.

5.7 Conclusion

Overall, the findings from this data set underscore how the inner setting (organizational culture, space, leadership, etc.) emerged as a major domain that influenced the successful

implementation of the birth companion program in Dar es Salaam, Tanzania. The findings illuminated the importance of leadership, communication, space challenges, and existing institutional cultures as core factors, all of which are inner setting constructs. Although providers and key stakeholders acknowledged the benefits and relative advantage of the program, implementing it without first addressing the inner setting challenges proved difficult. The process domain was another crucial domain, as the HCD approach allowed program design and execution that promoted co-partnering with stakeholders. By so doing, most of the inner setting challenges that providers struggled with such as infection control, privacy, and confidentiality were addressed by the providers themselves. For birth companion programs to scale up in Dar es Salaam and broader Tanzania, inner setting challenges should be addressed through continuous involvement and collaboration with several key stakeholders from the ministerial level to the provider level. Utilization of participatory, experimental, and iterative approaches such as HCD are a good starting point as they enable collaborative engagement, devolution of power, and enhance ownership. Lastly, the CFIR framework's comprehensive structure illuminated how most of these constructs are interlinked. This enabled a detailed understanding of how these factors interact to influence implementation. In addition, the intersection of these constructs can signal leverage points where action can be taken by future implementers to minimize challenges during program implementation. For example, building clear intent with leadership and encouraging them to actively support lower-level staff can foster ownership, improve communication, and enhance decision-making.

5.8 Limitations

The summarization of interview and focus group data collected during the inspiration stage may have led to loss in the nuances of what participants said. Similarly, data collected in

Swahili to understand the HCD process may have lost some nuance during translation into English. However, these losses did not influence the major findings in the study. The interviewers who summarized the notes have over 10 years of experience working in the field of global health, conducting interviews and documenting notes. The author was also present during most interview sessions (though not a Swahili speaker), following the interview guide in English and encouraging more elaborate note-taking on certain key questions that answered our research questions. Post-interview discussions and review of the notes with the research team also assisted in maintaining the nuances and quality of the data. Where notes were unclear, the research team listened again to the audio recordings and refined the notes. Additionally, the research assistant who translated the transcripts is a native Swahili speaker and fluent English speaker, therefore minimizing the risk of data loss during translation. For interviews conducted via Zoom by the author, there were instances where the Internet connection interfered with audio clarity during the recording. However, the author made follow-up calls to participants for further clarification and elaboration on what the participant had said.

The author was not physically present in Tanzania throughout the study, limiting her ability to observe the HCD process and program implementation in both facilities. Power dynamics and other tensions that require direct observation might have been missed by the local research team, as exploring some of these tensions were not within AMDD's key objectives. However, the weekly reports, regular Zoom meetings, photo images, and interview data provided rich data.

The study could have also included the voices of potential birth companions and those of men prior to program implementation. The study therefore failed to provide comprehensive information on the input of these voices, especially birth companions. Companions had to adhere

to protocols created by providers without their input, and challenges such as lack of accommodations were missed and only surfaced during implementation. Men are key decision-makers in sexual and reproductive health; for a program that requires women to make choices about who should accompany them, it was imperative that they be involved early in the study. Although their voices were later sought, future studies should consider inclusion of both men and women and should explore their views early, as well as in the co-design of similar projects.

Lastly, truncated implementation time due to grant funding interfered with in depth learning and understanding of implementation factors, including comprehensive understanding of the HCD process. However, this was a pilot study, and it provided adequate information on both the HCD process and factors influencing implementation. The author believes that the pilot provided baseline evidence and can serve as a benchmark for future programs.

Chapter 6: Conclusion and Implications for Practice, Policy, and Research

6.1 Summary of dissertation

The dissertation set out to explore and reflect on the utility of the Human-Centered Design approach as it was applied in the design and implementation of a birth companion model at Mwananyamala Referral Hospital and Tandale Health Center in Dar es Salaam, Tanzania. The dissertation also explored factors that influenced the implementation of this birth companion model at the two facilities. Existing literature on both subject matters, specifically on the reflection of HCD in global health and primary studies that explore factors influencing implementation of birth companion programs in Tanzania and most of Africa, is lacking. This dissertation adds to existing literature by providing perspectives on HCD in practice, surfacing the various power dynamics, decision-making pathways, and benefits and challenges of the approach. These findings are particularly important for future practitioners of HCD as they reveal the challenges faced in practice, set a tone of what to expect, and acknowledge that HCD application is not entirely seamless. In addition, the dissertation provides empirical evidence and multiple perspectives for understanding the factors that influence implementation of birth companion programs in Tanzania. It is one of the few studies to analyze and critique the HCD approach as well as factors influencing implementation of birth companion programs in Tanzania.

Critical Systems Heuristics and the Consolidated Framework for Implementation Research were operationalized to generate a theoretical understanding of the HCD approach in practice and the factors influencing the implementation of a birth companion program in an urban setting in Tanzania. The study also sought to establish the implications of the findings for

practice, policy, and pedagogical developments to enhance quality of care during childbirth and utilization of HCD in global health. The research is timely given the renewed focus shown by the SDGs on global health care delivery and management and the prioritization of universal health coverage, which calls for a major shift towards health systems that are people-centered and respond to the needs of the people they serve (WHO, 2017). The dissertation findings provide additional and contextually-sensitive contributions to maternal health and design practice as it is applied in global health in an environment where interest in birth companion programs and human-centered design is on the rise.

The CSH framework was used as a guiding framework to critique and reflect on the HCD approach, particularly issues of inclusion, decision-making pathways, and power dynamics. The utilization of the HCD approach in global health is still nascent and, similar to other disciplines, there is no standard definition of the concept. However, despite this lack of an approved definition, there is general consensus on certain qualities and considerations that should characterize the approach as discussed in the literature synthesis of HCD in Chapter 2. Notably, the issue of inclusion of multiple actors holding diverse expertise and perspectives and always including the program user surfaced as key in the literature review. Empirical studies in maternal health that have used HCD have illustrated how they have actively included primary users in the creation of model interventions that meet their expectations (Kanagat & LaFond, 2018; Lafond & Davis, 2016; Salgado et al., 2017). While this inclusion of primary users in the co-design of interventions is the general trend and was largely corroborated in this dissertation, situating primary users (women) at the core of the co-design process proved difficult. The inherent provider fears and concerns about bringing someone with no clinical background into the health system interrupted this HCD trend, as the providers were unwilling to work with companions

before resolving their concerns. Consequently, AMDD program staff and design experts made the fundamental decision that providers would be at the core of design and implementation in order for progress to be made. This, however, does not discount the utility of HCD. Rather, it emphasizes its malleability as an approach that evolves to adapt to contextual factors. The HCD experts adjusted how women's voices were incorporated into the prototype, leading to a model that provided a better experience of childbirth than they previously had. Perhaps its lack of standard definition and a *modus operandi*—commonly thought of as its Achilles' heel—might be HCD's strength.

Although the inclusion of diverse actors with different expertise and experiences occurred in the AMDD study, bringing everyone on the journey was nearly impossible. The HCD approach seeks to engage stakeholders and create space for every stakeholder to share opinions, find solutions, and test them together. There were key voices that were erroneously omitted such as those of OB/GYNs and security personnel. These groups contributed to implementation challenges, as they were not informed about the program and asked the birth companions to leave the premises. This experience demonstrated not only poor communication across departments but also the need for rigorous secondary research on the context and settings prior to initiation of program design.

Collective decision-making characterizes HCD work, as the approach seeks to increase equity and equality among the different stakeholders involved in the project (Design for Health, n.d; Donetto et al., 2015). It is however noted from the research findings that that is not always the case, as design team nurses failed to make implementation decisions in the absence of doctors. This finding underscores how collective decision-making can be difficult in systems fraught with power asymmetry and long-established hierarchies. This is consistent with findings

presented by Farr (2018) and Kanagat and LaFond 2018) emphasizing the existence of hierarchical structures within health systems that make application of HCD complex. This pattern of reluctance to make decisions not only showcases power asymmetry within health systems but also demonstrates how the fragility of life in health facilities further perpetuates these hierarchies, as lower-level providers adhere to rigid protocols that are meant to save lives.

Human-Centered Design centers on building interventions with users so as to address their needs and expectations. Although women's needs such as desired support were incorporated in the roles of birth companions, data from this dissertation also showed that sometimes user needs are refuted, especially when they are considered unnecessary or infringe upon the needs of those with more power and authoritative knowledge. Despite women expressing the desire to carry phones into the wards, this was met with provider resistance and was non-negotiable among health facility staff, further highlighting the complex nature of applying HCD among actors with stark power differences. Health providers and administrators were also quick to state how agency in and control of the birth process reside with them because they were the custodians of life at the health facility. They further reported that birth companions had to comply with set rules and follow provider instructions, as the health facility was not "someone's house; and *could not* be run whichever way someone thinks without protocols." These findings show that the extent to which the needs of users with less power and authority are considered within contexts filled with power imbalances remains uncertain.

Other factors also surfaced that repressed women's needs. The limited privacy in existing maternity wards prohibited the use of male companions, despite some women desiring male companions. Contextual factors also play a role in the application and utility of HCD and therefore should be considered by future users of the approach. Target users may have certain

expectations and needs that are not feasible in particular contexts, and users should be encouraged to explore alternative solutions.

The use of design and HCD methodology emerged as a key challenge particularly with the research team and program staff who were all public health practitioners. The research team and the AMDD staff struggled with understanding some of the technical design language used in HCD as well as the ethics of some of the HCD methodology used during design workshops. Notably, there were tensions between HCD experts and the research team regarding how fast-paced the design workshops were. This contrasted with traditional public health research, which allows participants to respond to questions at a much slower pace. These challenges with design terminology and methodology have been reported elsewhere (Doyle et al., 2019; Kanagat & LaFond, 2018). Holeman and Kane (2019) also describe how global health researchers and practitioners often find “design language and practices startling, and may perceive them as disruptive or lacking in rigor if they are not explained well” (p. 9).

6.2 Conclusion

HCD is a useful tool in the implementation of global health programs in LMIC settings such as Tanzania. Implementation science calls for methods that promote the *integration and adoption* of evidence-based research, initiatives, and policies into routine health care practices in different settings. In this dissertation research, the principles of multi-disciplinarity, iteration, prototyping, experimentation, and malleability emerged as the pertinent mechanisms that contributed to successful program design and implementation. The worth and utility of HCD in implementation is felt and experienced when its users adhere to these key characteristics and mechanisms.

Most implementation failures recorded in global health are usually associated with program implementers rolling out evidence-based research without including frontline stakeholders in program design and implementation. Use of multidisciplinary teams in HCD is not only important in bringing new and diverse modes of thinking together but it also brings together key stakeholders that are crucial in the implementation of the approved intervention that came out of the program design. Results from this dissertation revealed that multi-disciplinarity as a key feature of HCD played a pivotal role in the implementation of the birth companion program at both facilities. An earlier oversight to include key stakeholders such as OB/GYNs and security staff during program design initially threatened implementation of the program. However, once taken aboard and their views integrated, successful program implementation ensued. Human-Centered Design thrives on utilization of multidisciplinary teams because each stakeholder brings in important insights that are beneficial to implementation. While the OB/GYNs were experts in childbirth, they were also gatekeepers of the maternity wards and key decision-makers at the health facilities. Their insights were crucial in creating a holistic and integrated approach to problem solving. Similarly, the security staff, though not experts in childbirth, were context experts as they understood and protected the health facility environment from “intruders.” By failing to include these two important users of the health system, the program implementers detracted from one of the main ethos of Human-Centered Design of including several voices and expertise. HCD’s efficacy is not only based on technical expertise. Voices that understand the context, experiences, content, and intent are crucial in designing programs that are acceptable and feasible within different contexts, therefore underwriting why multi-disciplinarity is core in HCD.

