Understanding the Association of Savings and Internal Lending Communities (SILCs) Participation and Household Wealth and Access of Reproductive Health Services (RHSs) in Rural Zambia

by

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Abstract

Background: Poverty often prevents women from seeking, reaching, and receiving the full continuum of reproductive health services (RHSs). Savings and Internal Lending Communities (SILCs) are a type of informal microfinance mechanism designed to financially empower poor people living in rural areas. SILCs are often paired with additional health and non-health related interventions. However, limited studies have examined SILCs in the context of maternal health as a financial intervention to overcome financial barriers to accessing RHSs.

Objective: The objectives of this research are to use the socioecological model to: 1) examine how Saving Groups (SGs) like SILCs have been used as a financial intervention to overcome financial barriers to accessing RHSs, 2) understand the association between having access to SILC, household wealth, financial preparedness for birth, and utilization of RHSs, 3) understand the association between SILC participation, household wealth, and financial preparedness for birth, and 4) examine the association between sex and financial preparedness for birth.

Methods: Three studies were conducted to address the objectives. First, a scoping review was conducted to examine the impact of SGs as a financial intervention on utilization of RHSs. Second, a secondary analysis was conducted on baseline (n=2381) and endline (n=2330) household survey data where the samples were stratified into three community groups (CGs): CG1) communities with access to neither SILCs nor Maternity Waiting Homes (MWHs), CG2) communities with access to MWHs only, and CG3) communities with access to both SILCs and MWHs. Multiple linear regression models, binary logistic regression models, and interaction

effect models were used. Third, a secondary analysis was conducted on individual survey data collected from SILC participants in two rural districts of Zambia (n=600). Multiple binary logistic regression models were fit to assess the relationship between: 1) SILC participation and household wealth, 2) SILC participation and financial preparedness for birth, and 3) sex and financial preparedness for birth.

Results: Participating in SGs lead to increased utilization of RHS. However, nine of the ten articles included in the scoping review combined SGs with other intervention, making it difficult to differentiate the effect of SGs versus other components of the intervention. Secondary analysis of household survey showed the interaction effect of CGs and timepoint were significantly associated with MWH utilization, Health Facility (HF) delivery, and Skilled Provider (SP) delivery, but not with household wealth, financial preparedness for birth, Antenatal Care (ANC), and Postnatal Care (PNC) visits. Women with access to both MWHs and SILCs had higher odds of utilizing MWH, delivering at a HF with a SP compared to women who had access to neither MWHs nor SILCs. Finally, secondary analysis of SILC participation survey showed SILC participation led to increased household wealth. Participants who had their most recent childbirth after joining SILCs had higher odds of being financially prepared than those who had their most recent childbirth before joining SILCs. Furthermore, females were more likely to be financially prepared for birth compared to men only for the participants who had their most recent delivery before joining SILCs.

Conclusion: Overall, the findings of the three studies suggest that SILCs are a promising financial intervention to help poor and rural population to overcome financial barriers to accessing RHSs. However, SILCs alone may not be sufficient to provide enough financial resources to utilize the full continuum of RHSs.

Chapter 1

Introduction

Approximately every two minutes a woman dies while pregnant or giving birth (World Health Organization [WHO], United Nations International Children's Emergency Fund [UNICEF], United Nations Population Fund [UNPF], & The World Bank, 2019). Most of these women (96%) come from low-income countries (WHO, UNICEF, UNPF, & The World Bank, 2019). Nearly all maternal deaths can be prevented, as evidenced by the huge disparities found between the maternal death rates in high-income and low-income countries (Nour 2008; Obaid, 2007; Stenberg et al., 2014). There are numerous reasons why women in low-income countries are not seeking, reaching, and receiving appropriate care in time to avoid unnecessary mortality or morbidity (Black, Laminarayan, Temmerman, & Walker, 2016; Tancred, Marchang, Hanson, Schelleberg, & Manzi, 2016). A recent systematic review examined drivers and deterrents of facility-based delivery (Moyer & Mustafa, 2013). Higher household wealth was identified as a variable most consistently associated with facility-based birth, along with maternal education, parity, rural/urban residence, distance to the nearest facility, and number of antenatal care visits (Moyer & Mustafa, 2013). Furthermore, other studies have found lack of financial resources as one of the biggest barriers to accessing antenatal care, postnatal care visits, and family planning interventions (Borghi, Ensor, Somanathan, Lissner, & Mills, 2006; Sacks et al., 2017; Sibanda, Bernays, Weller, Hakim, & Cowan, 2018). Therefore, women with fewer financial resources are more likely to bear the burden of preventable maternal deaths and mortality both between and within countries (Jennings, Yang, Otupiri, Akinlo, Okunlola, & Hindin, 2017; Obaid, 2007).