The iterative nature of HCD contributes to implementation success. Iteration allows for repeated alteration and testing of an intervention in the field before making significant financial investment in an intervention that has not been tested or accepted by its beneficiaries. Engaging in iterative cycles during program design before testing it out in the field is not only cost-effective but also enhances the feasibility and acceptability of the prototype across different contexts. During the inspiration stage, several stakeholders expressed valid fear over the introduction of a non-clinical person into the health facility. Most providers acknowledged the importance of birth companions to women; however, they questioned the feasibility and acceptability of implementing such a program within their current settings. Providers were then challenged during the ideation stage to develop models that they felt would work in their settings. Through repeated cycles of testing and changing the models using low fidelity and cheap materials, providers could see how the models could work in their facilities. These iterative cycles made implementation easier as providers developed models that they tailored to suit their environments through ongoing iteration and experimentation with the models.

The dissertation also showed that HCD spurs creativity from the bottom up and surfaces the ingenuity of frontline stakeholders, which is commonly missing in program design in traditional research. The ideation stage, with its different tools for brainstorming different solutions, distilling ideas, prototyping, and trialing, affords stakeholders the opportunity to uncover solutions that they had trouble visualizing due to lack of familiarity with the possibilities or because they are locked in an old mindset or common culture. In Dar es Salaam, the HCD approach helped address an intransigent problem within the maternal health community. A recent synthesis by Bohren and colleagues (2019) revealed how implementation of birth companions required some restructuring of the maternity wards before program roll-out.

Similarly, Kabakian- Khasholian et al. (2018) and the AMDD Kigoma Implementation Report (2019) reported how program implementers committed significant financial investments. Human-centered design emerged as an approach that was “very involving and expanded one’s creativity.” Thus, participants were prompted to think outside the box and come up with solutions to a challenge that they felt required structural modifications to be successful. Providers realized that they had the solutions all along, and that each solution was unique to their different facilities. The fast-paced process stimulated participants to think broadly about possible solutions, pushing boundaries and challenging participants in their thinking. The trend of HCD as a spark for innovation is consistent with other global health studies (Davis & LaFond, 2016; Kanagat & LaFond, 2018; Lafond & Davis, 2016; Salgado et al., 2017) and therefore offers promise as an approach to tackle some of the indeterminable challenges in global health. HCD engendered greater agency for health providers, women, and their families to express their concerns and expectations. Providers discovered a creativity and ingenuity they did not know they had. Despite initial fear to make decisions in the absence of doctors, once they received encouragement from their leaders, many felt capable of providing solutions and executing them during the implementation process. More importantly, most providers and administrators valued the bottom-up approach of the HCD process as it allowed them to create their own program without external influence from international organizations.

The dissertation also demonstrated the tensions between some of HCD’s mechanisms (of ambiguity, experimentation, and prioritization of user needs) and its utility in global health, especially in health facilities where human life is at stake. Health providers are obligated by medical ethics to prioritize human life over anything else. Maternal mortality is still an intractable challenge across most of Sub-Saharan Africa, including in Tanzania, and providers

are well aware of these sobering statistics. Because of these realities, asking providers to succumb to the needs of women and their families is a huge ask, particularly when patient needs can threaten patient lives. For example, women and birth companions might advocate against a Cesarean section; however, providers may have to override this need if the pregnancy requires a life-saving emergency surgery. Additionally, providers' concerns on bringing in a non-clinical person in a health facility, who is not trained in key medical ethics topics such as client confidentiality, infection control and privacy were all valid concerns. As a result, for this dissertation, HCD became an approach of compromise between the needs of providers and those of the women and their families. While women were the primary users of the program, implementation was only possible once the providers became the key designers of the birth companion model they implemented in their facilities.

This decision to have the providers be the key designers may spark debate on the utility of HCD in similar settings and whether it is indeed the bottom-up approach it claims to be. However, it is important to note that traditional thinking and implementation of programs excluded people on the frontlines which made the feasibility, acceptance, and utilization of programs difficult. Initiatives were usually designed in different contexts and forced on stakeholders in developing nations. At the very least, HCD strips off this global hegemony and allows people on the frontlines to be in charge of the design and implementation of programs that meet their needs and suit their specific contexts. While women were not the primary designers, their needs were incorporated in the process. It is paramount to emphasize that the implementation occurred within health facilities, so it was sensible that the gatekeepers of the facilities be included in the creation of a program that worked in their contexts.

Human-centered design, as its name suggests, is centered in understanding humans and creating programs that suit a particular group of human beings. Human beings are complex, diverse, and ever-evolving together with their existing contexts. Consequently, HCD also evolves to adapt to the changing nature of humans and their contexts. Although its application should include its core characteristics, the mechanisms are malleable which makes HCD unique and useful in global health. For instance, in this dissertation women reported pervasive disrespect and abuse from providers during the inspiration stage of data gathering. Therefore, putting providers and women under one setting during ideation was not feasible. Instead, the HCD experts and local research team met the providers and the women in different settings, captured their needs, and incorporated these needs into the model later implemented. HCD calls for multiple disciplines and voices, but capturing those multiple voices might not occur in one setting especially if tensions or power asymmetry can threaten data gathering.

The dissertation also surfaced the prevalent power structures and asymmetry across developmental global health work. Human-centered design seeks to distribute power among stakeholders, yet the findings show that decentering of power might not always be plausible in institutions with inherent bureaucratic norms and structures. However, the issue was not that HCD failed to dissolve the power hierarchies; its application was flawed in that we zoomed in on the women and the frontline maternity health providers that they worked with instead of taking a broader look at the health facility system and beyond. By failing to recognize that HCD is a multi-disciplinary and systemic approach, we missed some of the stakeholders that held power at the facilities, which threatened implementation in the initial stages.

HCD utility is therefore a function of the characteristics that make up the approach and the execution of the approach. This dissertation illustrated that while laymen can understand the

core features of the approach, inclusion of HCD experts in the process assists in the successful execution of the approach which ultimately leads to successful implementation. Although tensions arose between local research teams and the HCD experts during the workshops, the tensions were easily resolved during a meeting where both parties explained their concerns.

Regarding implementation of birth companion programs in health settings such as Tandale Health Center and Mwananyamala Hospital, the dissertation illustrated that it is feasible, acceptable, and can be done without huge financial investments. There is a significant opportunity to adopt this model across Tanzania and in other settings with comparable contexts. What made this model feasible and acceptable is the Human-Centered Design approach that enabled a shift in the mindset of providers, sparked innovation, and allowed them to develop and test their own solutions without imposition from program planners. The Human-Centered Design approach therefore offers opportunities to design and implement interventions that are acceptable by users and other key stakeholders on the frontlines, leading to increased use and positive outcomes. HCD should not, however, be viewed as an antidote to all complex public health challenges. The power dynamics it seeks to dismantle are sometimes difficult to disrupt. Considerable efforts to locate where the power lies and how it can be reconfigured are necessary in the utilization of HCD. Application of HCD should prioritize the different contexts and evolve and adapt to suit the complexities within each context, yet at the same time maintain the major characteristics that separate it from other participatory approaches.

6.3 Recommendations for utilizing the HCD approach in global health

Human-Centered Design is not a silver bullet to addressing global health's wicked problems, nor is it an elixir in eradicating paternalistic and power hierarchies in health settings. However, it provides guidance in identifying and navigating through the problems and power

imbalances. HCD can work effectively together with the CSH framework. CSH would be most useful if used dynamically over time as an ongoing critical framework for HCD. Boundary questions regarding control and legitimacy should be ongoing during utilization of HCD to enable recognition and dialogue over power and equity.. Failure to ask these questions during utilization of HCD runs the risk of turning HCD into a buzzword that makes a program look great, yet exercising the same top-down paternalistic approaches that HCD seeks to disrupt. In addition, application of HCD in global health is different from its application in the technology world where focus is on one principal user. Global health is complex and beneficiaries do not exist in isolation. Rather, they form part of a broader network layered with power dynamics, cultural norms, and other complexities. It is therefore important that application of HCD in such settings adopt some form of systems mapping to uncover these diverse pathways and complexities and how they ultimately influence the targeted user's ability to make decisions.

Having HCD experts throughout the process is essential as they provide the technical expertise that enable the mechanisms underlying the core characteristics of the approach to be effective. This, however, comes at a cost, and proponents of HCD should have a budget to finance HCD experts. HCD experts' worth is felt when they remain in the country of implementation for a protracted period of time, as this enables them to familiarize themselves with the context and the different stakeholders for whom they are designing. One of the reasons HCD might seem ineffective and top-down is because HCD experts, who are usually expatriates, gather data and go back to their countries to design prototypes and then return to implement. This is a failure of the practitioners of the approach, not the approach itself, and it is important that this distinction is made. Program implementation in Tanzania was successful because one of

the HCD experts stayed in the country, frequented the facilities, and worked with women and providers, trialing and altering the model until it was ready for implementation.

6.4 Implications for Practice

1. The dissertation findings demonstrated that implementation of birth companionship in low-resource facilities is possible with few resources and no renovations. Smaller health facilities such as Tandale Health Center can utilize screens normally used during vaginal examinations. Bigger institutions like Mwananyamala Hospital can invest in acquiring low-cost cotton curtains to increase visual privacy. While audio privacy can be improved in facilities, it is important to note that in settings where disrespect and abuse of women is widespread, enhancing audio privacy can exacerbate mistreatment of women. This is particularly possible in settings where the advocacy role of birth companions is still less established.
2. Implementation of birth companion programs in government facilities and other similar contexts requires collaborative efforts by different stakeholders and a recognition of the power asymmetry across the groups. Collaborative and co-design approaches such as HCD are a step in the right direction. The selection of target audiences in the creation of these interventions should be guided not only by those with the technical expertise, but should also consider experience, need, and intention, among other factors. Women do not live in isolation but are surrounded by communities and individuals who are influential in decision-making on sexual and reproductive matters such as childbirth.
3. Provider fears and concerns, particularly around the introduction of a non-clinical person in a setting that operates on high standards of sterility and confidentiality, are real.

Overlooking these inner setting issues and provider attitudes creates serious implementation challenges. Providers should be allowed to raise these concerns, but at the same time allowed to identify solutions that address their particular contexts.

4. Birth companion programs in settings similar to Dar es Salaam might take another form and function. While the WHO promotes companions of choice, in settings such as Dar es Salaam this might not be possible. This is not necessarily due to patriarchy and women's inability to make choices, but because of existing maternity structures that inhibit the introduction of male companions to maintain privacy. Such programs should be driven by governments but involve the private sector, international organizations, and other important stakeholders in combining resources to ensure that maternity wards provide adequate structural privacy to include male companions. The WHO also advocates for continuous support and that companions provide mostly emotional and psychosocial support to the mother. In settings similar to this study, companionship might not be continuous nor primarily emotional support as previously discussed. Women valued the practical support that seemed to be lacking in these facilities. Practical support possibly has an influence on the psychosocial aspect of care and therefore should be fully encouraged as an important complement to emotional support. Additionally, in facilities with severe staff shortages, the companion's role of triaging and alerting providers when the condition of the woman changes is possible. However, providers should be instructed to regularly check on patients instead of trusting that the companions will notify them.
5. Utilization of HCD to design services in health facilities should not be synonymized with HCD or DT in technical and engineering fields that are mostly driven by product usability (Nielsen, 1994) and in some cases maximization of profit (Altman et al., 2018).

Future users of HCD within health settings should realize the complexity and sensitivity of such settings where human life is prioritized. In these settings, the practicality and technicality of producing objects is overridden by the existential priorities, and HCD becomes an approach of compromise. In this dissertation, providers became the primary co-designers instead of women because of their deep rooted concerns on issues such as infections that impact mortality and morbidity. In this dissertation, the author settled for Simon's (1996) understanding of design that it helps in finding satisfactory and better solutions. By situating providers at the center of co-design instead of women, the author acknowledged the complexity of health facilities and opted to create a birth companion model that incorporated some of the women's needs and made their birthing experience better than it previously was. However, key questions arise as to whether a birth companion in such settings can be advocates for women. The online Merriam-Webster dictionary defines an advocate as "one who defends or maintains a cause or proposal, or one who supports or promotes the interests of a cause or group." The findings from this dissertation indicate that this type of advocacy might be impossible because of the health facility hegemony and the prioritization of human life. In addition, to what extent will a birth companion with minimal education who is socialized in a culture that views providers as more knowledgeable advocate for women, especially in incidences of disrespect and abuse? Perhaps advocacy in such settings will take the form of that described by Bohren and colleagues (2019). According to them, advocacy involved companions witnessing childbirth and sharing and observing the childbirth experience so as to monitor, reflect, and report on the proceedings. This witnessing also involved witnessing the labor pain and the transition of women to motherhood.

6. Active leadership is paramount in the efficacy of HCD, especially in health facility settings and other settings where financial incentives are used as motivators. HCD thrives when there is ownership and buy-in. Health facility managers should prioritize their active engagement and support to lower-level providers when launching initiatives that might be viewed as additional work by health providers. Implementers should make deliberate efforts to build and understand the intent of facility leaders during the initial stages of the program. Additionally, implementers need to identify leaders who are or can become champions for interventions, as these can boost provider willingness to take part in the implementation process.
7. It is important to identify and understand the locus of power and how it affects the collaborative and co-creation exercises in HCD. In this dissertation, the HCD experts recognized the power differences between providers and the women and utilized alternative methods to still involve women in intervention design. While it is important in HCD for participants to sit together in workshops and co-design, the acknowledgement of the different power hierarchies and acting upon them can be more rewarding than overlooking the fact that the power differentials exist.

6.5 Implications for Policy

1. Reducing maternal and neonatal mortality are priority areas in Tanzania, with a primary objective of halving the current rates within five years since joining the quality of care network. Furthermore, the government of Tanzania has elevated the importance of RMC in its maternal health efforts, and the inclusion of birth companions in the health system is one key effort advocated by the World Health Organization. The Tanzanian government should be applauded for demonstrating commitment to improve MNH. This

dissertation shows that implementation of birth companionship is possible with minimal resources and without significant restructuring of the maternity wards. Such findings provide valuable evidence to incite creation of a national policy that allows the introduction of birth companions in facilities. The policy would, however, require government and other key stakeholder efforts to avail resources for structural privacy and reasonable accommodations for birth companions. It would also require establishment at the government level of a birth companionship task force to help design and monitor the implementation of the intervention in different settings. Working with the local research team that spearheaded the design and implementation of the program at the two facilities is an important step, as they will provide valuable information in the navigation of the process. In instituting policies on birth companionship, training of companions should be reinforced. However, training should aptly consider the context of the implementing facility, as training may not be possible during ANC (Bohren et al., 2019). This dissertation showed that training of birth companions during ANC for referral health facilities such as Mwananyamala is not feasible. ANC at Mwananyamala Hospital is designated for complicated cases. Women, however, bypass primary health centers and go to Mwananyamala for “better” care. Training of birth companions should be provided upon arrival through use of educational materials or short briefings from providers for illiterate companions (Bohren et al., 2019).

2. The government of Tanzania should integrate the inclusion of male companions in their current policy of male involvement during SRH activities to increase women’s options in choosing desired companions. Although this dissertation only showed one incident of a male companion at Tandale Health Center, it demonstrated that it is possible even within

facilities that for a long time believed their structural challenges prohibited the presence of male companions. Maternity health workers should be encouraged to include male companions where possible—for instance, during non-peak seasons when the delivery rooms are not fully occupied—until alternative methods are in place to fully accommodate male companions.

3. The Tanzania Ministry of Health Division of Nursing and Midwifery identified respectful and compassionate care, the strengthening of the user and midwife relationship, and end-user satisfaction as priority areas in the delivery of maternity care. The study showed that utilization of the HCD approach assisted in enhancing relationships and user satisfaction. The Nursing and Midwifery division can include more participatory and people-centered approaches in their efforts to promote all three aforementioned factors. This will require investments and training of task force teams involved in promoting RCC and user satisfaction in people-centered approaches.

6.6 Implications for Research

1. Using the CFIR framework revealed that one of the relative advantages of introducing birth companion programs is the potential for companions to reduce disrespect and abuse. This dissertation failed to establish this association due to time constraints; however, future studies should explore this association and provide insights into whether companions do indeed reduce disrespect and abuse.
2. In this dissertation, providers oriented companions upon arrival using leaflets. However, there were instances when companions violated certain rules on the education materials. This may have been due to the short nature of the orientation sessions provided. Further research is therefore needed to understand if ad-hoc training upon arrival at facilities

compared to more protracted training during ANC has an effect on compliance with rules, quality of support provided, documented clinical health outcomes, and user satisfaction.

3. To my knowledge, this is the first study that sought to understand how HCD reconfigures power relations and decision-making pathways in Tanzania, if not SSA. While the study surfaced the locus of power as well as methods and challenges in reconfiguring these power dynamics, more studies exploring these variables within the region are required. These studies will also need to closely explore and critique the inclusion of the users and the extent to which they are representative of other users.

Chapter 7: References

- Abushaikha, L., & Massah, R. (2012). The Roles of the Father During Childbirth: The Lived Experiences of Arab Syrian Parents. *Health Care for Women International*, *33*(2), 168–181.
<https://doi.org/10.1080/07399332.2011.610534>
- Abushaikha, L., & Massah, R. (2013a). Perceptions of barriers to paternal presence and contribution during childbirth: An exploratory study from Syria. *Birth*, *40*(1), 61–66.
<https://doi.org/10.1111/birt.12030>
- Abushaikha, L., & Massah, R. (2013b). Perceptions of barriers to paternal presence and contribution during childbirth: An exploratory study from Syria. *Birth*, *40*(1), 61–66.
<https://doi.org/10.1111/birt.12030>
- Abuya, T., Warren, C. E., Miller, N., Njuki, R., Ndwiga, C., Maranga, A., ... Bellows, B. (2015). Exploring the Prevalence of Disrespect and Abuse during Childbirth in Kenya. *PloS One*, *10*(4), e0123606. <https://doi.org/10.1371/journal.pone.0123606>
- Afulani, P. A., Diamond-Smith, N., Golub, G., & Sudhinaraset, M. (2017). Development of a tool to measure person-centered maternity care in developing settings: Validation in a rural and urban Kenyan population. *Reproductive Health*, *14*(1), 1–18.
<https://doi.org/10.1186/s12978-017-0381-7>
- Afulani, P., Kusi, C., Kirumbi, L., & Walker, D. (2018). Companionship during facility-based childbirth: Results from a mixed-methods study with recently delivered women and providers in Kenya. *BMC Pregnancy and Childbirth*, *18*(1), 1–28.
<https://doi.org/10.1186/s12884-018-1806-1>

- Akhavan, S., & Edge, D. (2012). Foreign-Born Women's Experiences of Community-Based Doulas in Sweden-A Qualitative Study. *Health Care for Women International*, 33(9), 833–848. <https://doi.org/10.1080/07399332.2011.646107>
- Alexander, A., Mustafa, A., Emil, S. A. V., Amekah, E., Engmann, C., Adanu, R., & Moyer, C. A. (2014). Social support during delivery in Rural Central Ghana: A mixed methods study of women's preferences for and against inclusion of a lay companion in the delivery room. *Journal of Biosocial Science*, 46(5), 669–685. <https://doi.org/10.1017/S0021932013000412>
- Altfeld, S. (2002). *The Chicago Doula Project Final Report*.
- Altman M, Huang TTK, B. J. (2018). Design Thinking in Health Care - NEJM Knowledge+. *Preventing Chronic Disease: Public Health Research, Practice and Policy*, 15(E117), 1–13.
- Altman M, H. T. (2018). Design Thinking in Health Care. *Public Health Research, Practice, and Policy*, 15(E117), 1–13.
- Andrewes, L., Moorthy, A., & McMurray, A. (2016a). Disrupting conventions in development: from 'beneficiaries' to 'co-designers.' *International Perspectives on Business Innovation and Disruption in Design*, 95–117. <https://doi.org/10.4337/9781784716646.00012>
- Andrewes, L., Moorthy, A., & McMurray, A. (2016b). Disrupting conventions in development: From "beneficiaries" to "co-designers." *International Perspectives on Business Innovation and Disruption in Design*, 95–117. <https://doi.org/10.4337/9781784716646>
- Andrews, M., Pritchett, L., & Woolcock, M. (2013). Escaping Capability Traps Through Problem Driven Iterative Adaptation (PDIA). *World Development*, 51, 234–244. <https://doi.org/10.1016/j.worlddev.2013.05.011>

- Asuquo, E., Etuk, S., & Duke, F. (2000). Staff Attitude as a Barrier to the Utilisation of University of Calabar Teaching Hospital for Obstetric Care. *African Journal of Reproductive Health*, 4(2), 69–73. <https://doi.org/10.4314/AJRH.V4I2.7711>
- Baldisserotto, M. L., Theme Filha, M. M., & Da Gama, S. G. N. (2016). Good practices according to WHO's recommendation for normal labor and birth and women's assessment of the care received: The "birth in Brazil" national research study, 2011/2012. *Reproductive Health*, 13(Suppl 3). <https://doi.org/10.1186/s12978-016-0233-x>
- Banda, G., Kafulafula, G., Nyirenda, E., Taulo, F., & Kalilani, L. (2010). Acceptability and experience of supportive companionship during childbirth in Malawi. *BJOG: An International Journal of Obstetrics and Gynaecology*, 117(8), 937–945. <https://doi.org/10.1111/j.1471-0528.2010.02574.x>
- Bazzano, A. N., & Martin, J. (2017). Designing Public Health: Synergy and Discord. *Design Journal*, 20(6), 735–754. <https://doi.org/10.1080/14606925.2017.1372976>
- Bazzano, A. N., Martin, J., Hicks, E., Faughnan, M., & Murphy, L. (2017). *Human-centred design in global health : A scoping review of applications and contexts*. 1–24.
- Behruzi, R., Hatem, M., Goulet, L., Fraser, W., & Misago, C. (2013). Understanding childbirth practices as an organizational cultural phenomenon: A conceptual framework. *BMC Pregnancy and Childbirth*, 13. <https://doi.org/10.1186/1471-2393-13-205>
- Berg, M., & Terstad, A. (2006). Swedish women's experiences of doula support during childbirth. *Midwifery*, 22(4), 330–338. <https://doi.org/10.1016/j.midw.2005.09.006>
- Bey, A., Brill, A., Porschia-Albert, C., Gradilla, M., & S. N. (2019). *ADVANCING BIRTH*

JUSTICE : Models as a Standard of Care for Ending Racial Disparities.

- Bohren, M. A., Berger, B. O., Munthe-Kaas, H., & Tunçalp, Ö. (2019). *Perceptions and experiences of labour companionship : a qualitative evidence synthesis (Review)*. (3).
<https://doi.org/10.1002/14651858.CD012449.pub2>.www.cochranelibrary.com
- Bohren, M., Hofmeyr, G., Sakala, C., Fukuzawa, R., & Cuthbert, A. (2017a). Continuous support for women during childbirth(Review). *Cochrane Database of Systematic Reviews*, 8(7), 1–8. <https://doi.org/10.1002/14651858.CD003766.pub6>.www.cochranelibrary.com
- Bohren, M., Hofmeyr, G., Sakala, C., Fukuzawa, R., & Cuthbert, A. (2017b). Continuous support for women during childbirth(Review). *Cochrane Database of Systematic Reviews*, 8(7), 1–8. <https://doi.org/10.1002/14651858.CD003766.pub6>.www.cochranelibrary.com
- Bohren, M.A, Hofmeyr, G. ., Sakala, C., Fukuzawa, R. ., & Cuthbert, A. (2017). Continuous support for women during childbirth. *Cochrane Database of Systematic Reviews*, 2017(7).
<https://doi.org/10.1002/14651858.CD003766.pub6>
- Bohren, Meghan A., Munthe-Kaas, H., Berger, B. O., Allanson, E. E., & Tunçalp, Ö. (2019). Perceptions and experiences of labour companionship: A qualitative evidence synthesis. *Cochrane Database of Systematic Reviews*, 2019(12).
<https://doi.org/10.1002/14651858.CD012449>
- Bohren, Meghan A, Hofmeyr, G. J., Sakala, C., Fukuzawa, R. K., & Cuthbert, A. (2017). Continuous support for women during childbirth. *The Cochrane Database of Systematic Reviews*, 7, CD003766. <https://doi.org/10.1002/14651858.CD003766.pub6>
- Bohren, Meghan A, Hunter, E. C., Munthe-Kaas, H. M., Souza, J. P., Vogel, J. P., &

- Gülmezoglu, A. M. (2014). Facilitators and barriers to facility-based delivery in low- and middle-income countries: a qualitative evidence synthesis. *Reproductive Health, 11*(1), 71. <https://doi.org/10.1186/1742-4755-11-71>
- Bowser, D., & Hill, M. P. H. K. (2010). *Exploring Evidence for Disrespect and Abuse in Facility-Based Childbirth Report of a Landscape Analysis*.
- Boyes, B. (2019). Co-creative approaches to knowledge production and implementation series (part 6): What qualities and considerations should characterise co-creative research?. Retrieved from <https://realkm.com/2019/10/30/co-creative-approaches-to-knowledge-production-and-implementation-series-part-6-what-qualities-and-considerations-should-characterise-co-creative-research/>
- Breedlove, G. (2005). Perceptions of Social Support from Pregnant and Parenting Teens Using Community-Based Doulas. *Journal of Perinatal Education, 14*(3), 15–22. <https://doi.org/10.1624/105812405X44691>
- Brown, T & Wyatt, J. (2010). Design_Thinking_for_Social_Inn. *Stanford Social Innovation Review, 8*(1), 31–35.
- Brown, H., Hofmeyr, G. J., Nikodem, V. C., Smith, H., & Garner, P. (2007). Promoting childbirth companions in South Africa: A randomised pilot study. *BMC Medicine, 5*, 1–8. <https://doi.org/10.1186/1741-7015-5-7>
- Brown, T. (2008). Deisgn thinking. *Harvard Business Review, 86*(6), 84–92. <https://doi.org/10.1002/med>
- Bruce, J. E. (2014). *Applying Implementation Science to Improve Adherence to Clinical*

Guidelines in Asthma Care : A Public Health Practice Dissertation to Improve the utilization of Asthma Action Plans in Tennessee.

- Brüggemann, O. M., Ebsen, E. S., Oliveira, M. E. de, Gorayeb, M. K., & Ebele, R. R. (2014). Reasons which lead the health services not to allow the presence of the birth companion: nurses' discourses TT - Motivos que levam os serviços de saúde a não permitirem acompanhante de parto: discursos de enfermeiros TT - Motivos que llevan a los s. *Texto & Contexto - Enfermagem*, 23(2), 270–277. <https://doi.org/10.1590/0104-07072014002860013>
- Bruggemann, O. M., Parpinelli, M. A., Osis, M. J. D., Cecatti, J. G., & Neto, A. S. C. (2007). Support to woman by a companion of her choice during childbirth: A randomized controlled trial. *Reproductive Health*, 4, 1–7. <https://doi.org/10.1186/1742-4755-4-5>
- Buchanan, R. (1992). Wicked Problems Thinking in Design. *Design Issues*, 8(2), 5–21.
- Buse, C. (2013). Intersectoral action for health equity as it relates to climate change in Canada: Contributions from critical systems heuristics. *Journal of Evaluation in Clinical Practice*, 19(6), 1095–1100. <https://doi.org/10.1111/jep.12069>
- Campbell, A. . (2017). Lay Designers: Grassroots Innovation for Appropriate Change. *DesignIssues*, 33(1). <https://doi.org/10.1162/DESI>
- Campbell, D. A., Lake, M. F., Falk, M., & Backstrand, J. R. (2006). A randomized control trial of continuous support in labor by a Lay Doula. *JOGNN - Journal of Obstetric, Gynecologic, and Neonatal Nursing*, 35(4), 456–464. <https://doi.org/10.1111/j.1552-6909.2006.00067.x>
- Campbell, D., Scott, K. D., Klaus, M. H., & Falk, M. (2007). Female relatives or friends trained

as labor doulas: Outcomes at 6 to 8 weeks postpartum. *Birth*, 34(3), 220–227.

<https://doi.org/10.1111/j.1523-536X.2007.00174.x>

Campbell, O. M. R., Calvert, C., Testa, A., Strehlow, M., Benova, L., Keyes, E., ... Bailey, P. (2016). The scale, scope, coverage, and capability of childbirth care. *The Lancet*, 388(10056), 2193–2208. [https://doi.org/10.1016/S0140-6736\(16\)31528-8](https://doi.org/10.1016/S0140-6736(16)31528-8)

Campero, L., García, C., Díaz, C., Ortiz, O., Reynoso, S., & Langer, A. (1998). “Alone, I wouldn’t have known what to do”: A qualitative study on social support during labor and delivery in Mexico. *Social Science and Medicine*, 47(3), 395–403. [https://doi.org/10.1016/S0277-9536\(98\)00077-X](https://doi.org/10.1016/S0277-9536(98)00077-X)

Catalani, C., Green, E., Owiti, P., Keny, A., Diero, L., Yeung, A., ... Biondich, P. (2014). A clinical decision support system for integrating tuberculosis and HIV care in Kenya: A human-centered design approach. *PLoS ONE*, 9(8). <https://doi.org/10.1371/journal.pone.0103205>

Chalmers, B., & Wolman, W. (1993). Social support in labor - a selective review. *Journal of Psychosomatic Obstetrics and Gynecology*, 14(1), 1–15. <https://doi.org/10.3109/01674829309084426>

Chalmers, B., Wolman, W. L., Nikodem, V. C., Gulmezoglu, a M., & Hofmeyer, G. J. (1995). Companionship in labour: do the personality characteristics of labour supporters influence their effectiveness. *Curationis*, 18(4), 77–80.

Churchman, C. W. (1967). Letter to the Editor. *Science*, 155(3765), 953–953. <https://doi.org/10.1126/science.155.3765.953-b>

- Clewett, N., & Pinfold, V. (2015). *Evaluation of Birth Companions ' Community Link Service Report produced July 2015*. (July).
- Cogan, R., & Spinnato, J. A. (1988). Social support during premature labor: Effects on labor and the newborn. *Journal of Psychosomatic Obstetrics and Gynecology*, 8(3), 209–216.
<https://doi.org/10.3109/01674828809016789>
- Cole, C. B., Pacca, J., Mehl, A., Tomasulo, A., van der Veken, L., Viola, A., & Ridde, V. (2018). Toward communities as systems: a sequential mixed methods study to understand factors enabling implementation of a skilled birth attendance intervention in Nampula Province, Mozambique. *Reproductive Health*, 15(1), 132. <https://doi.org/10.1186/s12978-018-0574-8>
- Coley, S. L., & Nichols, T. R. (2016). *Understanding Factors That Influence Adolescent Mothers ' Doula Use : A Qualitative Study*. 25(1), 46–56.
- Damschroder, L. J., Aron, D. C., Keith, R. E., Kirsh, S. R., Alexander, J. A., & Lowery, J. C. (2009). Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implementation Science*, 4(1), 50. <https://doi.org/10.1186/1748-5908-4-50>
- Dare, S. (2018). *A multilevel mixed methods study of neonatal mortality in Ghana*. University of Glasgow.
- Darwin, Z., Green, J., McLeish, J., Willmot, H., & Spiby, H. (2017). Evaluation of trained volunteer doula services for disadvantaged women in five areas in England: women's experiences. *Health and Social Care in the Community*, 25(2), 466–477.
<https://doi.org/10.1111/hsc.12331>

- Davis-Floyd, R. (2001). The technocratic, humanistic, and holistic paradigms of childbirth. *International Journal of Gynecology and Obstetrics*, 75(SUPPL. 1), 5–23.
[https://doi.org/10.1016/S0020-7292\(01\)00510-0](https://doi.org/10.1016/S0020-7292(01)00510-0)
- Davis, N & LaFond, A. (2016). *The Use of Design Thinking in MNCH Programs: A Case Study of the Care Community Hub (CCH) Pilot, Ghana*. (December), 1–45. Retrieved from
https://www.jsi.com/JSIInternet/Inc/Common/_download_pub.cfm?id=18332&lid=3
- Deitrick, L. M., & Draves, P. R. (2008). Attitudes towards Doula Support during Pregnancy by Clients, Doulas, and Labor-and-Delivery Nurses: A Case Study from Tampa, Florida. *Human Organization*, 67(4), 397–406. <https://doi.org/10.2307/44127804>
- DeJonckheere, M., & Vaughn, L. M. (2019). Semistructured interviewing in primary care research: A balance of relationship and rigour. *Family Medicine and Community Health*, 7(2), e000057. <https://doi.org/10.1136/fmch-2018-000057>
- Denend, L., Lockwood, A., Barry, M., & Zenios, S. (2014). Meeting the Challenges of Global Health. *Stanford Social Innovation Review*, 12(2), 34–41.
<https://doi.org/10.1109/MPER.1986.5528036>
- Diamond-Smith, N., Sudhinaraset, M., Melo, J., & Murthy, N. (2016). The relationship between women’s experiences of mistreatment at facilities during childbirth, types of support received and person providing the support in Lucknow, India. *Midwifery*, 40, 114–123.
<https://doi.org/10.1016/j.midw.2016.06.014>
- Diniz, C. S., d’Orsi, E., Domingues, R. M., Torres, J. A., Dias, M. A., Schneck, C. A., ... Sandall, J. (2014). Implementation of the presence of companions during hospital admission for childbirth: data from the Birth in Brazil national survey. *Cadernos de Saude Publica*, 30

Suppl 1(November 2015), S1-14. <https://doi.org/S0102-311X2014001300020> [pii]

DiRusso, S. (2016). *Understanding the behaviour of design thinking in complex environments A thesis submitted for the degree of Doctor of Philosophy*. 310.

Docherty, C. (2017). Perspectives on Design Thinking for Social Innovation. *Design Journal*, 20(6), 719–724. <https://doi.org/10.1080/14606925.2017.1372005>

Donetto, S., Pierri, P., Tsianakas, V., & Robert, G. (2015). Experiencebased co-design and healthcare improvement: Realizing participatory design in the public sector. *Design Journal*, 18(2), 227–248. <https://doi.org/10.2752/175630615X14212498964312>

Downe, S., Finlayson, K., Tunçalp, & Metin Gülmezoglu, A. (2016). What matters to women: A systematic scoping review to identify the processes and outcomes of antenatal care provision that are important to healthy pregnant women. *BJOG: An International Journal of Obstetrics and Gynaecology*, 123(4), 529–539. <https://doi.org/10.1111/1471-0528.13819>

Downe, Soo, Finlayson, K., Oladapo, O. T., Bonet, M., & Gülmezoglu, A. M. (2018). Correction: What matters to women during childbirth: A systematic qualitative review (PLoS ONE (2018) 13:4 (e0194906) DOI 10.1371/journal.pone.0194906). *PLoS ONE*, 13(5), 1–17. <https://doi.org/10.1371/journal.pone.0197791>

Downe, Soo, & Gülmezoglu, A. M. (2017). Turning local knowledge and experience into innovative tools for quality care during labor and childbirth: The BOLD project experience. *International Journal of Gynecology and Obstetrics*, 139(December), 1–3. <https://doi.org/10.1002/ijgo.12377>

Doyle, A. M., Mulhern, E., Rosen, J., Appleford, G., Atchison, C., Bottomley, C., ...

Weinberger, M. (2019a). *Open Peer Review Challenges and opportunities in evaluating programmes incorporating human-centred design: lessons learnt from the evaluation of Adolescents 360* [version 2; peer review: 3 approved].

<https://doi.org/10.12688/gatesopenres.12998.1>

Doyle, A. M., Mulhern, E., Rosen, J., Appleford, G., Atchison, C., Bottomley, C., ...

Weinberger, M. (2019b). *Open Peer Review Challenges and opportunities in evaluating programmes incorporating human-centred design: lessons learnt from the evaluation of Adolescents 360* [version 2; peer review: 3 approved].

<https://doi.org/10.12688/gatesopenres.12998.1>

Dundek, L. H. (2006). Establishment of a Somali Doula Program at a large Metropolitan Hospital. *Journal of Perinatal and Neonatal Nursing*, 20(2), 128–137.

<https://doi.org/10.1097/00005237-200604000-00006>

Dynes, M. M., Binzen, S., Twentyman, E., Nguyen, H., Lobis, S., Mwakatundu, N., ...

Serbanescu, F. (2019). Client and provider factors associated with companionship during labor and birth in Kigoma Region, Tanzania. *Midwifery*, 69, 92–101.

<https://doi.org/10.1016/j.midw.2018.11.002>

Eccles, M. P., & Mittman, B. S. (2006, December 22). Welcome to implementation science.

Implementation Science, Vol. 1, p. 1. <https://doi.org/10.1186/1748-5908-1-1>

Farr, M. (2018). Power dynamics and collaborative mechanisms in co-production and co-design processes. *Critical Social Policy*, 38(4), 623–644.

<https://doi.org/10.1177/0261018317747444>

Faulkner, W. (2016). *Critical System Heuristics*.

- Flyvbjerg, B. (2006). Five misunderstandings about case-study research. *Qualitative Inquiry*, 12(2), 219–245. <https://doi.org/10.1177/1077800405284363>
- Freedman, L. P. (2016a). Implementation and aspiration gaps: whose view counts? *The Lancet*, 388(10056), 2068–2069. [https://doi.org/10.1016/S0140-6736\(16\)31530-6](https://doi.org/10.1016/S0140-6736(16)31530-6)
- Freedman, L. P. (2016b). Implementation and aspiration gaps: whose view counts? *The Lancet*, 388(10056), 2068–2069. [https://doi.org/10.1016/S0140-6736\(16\)31530-6](https://doi.org/10.1016/S0140-6736(16)31530-6)
- Gale, N. K., Heath, G., Cameron, E., Rashid, S., & Redwood, S. (2013). Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC Medical Research Methodology*, 13(1), 117. <https://doi.org/10.1186/1471-2288-13-117>
- Gates, E. F. (2018). Toward Valuing With Critical Systems Heuristics. *American Journal of Evaluation*, 39(2), 201–220. <https://doi.org/10.1177/1098214017703703>
- Gerring, J. (2004). What Is a Case Study and What Is It Good for? What Is a Case Study and What Is It Good fo. *Source: The American Political Science Review American Political Science Review*, 98(2), 341–354. <https://doi.org/10.1017/S0003055404001182>
- Giacomin, J. (2014). What is human centred design? *Design Journal*, 17(4), 606–623. <https://doi.org/10.2752/175630614X14056185480186>
- Glaw, X., Inder, K., Kable, A., & Hazelton, M. (n.d.). *Visual Methodologies in Qualitative Research: Autophotography and Photo Elicitation Applied to Mental Health Research*. <https://doi.org/10.1177/1609406917748215>
- Gordon, N. P., Walton, D., McAdam, E., Derman, J., Gallitero, G., & Garrett, L. (1999). Effects of providing hospital-based doulas in health maintenance organization hospitals. *Obstetrics*

and Gynecology, 93(3), 422–426. [https://doi.org/10.1016/S0029-7844\(98\)00430-X](https://doi.org/10.1016/S0029-7844(98)00430-X)

Greenhalgh, T., Robert, G., Macfarlane, F., Bate, P., & Kyriakidou, O. (2004). Diffusion of innovations in service organizations: Systematic review and recommendations. *Milbank Quarterly*, Vol. 82, pp. 581–629. <https://doi.org/10.1111/j.0887-378X.2004.00325.x>

Groeneveld, B., Dekkers, T., Boon, B., & D’Olivo, P. (2018). Challenges for design researchers in healthcare. *Design for Health*, 2(2), 305–326. <https://doi.org/10.1080/24735132.2018.1541699>

Gruber, K. J., Cupito, S. H., & Dobson, C. F. (2013). Impact of Doulas on Healthy Birth Outcomes. *The Journal of Perinatal Education*, 22(1), 49–58. <https://doi.org/10.1891/1058-1243.22.1.49>

Guest, G., Bunce, A., & Johnson, L. (2006). How Many Interviews Are Enough? *Field Methods*, 18(1), 59–82. <https://doi.org/10.1177/1525822X05279903>

Gyamfi, J., Allegrante, J. P., Iwelunmor, J., Williams, O., Plange-Rhule, J., Blackstone, S., ... Ogedegbe, G. (2020). Application of the Consolidated Framework for Implementation Research to examine nurses’ perception of the task shifting strategy for hypertension control trial in Ghana. *BMC Health Services Research*, 20(1), 1–11. <https://doi.org/10.1186/s12913-020-4912-5>

Hammarberg, K., Kirkman, M., & De Lacey, S. (2016). Qualitative research methods: When to use them and how to judge them. *Human Reproduction*, 31(3), 498–501. <https://doi.org/10.1093/humrep/dev334>

Hardin, A. M., & Buckner, E. B. (2004). Characteristics of a Positive Experience for Women

Who Have Unmedicated Childbirth. *Journal of Perinatal Education*, 13(4), 10–16.

<https://doi.org/10.1624/105812404X6180>

Harper, D. (2002). Talking about pictures: a case for photo elicitation. *Visual Studies*, 17(1).

<https://doi.org/10.1080/14725860220137345>

Hassi, L. & Laakso, M. (2011). *Design Thinking in the Management Discourse: Defining the elements of the Concept*.

Hassi, L., & Laakso, M. (2011). Conceptions of Design Thinking in the Design and Management discourse: Open questions and possible directions for research. *Proceedings of International Association of Societies of Design Research*, 1–10.

Hazard, C. J., Callister, L. C., Birkhead, F. A., & Nichols, L. (2009). Hispanic Labor Friends initiative: Supporting vulnerable women. *MCN The American Journal of Maternal/Child Nursing*, 34(2), 115–121. <https://doi.org/10.1097/01.NMC.0000347306.15950.ae>

Henley, M. M. (2015). Alternative and authoritative knowledge: The role of certification for defining expertise among doulas. *Social Currents*, 2(3), 260–279.

<https://doi.org/10.1177/2329496515589851>

Hodnett, E. D., Gates, S., Hofmeyr, G. J., & Sakala, C. (2012). Continuous Support for Women During Childbirth. *Cochrane Database of Systematic Reviews*, 32(10), 1–117.

<https://doi.org/10.1111/j.0730-7659.2005.00336.x>

HOFMEYR, G. J., NIKODEM, V. C., WOLMAN, W. -L, CHALMERS, B. E., & KRAMER, T. (1991). Companionship to modify the clinical birth environment: effects on progress and perceptions of labour, and breastfeeding. *BJOG: An International Journal of Obstetrics &*

- Gynaecology*, 98(8), 756–764. <https://doi.org/10.1111/j.1471-0528.1991.tb13479.x>
- Holeman, I., & Kane, D. (2019a). Human-centered design for global health equity. *Information Technology for Development*, 1–44. <https://doi.org/10.1080/02681102.2019.1667289>
- Holeman, I., & Kane, D. (2019b). Human-centered design for global health equity. *Information Technology for Development*, 0(0), 1–29. <https://doi.org/10.1080/02681102.2019.1667289>
- Holland, H. L. (2009). *Relational Spaces in Maternal Healthcare: A Qualitative Study of Young Mothers' Experiences with Community-based Doula Care*.
<https://doi.org/10.1017/CBO9781107415324.004>
- Hughston, L. (2018). *EXPLORING THE MOTIVATIONS OF BIRTH COMPANIONS Maternal and New born Health Improvement Project Table of Contents*. (January).
- Hunter, C. (2012). Intimate space within institutionalized birth: Women's experiences birthing with doulas. *Anthropology and Medicine*, 19(3), 315–326.
<https://doi.org/10.1080/13648470.2012.692358>
- Huppatz, D. (2015a). Revisiting Herbert Simon's "Science of Design." 31(2).
<https://doi.org/10.1162/DESI>
- Huppatz, D. (2015b). Revisiting Herbert Simon's "Science of Design." *Design Issues*, 31(2).
<https://doi.org/10.1162/DESI>
- Ideo.org. (2015). The Field Guide to Human-Centered Design. In *Determann's Field Guide to Data Privacy Law*. <https://doi.org/10.4337/9781786438690.00009>
- Iedema, R., Merrick, E., Piper, D., Britton, K., Gray, J., Verma, R., & Manning, N. (2010).
Codesigning as a Discursive Practice in Emergency Health Services: The Architecture of

- Deliberation. *The Journal of Applied Behavioral Science*, 46(1), 73–91.
<https://doi.org/10.1177/0021886309357544>
- Ishola, F., Owolabi, O., & Filippi, V. (2017). Disrespect and abuse of women during childbirth in Nigeria: A systematic review. *PLoS ONE*, 12(3), 1–17.
<https://doi.org/10.1371/journal.pone.0174084>
- Jackson, R. (2014). The Place of Birth in Kafa Zone, Ethiopia. *Health Care for Women International*, 35(7–9), 728–742. <https://doi.org/10.1080/07399332.2014.914940>
- Johansson-Sköldberg, U., Woodilla, J., & Çetinkaya, M. (2013). Design thinking: Past, present and possible futures. *Creativity and Innovation Management*, 22(2), 121–146.
<https://doi.org/10.1111/caim.12023>
- Johansson, U., & Woodilla, J. (2010). How to avoid throwing the baby out with the bath water: An ironic perspective on design thinking. *Egos Colloquium*, 1–25.
- Jordan, B. (1992). Technology and Social Interaction: Authoritative Knowledge. *Institute for Research on Learning*.
- Kabakian-khasholian, T., Bashour, H., El-nemer, A., Kharouf, M., Elsheikh, O., & Study, C. (2018). Implementation of a labour companionship model in three public hospitals in Arab middle-income countries. 107, 35–43. <https://doi.org/10.1111/apa.14540>
- Kabakian-Khasholian, T., El-Nemer, A., & Bashour, H. (2015). Perceptions about labor companionship at public teaching hospitals in three Arab countries. *International Journal of Gynecology and Obstetrics*, 129(3), 223–226. <https://doi.org/10.1016/j.ijgo.2014.12.005>
- Kabakian-Khasholian, T., & Portela, A. (2017). Companion of choice at birth: Factors affecting

implementation. *BMC Pregnancy and Childbirth*, 17(1), 1–13.

<https://doi.org/10.1186/s12884-017-1447-9>

Kanagat, N., & LaFond, A. (2018). *The Use of Design Thinking in MNCH Programs: A Case Study of the Community Benefits Health (CBH) Pilot, Ghana*. Retrieved from

https://www.jsi.com/JSIInternet/Inc/Common/_download_pub.cfm?id=18332&lid=3

Kane Low, L., Moffat, A., & Brennan, P. (2006a). Doulas as Community Health Workers:

Lessons Learned from a Volunteer Program. *Journal of Perinatal Education*, 15(3), 25–33.

<https://doi.org/10.1624/105812406x118995>

Kane Low, L., Moffat, A., & Brennan, P. (2006b). Doulas as Community Health Workers:

Lessons Learned from a Volunteer Program. *Journal of Perinatal Education*, 15(3), 25–33.

<https://doi.org/10.1624/105812406X118995>

Karrel, T. (2017). *Design Thinking for Global Health: A critical review of selected peer reviewed and grey literature* (Tulane University).

<https://doi.org/10.1017/CBO9781107415324.004>

Kassebaum, N. J., Lozano, R., Lim, S. S., & Murray, C. J. (2017, February 18). Setting maternal mortality targets for the SDGs – Authors’ reply. *The Lancet*, Vol. 389, pp. 697–698.

[https://doi.org/10.1016/S0140-6736\(17\)30339-2](https://doi.org/10.1016/S0140-6736(17)30339-2)

Kaye, D. K., Kakaire, O., Nakimuli, A., Osinde, M. O., Mbalinda, S. N., & Kakande, N. (2014).

Male involvement during pregnancy and childbirth: Men’s perceptions, practices and experiences during the care for women who developed childbirth complications in Mulago

Hospital, Uganda. *BMC Pregnancy and Childbirth*, 14(1), 54. [https://doi.org/10.1186/1471-](https://doi.org/10.1186/1471-2393-14-54)

[2393-14-54](https://doi.org/10.1186/1471-2393-14-54)

KENNEL, J., KLAUS, M., MCGRATH, S., ROBERTSON, S., & HINKLEY, C. (1991).

Continuous Emotional Support During Labor in a United-States Hospital - a Randomized Controlled Trial. *Jama-Journal of the American Medical Association*, 265(17), 2197–2201.

Retrieved from

http://conricyt2.summon.serialssolutions.com/2.0.0/link/0/eLvHCXMwtV3PT4MwFG42D2pijD_jz6QH44VgNhiDHTwgY47I2qWUg14WBizx4DQGD_73vgJb18XDPHiB5hUKoV--vpbX7yFkGnctfY0TWmlidTM7cZKp3cpnMzhD72c9x3Sm1jRpl2nJOs9-h_Ge12gsUvFJ2792PNig68VG2j90_rJRMEAZIABHAAEcN4KBRwkPS

Kerr, F. (2015). *External Evaluation Report Birth Companions Peterborough Doula Pilot Project Fiona Kerr Head for Success June 2015*. (June).

Khreshch, R. (2010). Support in the first stage of labour from a female relative: The first step in improving the quality of maternity services. *Midwifery*, 26(6), e21–e24.

<https://doi.org/10.1016/j.midw.2008.11.003>

Kim, S., Piccinini, D., Mensah, E., & Lynch, M. (2019). Using a human-centered design approach to determine consumer preferences for long-lasting insecticidal nets in Ghana. *Global Health Science and Practice*, 7(2), 160–170. <https://doi.org/10.9745/GHSP-D-18-00284>

Kimbell, L. (2011). Rethinking Design Thinking: Part I. *Design and Culture*, 3(3), 285–306.

<https://doi.org/10.2752/175470811x13071166525216>

Kirk, M. A., Kelley, C., Yankey, N., Birken, S. A., Abadie, B., & Damschroder, L. (2016). A systematic review of the use of the Consolidated Framework for Implementation Research.

<https://doi.org/10.1186/s13012-016-0437-z>

- Koblinsky, M., Moyer, C. A., Calvert, C., Campbell, J., Campbell, O. M. R., Feigl, A. B., ... Langer, A. (2016). Quality maternity care for every woman, everywhere: a call to action. *The Lancet*, 388(10057), 2307–2320. [https://doi.org/10.1016/S0140-6736\(16\)31333-2](https://doi.org/10.1016/S0140-6736(16)31333-2)
- Koumouitzes-Douvia, J., & Carr, C. a. (2006). Women’s Perceptions of Their Doula Support. *The Journal of Perinatal Education*, 15(4), 34–40. <https://doi.org/10.1624/105812406X151402>
- Kozhimannil, Katy B., & Hardeman, R. R. (2016). Coverage for Doula Services: How State Medicaid Programs Can Address Concerns about Maternity Care Costs and Quality. *Birth*, 43(2), 97–99. <https://doi.org/10.1111/birt.12213>
- Kozhimannil, Katy Backes, Hardeman, R. R., Attanasio, L. B., Blauer-Peterson, C., & O’Brien, M. (2013). Doula care, birth outcomes, and costs among medicaid beneficiaries. *American Journal of Public Health*, 103(4), 1–10. <https://doi.org/10.2105/AJPH.2012.301201>
- Krippendorff, K. (2006). *The Semantic turn: A new foundation for design*. Boca Raton: Taylor & Francis.
- Kruk, M. E., Gage, A. D., Arsenault, C., Jordan, K., Leslie, H. H., Roder-dewan, S., ... Pate, M. (2018). *The Lancet Global Health Commission High-quality health systems in the Sustainable Development Goals era : time for a revolution*. 6(November), 1196–1252. [https://doi.org/10.1016/S2214-109X\(18\)30386-3](https://doi.org/10.1016/S2214-109X(18)30386-3)
- Kruk, M. E., Kujawski, S., Mbaruku, G., Ramsey, K., Moyo, W., & Freedman, L. P. (2014). Disrespectful and abusive treatment during facility delivery in Tanzania: a facility and community survey. *Health Policy and Planning*, 33, 26–33. <https://doi.org/10.1093/heapol/czu079>

- Kujala, S. (2003). User involvement : a review of the benefits and challenges. *Behavior and Information Technology*, 22(1), 1–16. <https://doi.org/10.1080/0144929021000055530>
- Kululanga, L. I., Malata, A., Chirwa, E., & Sundby, J. (2012). Malawian fathers' views and experiences of attending the birth of their children: a qualitative study. *BMC Pregnancy and Childbirth*, 12(1). <https://doi.org/10.1186/1471-2393-12-141>
- Kungwimba, E., Malata, A., Maluwa, A., & Chirwa, E. (2013). Experiences of women with the support they received from their birth companions during labour and delivery in Malawi. *Health*, 5(1), 45–52. <https://doi.org/10.4236/health.2013.51007>
- Kwagala, B. (2013). Birthing choices among the Sabinu of Uganda. *Culture, Health and Sexuality*, Vol. 15, pp. S401–S414. <https://doi.org/10.1080/13691058.2013.799232>
- Lafond, A., & Davis, N. (2016). *The Use of Design Thinking in MNCH Programs: A Case Study of the Care Community Hub (CCH) Pilot, Ghana*. (November). Retrieved from https://www.jsi.com/JSIInternet/Inc/Common/_download_pub.cfm?id=18332&lid=3
- Lagendyk, L. E., & Thurston, W. E. (2005). A case study of volunteers providing labour and childbirth support in hospitals in Canada. *Midwifery*, 21(1), 14–22. <https://doi.org/10.1016/j.midw.2004.07.002>
- Langer A. and Campero, L. and G. C. and R. S. (1998). Effects of psychosocial support during labor and childbirth on breastfeeding, medical intervention, and mothers' wellbeing in a Mexican public hospital;: a randomized clinical trial. *Br J Obstet Gynaecol*, 105(October), 1056–1063. <https://doi.org/10.1111/j.1471-0528.1998.tb09936.x>
- Levira, F., & Todd, G. (2017). Urban Health in Tanzania: Questioning the Urban Advantage.

- Journal of Urban Health*, 94(3), 437–449. <https://doi.org/10.1007/s11524-017-0137-2>
- Lieberman, A. (2016). Challenges for maternal health efforts. *Lancet (London, England)*, 388(10050), 1146–1147. [https://doi.org/10.1016/S0140-6736\(16\)31644-0](https://doi.org/10.1016/S0140-6736(16)31644-0)
- Lin, M. C., Hughes, B. L., Katica, M. K., Dining-Zuber, C., & Plsek, P. E. (2011). Service design and change of systems: Human-centered approaches to implementing and spreading service design. *International Journal of Design*, 5(2), 73–86.
- Lourens, N. (2015). *A critique of design thinking : An interrogation into the value and values of design thinking*. (August).
- Lundgren, I. (2010). Swedish women’s experiences of doula support during childbirth. *Midwifery*, 26(2), 173–180. <https://doi.org/10.1016/j.midw.2008.05.002>
- MacDonald, M., Pauly, B., Wong, G., Schick-Makaroff, K., van Roode, T., Strosher, H. W., ... Ward, M. (2016). Supporting successful implementation of public health interventions: Protocol for a realist synthesis. *Systematic Reviews*, 5(1), 1–11. <https://doi.org/10.1186/s13643-016-0229-1>
- Madi, B. C., Sandall, J., Bennett, R., & MacLeod, C. (1999). Effects of female relative support in labor: A randomized controlled trial. *Birth*, 26(1), 4–8. <https://doi.org/10.1046/j.1523-536x.1999.00004.x>
- Maher, J. (2004). Midwife interactions with birth support people in Melbourne, Australia. *Midwifery*, 20(3), 273–280. <https://doi.org/10.1016/j.midw.2003.12.010>
- Maimbolwa, M. C., Sikazwe, N., Yamba, C. B., Diwan, V., & Ransjö-Arvidson, A. B. (2001). Views on involving a social support person during labor in Zambian maternities. *Journal of*

Midwifery and Women's Health, 46(4), 226–234. [https://doi.org/10.1016/S1526-9523\(01\)00134-9](https://doi.org/10.1016/S1526-9523(01)00134-9)

Maimbolwa, M. C., Yamba, B., Diwan, V., & Ransjö-Arvidson, A. B. (2003). Cultural childbirth practices and beliefs in Zambia. *Journal of Advanced Nursing*, 43(3), 263–274. <https://doi.org/10.1046/j.1365-2648.2003.02709.x>

Malham, S. A., Touati, N., Maillet, L., Gaboury, I., Loignon, C., & Breton, M. (2017). *What Are the Factors Influencing Implementation of Advanced Access in Family Medicine Units? A Cross-Case Comparison of Four Early Adopters in Quebec*. <https://doi.org/10.1155/2017/1595406>

Margolin, V., & Buchanan, R. (Eds.). (1995). *The idea of design*. Cambridge, MA: MIT press.

Marwa, R., & Anaeli, A. (2020).

Perceived Barriers Toward Provider-Initiated HIV Testing and Counseling (PITC) in Pediatric Clinics: A Qualitative Study Involving Two Regional Hospitals in Dar-Es-Salaam, Tanzania

. *HIV/AIDS - Research and Palliative Care*, Volume 12, 141–150. <https://doi.org/10.2147/hiv.s235818>

Maung Maung, T., Show, K. L., Mon, N. O., Tunçalp, Ö., Aye, N. S., Soe, Y. Y., & Bohren, M. A. (2020). A qualitative study on acceptability of the mistreatment of women during childbirth in Myanmar. *Reproductive Health*, 17. <https://doi.org/10.1186/s12978-020-0907-2>

Mayers, J., & Vermeulen, S. (2005). Stakeholder influence mapping. *Development*, (March), 1–16. <https://doi.org/10.13140/RG.2.2.30714.75207>

Mc Hugh, S. (n.d.). *Using Frameworks in Implementation Science Research*.

- McGarry, A., Stenfert Kroese, B., & Cox, R. (2016). How Do Women with an Intellectual Disability Experience the Support of a Doula During Their Pregnancy, Childbirth and After the Birth of Their Child? *Journal of Applied Research in Intellectual Disabilities*, 29(1), 21–33. <https://doi.org/10.1111/jar.12155>
- McGrath, S. K., & Kennell, J. H. (2008). A randomized controlled trial of continuous labor support for middle-class couples: Effect on cesarean delivery rates. *Birth*, 35(2), 92–97. <https://doi.org/10.1111/j.1523-536X.2008.00221.x>
- McLeish, J., & Redshaw, M. (2018). A qualitative study of volunteer doulas working alongside midwives at births in England: Mothers' and doulas' experiences. *Midwifery*, 56(May 2017), 53–60. <https://doi.org/10.1016/j.midw.2017.10.002>
- McMahon, S. A., George, A. S., Chebet, J. J., Mosha, I. H., Mpembeni, R. N. M., & Winch, P. J. (2014). Experiences of and responses to disrespectful maternity care and abuse during childbirth; a qualitative study with women and men in Morogoro Region, Tanzania. *BMC Pregnancy and Childbirth*, 14(1), 1–13. <https://doi.org/10.1186/1471-2393-14-268>
- Mehta, S & Cole, C. (2018). *Pursuing Youth-Powered, Transdisciplinary Programming for Contraceptive Service Delivery across Three Countries: The Case of Kuwa Mjanja in Tanzania*.
- Moody, L. (2015). User-centred health design: Reflections on D4Ds experiences and challenges. *Journal of Medical Engineering and Technology*, 39(7), 395–403. <https://doi.org/10.3109/03091902.2015.1088086>
- Morhason-Bello, I. O., Olayemi, O., Ojengbede, O. A., Adedokun, B. O., Okuyemi, O. O., & Orji, B. (2008). Attitude and preferences of Nigerian antenatal women to social support

during labour. *Journal of Biosocial Science*, 40(4), 553–562.

<https://doi.org/10.1017/S0021932007002520>

Morhason-Bello, Imran O., Adedokun, B. O., Ojengbede, O. A., Olayemi, O., Oladokun, A., & Fabamwo, A. O. (2009). Assessment of the effect of psychosocial support during child birth in Ibadan, south-west Nigeria: A randomised controlled trial. *Australian and New Zealand Journal of Obstetrics and Gynaecology*, 49(2), 145–150. <https://doi.org/10.1111/j.1479-828X.2009.00983.x>

Morris, J. L., Short, S., Robson, L., & Andriatsihosena, M. S. (2014). Maternal health practices, beliefs and traditions in southeast Madagascar. *African Journal of Reproductive Health*, 18(3), 101–117.

Mosallam, M., Rizk, D. E. E., Thomas, L., & Ezimokhai, M. (2004). Women's attitudes towards psychosocial support in labour in United Arab Emirates. *Archives of Gynecology and Obstetrics*, 269(3), 181–187. <https://doi.org/10.1007/s00404-002-0448-7>

Mottl-Santiago, J., Walker, C., Ewan, J., Vragovic, O., Winder, S., & Stubblefield, P. (2008). A hospital-based doula program and childbirth outcomes in an Urban, multicultural setting. *Maternal and Child Health Journal*, 12(3), 372–377. <https://doi.org/10.1007/s10995-007-0245-9>

Mselle, L. T., Kohi, T. W., & Dol, J. (2019, July 5). Humanizing birth in Tanzania: A qualitative study on the (mis) treatment of women during childbirth from the perspective of mothers and fathers. *BMC Pregnancy and Childbirth*, Vol. 19, p. 231. <https://doi.org/10.1186/s12884-019-2385-5>

Mselle, L. T., Moland, K. M., Mvungi, A., Evjen-Olsen, B., & Kohi, T. W. (2013). Why give

- birth in health facility? Users' and providers' accounts of poor quality of birth care in Tanzania. *BMC Health Services Research*, 13(1), 174. <https://doi.org/10.1186/1472-6963-13-174>
- Mutambirwa, J. (1985). Pregnancy, childbirth, mother and child care among the indigenous people of Zimbabwe. *International Journal of Gynecology and Obstetrics*, 275–285.
- Mutanga, O. (2015). *Experiences of disabled students at two South African Universities: A capabilities Approach*. (November), 1–300.
- Naidu, M., & Nqila, K. (2013). Indigenous mothers: An ethnographic study of using the environment during pregnancy. *Studies on Ethno-Medicine*, 7(2), 127–135. <https://doi.org/10.1080/09735070.2013.11886453>
- Nelson, H. G., & Stolterman, E. (2014). The case for design Creating a Culture of intention. *Design Management Journal*, 26(3), 13–15. <https://doi.org/10.1111/drev.10327>
- Nilsen, P. (2015). *Making sense of implementation theories , models and frameworks*. 1–13. <https://doi.org/10.1186/s13012-015-0242-0>
- Noble, H., & Smith, J. (2015). 7) Issues of validity and reliability in qualitative research. *Evidence-Based Nursing*, 18(2), 34–35. <https://doi.org/10.1136/eb-2015-102054>
- Nommsen-rivers, L. A., Mastergeorge, A. M., Hansen, R. L., Cullum, A. S., & Dewey, K. G. (2009). Doula care, early breastfeeding outcomes, and breastfeeding status at 6 weeks postpartum among low-income primiparae. *JOGNN - Journal of Obstetric, Gynecologic, and Neonatal Nursing*, 38(2), 157–173. <https://doi.org/10.1111/j.1552-6909.2009.01005.x>
- Norman, D. A. (2005a). Human-centered design considered harmful. *Interactions*, 12(4), 14.

<https://doi.org/10.1145/1070960.1070976>

Norman, D. A. (2005b). Human-centered design considered harmful. *Interactions*, 12(4), 14.

<https://doi.org/10.1145/1070960.1070976>

Olivier de Sardan, J. P., Diarra, A., & Moha, M. (2017). Travelling models and the challenge of pragmatic contexts and practical norms: The case of maternal health. *Health Research Policy and Systems*, 15(Suppl 1). <https://doi.org/10.1186/s12961-017-0213-9>

<https://doi.org/10.1186/s12961-017-0213-9>

Owen, C. (2007). Design Thinking: Notes on its Nature and Use. *Design Research Quarterly*, 2(1), 16–27. Retrieved from

www.designresearchsociety.org

Palinkas, L. A. (2014). Qualitative and Mixed Methods in Mental Health Services and Implementation Research. *Journal of Clinical Child and Adolescent Psychology*, 43(6), 851–861. <https://doi.org/10.1080/15374416.2014.910791>

Panditi-Rajani, T. (2016). *Community Voices for Policy Development: Applying Human-Centered Design in Tanzania*.

Parkinson, S., Eatough, V., Holmes, J., Stapley, E., & Midgley, N. (2016). Framework analysis: a worked example of a study exploring young people's experiences of depression.

Qualitative Research in Psychology, 13(2), 109–129.

<https://doi.org/10.1080/14780887.2015.1119228>

Price, S., Noseworthy, J., & Thornton, J. (2007). Women's Experience with Social Presence During Childbirth. *The American Journal of Maternal/Child Nursing*, 32(3), 184–191.

Protzen, J. . (2010). *Design Thinking... What is That?* Retrieved from

<http://www.fastcompany.com/resources/design/dziersk/design-thinking-083107.html>

Qualitative Methods In Implementation Science. (n.d.).

Raman, S., Nicholls, R., Ritchie, J., Razee, H., & Shafiee, S. (2016). How natural is the supernatural? Synthesis of the qualitative literature from low and middle income countries on cultural practices and traditional beliefs influencing the perinatal period. *Midwifery*, *39*, 87–97. <https://doi.org/10.1016/j.midw.2016.05.005>

Randive, B., Diwan, V., & De Costa, A. (2013). India's Conditional Cash Transfer Programme (the JSY) to Promote Institutional Birth: Is There an Association between Institutional Birth Proportion and Maternal Mortality? *PLoS ONE*, *8*(6). <https://doi.org/10.1371/journal.pone.0067452>

Rankin, K. M., Kroelinger, C. D., DeSisto, C. L., Pliska, E., Akbarali, S., Mackie, C. N., & Goodman, D. A. (2016). Application of Implementation Science Methodology to Immediate Postpartum Long-Acting Reversible Contraception Policy Roll-Out Across States. *Maternal and Child Health Journal*, *20*(1), 173–179. <https://doi.org/10.1007/s10995-016-2002-4>

Resnick, K. . (2016). *Bridging Birth : The Birth Sisters as an adaptation to Hospital Birth*.

Rith, C., & Dubberly, H. (2007). Why Horst W. J. Rittel Matters. *Design Issues*, *23*(1), 72–91. <https://doi.org/10.1162/desi.2007.23.1.72>

Rittel, H. W. J & Webber, M. . . (1973). Dilemmas in a General Theory of Planning. *Policy Sciences*, *4*, 155–169. <https://doi.org/10.1080/01636609209550084>

Roberts, J. P., Fisher, T. R., Trowbridge, M. J., & Bent, C. (2016). A design thinking framework for healthcare management and innovation. *Healthcare*, *4*(1), 11–14.

<https://doi.org/10.1016/j.hjdsi.2015.12.002>

Rodrigues, D. P., Alves, V. H., Pereira, A. V., Penna, L. H. G., Branco, M. B. L. R., & de Souza, R. de M. P. (2017). Non-compliance with the companion law as an aggravation to obstetric health. *Texto e Contexto Enfermagem*, 26(3), 1–10. <https://doi.org/10.1590/0104-07072017005570015>

Safaeinili, N., Brown-Johnson, C., Shaw, J. G., Mahoney, M., & Winget, M. (2020). CFIR simplified: Pragmatic application of and adaptations to the Consolidated Framework for Implementation Research (CFIR) for evaluation of a patient-centered care transformation within a learning health system. *Learning Health Systems*, 4(1). <https://doi.org/10.1002/lrh2.10201>

Salgado, M., Wendland, M., Rodriguez, D., Bohren, M. A., Oladapo, O. T., Ojelade, O. A., ... Fawole, B. (2017). A service concept and tools to improve maternal and newborn health in Nigeria and Uganda. *International Journal of Gynecology and Obstetrics*, 139(December), 67–73. <https://doi.org/10.1002/ijgo.12382>

Salgado, M., Wendland, M., Rodriguez, D., Bohren, M. A., Oladapo, O. T., Ojelade, O. A., ... Fawole, B. (2017). Using a service design model to develop the “Passport to Safer Birth” in Nigeria and Uganda. *International Journal of Gynecology and Obstetrics*, 139(December), 56–66. <https://doi.org/10.1002/ijgo.12381>

Sanders, E. B.-N., & Stappers, P. J. (2008). Co-creation and the new landscapes of design. *CoDesign*, 4(1), 5–18. <https://doi.org/10.1080/15710880701875068>

Sando, D., Kendall, T., Lyatuu, G., Ratcliffe, H., McDonald, K., Mwanyika-Sando, M., ... Langer, A. (2014). Disrespect and abuse during childbirth in Tanzania: Are women living

with HIV more vulnerable? *Journal of Acquired Immune Deficiency Syndromes*, 67(Suppl 4), S228–S234. <https://doi.org/10.1097/QAI.0000000000000378>

Sando, D., Ratcliffe, H., McDonald, K., Spiegelman, D., Lyatuu, G., Mwanyika-Sando, M., ... Langer, A. (2016). The prevalence of disrespect and abuse during facility-based childbirth in urban Tanzania. *BMC Pregnancy and Childbirth*, 16(1), 236. <https://doi.org/10.1186/s12884-016-1019-4>

Sapkota, S., Kobayashi, T., & Takase, M. (2012). Husbands' experiences of supporting their wives during childbirth in Nepal. *Midwifery*, 28(1), 45–51. <https://doi.org/10.1016/j.midw.2010.10.010>

Schaaf, M. L. B. (2018). Social accountability and legal empowerment for quality maternal health care. *Dissertation Abstracts International: Section B: The Sciences and Engineering*.

Schroeder, C., & Bell, J. (2005). Doula birth support for incarcerated pregnant women. *Public Health Nursing*, 22(1), 53–58. <https://doi.org/10.1111/j.0737-1209.2005.22108.x>

Searl, M. M., Borgi, L., & Chemali, Z. (2010). It is time to talk about people: A human-centered healthcare system. *Health Research Policy and Systems*, 8(1), 35. <https://doi.org/10.1186/1478-4505-8-35>

Selepe, H. L., & Thomas, D. J. (2000). The beliefs and practices of traditional birth attendants in the Manxili area of KwaZulu, South Africa: a qualitative study. *Journal of Transcultural Nursing : Official Journal of the Transcultural Nursing Society / Transcultural Nursing Society*, 11(2), 96–101. <https://doi.org/10.1177/104365960001100203>

Senanayake, H, Somawardana, U., & Samarasinghe, M. (2013). Effect of a female labour

companion and of educating her regarding support during labour on perinatal and labour outcomes. *Sri Lanka Journal of Obstetrics and Gynaecology*, (December), 112–115.

<https://doi.org/10.4038/sljog.v35i4.6584>

Senanayake, Hemantha, Wijesinghe, R. D., & Nayar, K. R. (2017). Is the policy of allowing a female labor companion feasible in developing countries? Results from a cross sectional study among Sri Lankan practitioners. *BMC Pregnancy and Childbirth*, 17(1), 1–6.

<https://doi.org/10.1186/s12884-017-1578-z>

Shiferaw, S., Spigt, M., Godefrooij, M., Melkamu, Y., & Tekie, M. (2013). Why do women prefer home births in Ethiopia? *BMC Pregnancy and Childbirth*, 13(1), 1.

<https://doi.org/10.1186/1471-2393-13-5>

Shimpuku, Y., Patil, C. L., Norr, K. F., & Hill, P. D. (2013). Women's Perceptions of Childbirth Experience at a Hospital in Rural Tanzania. *Health Care for Women International*, 34(6), 461–481. <https://doi.org/10.1080/07399332.2012.708374>

Short, R., Gurung, R., Rowcliffe, M., Hill, N., & Milner-Gulland, E. J. (2018). The use of mosquito nets in fisheries: A global perspective. *PLoS ONE*, 13(1), 1–14.

<https://doi.org/10.1371/journal.pone.0191519>

Simon, H. A. (1996). The Sciences of the Artificial. In *Technology and Culture* (3rd ed.).

<https://doi.org/10.2307/3102825>

Sims-Gould, J., McKay, H. A., Hoy, C. L., Nettlefold, L., Gray, S. M., Lau, E. Y., & Bauman, A. (2019). Factors that influence implementation at scale of a community-based health promotion intervention for older adults. *BMC Public Health*, 19(1), 1619.

<https://doi.org/10.1186/s12889-019-7984-6>

- Spiby, H., Green, J. M., Darwin, Z., Willmot, H., Knox, D., McLeish, J., & Smith, M. (2015). Multisite implementation of trained volunteer doula support for disadvantaged childbearing women: a mixed-methods evaluation. *Health Services and Delivery Research*, 3(8), 1–332. <https://doi.org/10.3310/hsdr03080>
- Srivastava, Aashish, & Thomson, S. B. (2009). Framework Analysis : Research Note. *Journal of Administration & Governance*, 4(2), 72–79.
- Srivastava, Aradhana, Avan, B. I., Rajbangshi, P., & Bhattacharyya, S. (2015). *Determinants of women ' s satisfaction with maternal health care : a review of literature from developing countries*. 1–12. <https://doi.org/10.1186/s12884-015-0525-0>
- Steel, A., Diezel, H., Johnstone, K., Sibbritt, D., Adams, J., & Adair, R. (2013). The value of care provided by student doulas: an examination of the perceptions of women in their care. *The Journal of Perinatal Education*, 22(1), 39–48. <https://doi.org/10.1891/1058-1243.22.1.39>
- Steen, M. (2011). Tensions in human-centred design. *CoDesign*, 7(1), 45–60. <https://doi.org/10.1080/15710882.2011.563314>
- Sychareun, V., Hansana, V., Somphet, V., Xayavong, S., Phengsavanh, A., & Popenoe, R. (2012). Reasons rural Laotians choose home deliveries over delivery at health facilities: a qualitative study. *BMC Pregnancy and Childbirth*, 12(1), 1. <https://doi.org/10.1186/1471-2393-12-86>
- Tani, F., & Castagna, V. (2017). Maternal social support, quality of birth experience, and postpartum depression in primiparous women. *Journal of Maternal-Fetal and Neonatal Medicine*, 30(6), 689–692. <https://doi.org/10.1080/14767058.2016.1182980>

Tanzania Demographic and Health Survey and Malaria Indicator Survey. (2015).

Tanzania Revised One Plan II 2018 Report

Teles, L. M. R., Américo, C. F., Oriá, M. O. B., Vasconcelos, C. T. M., Brüggemann, O. M., & Damasceno, A. K. de C. (2018). Efficacy of an educational manual for childbirth companions: Pilot study of a randomized clinical trial. *Revista Latino-Americana de Enfermagem*, 26. <https://doi.org/10.1590/1518-8345.2277.2996>

Thamini Uhai. (2017). *The Kigoma Birth Companionship Companionship Pilot Project Code of Good Practice*. 1(July), 4.

The King's Fund. (2011). The Patient-Centred Care Project: Evaluation report. *The King's Fund*, (August), 1–10. Retrieved from www.kingsfund.org.uk

Thomas, M. P., Ammann, G., Brazier, E., Noyes, P., & Maybank, A. (2017). Doula Services Within a Healthy Start Program : Increasing Access for an Underserved Population. *Maternal and Child Health Journal*, 21(1), 59–64. <https://doi.org/10.1007/s10995-017-2402-0>

Thomson, G & Balaam, M. (2016). *Birth Companions Research Project : Experiences and Birth Outcomes of Vulnerable Women*. 1–68.

Thoring, K & Muller, R. M. (2011). Understanding the Creative Mechanisms of Design Thinking: An Evolutionary Approach. *DESIRE - Proceedings of the Second Conference on Creativity and Innovation in Design*, 2, 137–147.

Thwala, S. B. P., Jones, L. K., & Holroyd, E. (2011). Swaziland rural maternal care: Ethnography of the interface of custom and biomedicine. *International Journal of Nursing*

Practice, 17(1), 93–101. <https://doi.org/10.1111/j.1440-172X.2010.01911.x>

Torres, J. M. C. (2013). Breast milk and labour support: Lactation consultants' and doulas' strategies for navigating the medical context of maternity care. *Sociology of Health and Illness*, 35(6), 924–938. <https://doi.org/10.1111/1467-9566.12010>

Trueba, G., Contreras, C., Velazco, M. T., Lara, E. G., & Martínez, H. B. (2000). Alternative strategy to decrease cesarean section: support by doulas during labor. *The Journal of Perinatal Education*, 9(2), 8–13. <https://doi.org/10.1624/105812400X87608>

Ulrich, W. (n.d.). *A Brief Introduction to Critical Systems Heuristics (CSH)*. Retrieved from http://projects.kmi.open.ac.uk/ecosensus/publications/ulrich_csh_intro.pdf and http://wulrich.com/downloads/ulrich_2005f.pdf

Ulrich, W. (1983). *A Brief Introduction to Critical Systems Heuristics (CSH)*. 1–15.

USAID Tanzania RMC Scoping Activity Draft, 2019

Van Der Bijl-Brouwer, M. (2016). *The Challenges of Human-Centred Design in a Public Sector Innovation Context*.

van Dijk, M., Ruiz, M. J., Letona, D., & García, S. G. (2013). Ensuring intercultural maternal health care for Mayan women in Guatemala: A qualitative assessment. *Culture, Health and Sexuality*, 15(SUPPL.3). <https://doi.org/10.1080/13691058.2013.779026>

Van Patter, G. K (2017) <https://www.humantific.com/blog/categories/gk-vanpatter>

Vasdev, S. M. (2013). *Development by Design: Leveraging Design Thinking for improved aid effectiveness*.

Vechakul, J., Shrimali, B. P., & Sandhu, J. S. (2015). Human-Centered Design as an Approach

- for Place-Based Innovation in Public Health: A Case Study from Oakland, California. *Maternal and Child Health Journal*, 19(12), 2552–2559. <https://doi.org/10.1007/s10995-015-1787-x>
- Venter, C & Goede, R. (2016). A Critical Systems Approach to Business Intelligence System Development. In *Proceedings of the 59th Annual Meeting of the ISSS-2015 Berlin, Germany* (Vol. 1). <https://doi.org/10.1017/CBO9781107415324.004>
- Vohra, D., Neil, S. O., & Pottinger, E. (2019). *Using a Human-Centered Design Lens to Examine Community Accountability Programs to Improve Quality of Maternal Health Care in India*. (March).
- Waks, L. J. (2001). *Donald Schon ' s Philosophy of Design and Design Education*. (Walsh 1997), 37–51.
- Warren, C. E., Ndwiga, C., Sripad, P., Medich, M., Njeru, A., Maranga, A., ... Abuya, T. (2017). Sowing the seeds of transformative practice to actualize women's rights to respectful maternity care: Reflections from Kenya using the consolidated framework for implementation research. *BMC Women's Health*, 17(1). <https://doi.org/10.1186/s12905-017-0425-8>
- Whitley, R., Gingerich, S., Lutz, W. J., & Mueser, K. T. (2009). Implementing the illness management and recovery program in community mental health settings: Facilitators and barriers. *Psychiatric Services*, 60(2), 202–209. <https://doi.org/10.1176/ps.2009.60.2.202>
- WHO. (n.d.). Maternal & Newborn, Child and Adolescent Health Policy Indicators Dashboard.
- WHO. (2014). *WHO recommendations for augmentation of labor*.

- WHO. (2015). *WHO recommendations for maternal and interventions on health promotion newborn.*
- WHO. (2016). Standards for improving quality of maternal and newborn care in health facilities. *Who*, 73. <https://doi.org/978-92-4-151121-6>
- WHO Country Cooperation Strategy 2016-2020, Tanzania (2016)
- WHO. (2017). *Integrated People-Centred Health Services (IPHCS) - Reforming Health Service Delivery for UHC.* (ii).
- Willis-Shattuck, M., Bidwell, P., Thomas, S., Wyness, L., Blaauw, D., & Ditlopo, P. (2008). Motivation and retention of health workers in developing countries: A systematic review. *BMC Health Services Research*, 8. <https://doi.org/10.1186/1472-6963-8-247>
- Witteman, H. O., Dansokho, S. C., Colquhoun, H., Coulter, A., Dugas, M., Fagerlin, A., ... Witteman, W. (2015). User-centered design and the development of patient decision aids: Protocol for a systematic review. *Systematic Reviews*, 4(1), 1–8. <https://doi.org/10.1186/2046-4053-4-11>
- World Bank. (2019). *Tanzania Economic Update. Human Capital: Human Capital: The Real Wealth of Nations.*
- World Health Organization. (2018). *Intrapartum care for a positive childbirth experience.* Retrieved from <http://apps.who.int/iris/bitstream/10665/260178/1/9789241550215-eng.pdf?ua=1> <http://www.who.int/reproductivehealth/publications/intrapartum-care-guidelines/en/>
- Wylant, B. (2008). *and the Experience of Innovation.* 24(2).

<https://doi.org/10.1162/desi.2008.24.2.3>

Yin, R. K. (2006). Case Study Reserach - Design and Methods. *Clinical Research*, 2, 8–13.

<https://doi.org/10.1016/j.jada.2010.09.005>

Yuenyong, S., O'Brien, B., & Jirapeet, V. (2012). Effects of Labor Support from Close Female

Relative on Labor and Maternal Satisfaction in a Thai Setting. *JOGNN - Journal of*

Obstetric, Gynecologic, and Neonatal Nursing, 41(1), 45–56.

<https://doi.org/10.1111/j.1552-6909.2011.01311.x>