To help women overcome the financial barriers to seeking care during and after pregnancy, universal access to reproductive health services (RHSs) was included among the Millennium Development Goals (McPake et al., 2013; United Nations [UN], 2016). Since then, a long list of countries including Benin, Burkina Faso, Burundi, Cameroon, Ethiopia, Ghana, Kenya, Liberia, Mali, Nepal, Niger, Senegal, South Africa, Sudan, Uganda, and Zambia have removed user fees for delivery care (Masiye, Chitah, & Mcintyre, 2010; McPake et al., 2013). While the user fee abolition has generally led to higher utilization, costs associated with transportation, delivery supplies, and informal payments are still considerable barriers to accessing care (Atuoye, Dizon, Rishworth, Galaa, Boamah, & Luginaah, 2015; Chiu et al., 2019; Danilovinch & Yessaliyeva, 2014; Dodzo & Mhloyi, 2017; Kananura, Kiwanuka, Ekirapa-Kiracho & Waiswa, 2017). In Zambia, free care was introduced in 2006 and an analysis of facility records from the Health Management Information System (HMIS) found that removing user fees for primary health care services did increase the number of outpatient visits in rural districts (Lagarde,Barroy, & Palmer, 2012; Ministry of Health [MoH] Zambia, 2013). However, the increase in use varied greatly among districts and was not sustained over time in all districts (Lagarde et al., 2012; Hangoma Robberstad, &Aakvik, 2018; Lépine, Lagarde, &Le Nestour, 2018).

Other interventions have also been implemented in different low-income countries to further reduce out-of-pocket fees for the poor, such as conditional cash transfers, vouchers, prepayment plans, community health insurance, and social insurance (Ndiaye, Kaba, Kourouma, Barry, Barry & Criel, 2008; Ogwang, Najjemba, Tumwesigye, & Orach, 2012; Richard, Witter, & Brouwere, 2008; Richard, Witter, & Brouwere, 2010). While these interventions vary in implementation scale, timeline, and cost, they generally increased RHS utilization in most

settings (Lagarde et al., 2012; Richard et al., 2008; Richard et al., 2010). However, concerns remain about both the quality of care and sustainability of the various interventions (McPake et al., 2013; Ogwang et al., 2012; Richard et al., 2008; Richard et al., 2010). Multiple studies identified that while the above listed interventions promoted service utilization, with no additional recruitment, substantial workload was added to the health care providers which often led to lower quality of care (Campbell, Oulton, McPake, & Buchan, 2010; McPake et al., 2013; Richard et al., 2008; Richard et al., 2010). Furthermore, because user fees often contribute to the wages or small bonuses for the health care providers or community health workers, removal of user fees also led to lower salaries, which can contribute to lower quality of care (Nabyonga-Orem, Karamagi, Atuyambe, Bagenda, Okuonzi & Walker, 2008; Steinhardt, Aman, Pakzad, Kumar, Singh,& Peters, 2011; McPake et al., 2013; Witter, Dieng, Mbengue, Moreira, & De Brouwere, 2010). Critics also argue that most of these interventions are not sustainable long term nor can they be easily scaled up, regardless of the funding sources of the interventions-whether through the national government funding, outside donors, or a mix of users, local government and national government (McPake et al., 2013; Richard et al., 2008; Richard et al., 2010). Therefore, in addition to government and policy level interventions that provide resources and services to women to help overcome financial barriers, innovative interventions are critically needed to further empower women directly and reduce the financial burden in accessing RHS.

Savings Group (SGs), a self-managed savings and credit group designed to strengthen household economy of the poor (those earning less than $2/day), has received much attention in the past few decades in the field of development (Parker, Francois, Desinor, Cela, & Fleischman Foreit, 2017; Rooyen, Stewart, & Wet, 2012). A variety of SGs models have been implemented by more than 70 organizations worldwide (Rippey, Nelson, & Devietti, 2015). While scholars

agree that SGs are one of the few interventions that can reach the poorest of the poor, people living in rural areas with limited access to the formal sector of financial services (e.g., banks), the economic benefits of SGs are still controversial (Annan, Bundervoet, Seban, & Costigan, 2013; Bureau of Applied Research in Anthropology [BARA], 2013; Karlan et al., 2012; Ksyombe, Miller & Barkey, 2017; Parker et al., 2017; Parr & Bachey, 2015; Shaikh, Noorani, &Abbas, 2017; Taneja, 2013). Furthermore, literature examining the potential of SGs to financially empower individuals directly as opposed to interventions targeted at the government, policy, or community levels in RHSs is extremely scarce (Ekirapa-Kiracho et al., 2017; Pitt, Khandker, Mckernan, & Latif, 1999; Shaikh et al., 2017).

Statement of the Problem

While government level interventions can improve access to RHS, there is an unintended consequences of lower quality health care. For example, abolition of user fees, conditional cash transfers, vouchers, and insurance programs have shown to increase utilization of RHS (Ndiaye et al., 2008; Ogwang et al.,2012; Richard et al., 2008; Richard et al., 2010). However, not increasing the number of healthcare workers and the wages for them have significantly lowered the quality of the services provided (Ndiaye et al., 2008; Ogwang et al.,2012; Richard et al., 2008; Richard et al., 2010). The literature identifies compromised quality of care, lack of financial sustainability of the interventions (e.g., conditional cash transfers, vouchers, prepayment plan, community health insurance, social insurance), and informal fees involved in seeking, reaching and receiving care that are not covered by the variety of the interventions as a few of the important reasons contributing to the continued challenge for accessing RHSs (Sacks et al., 2017; Scott et al., 2018; Sialubanje et al., 2015; Sibanda et al., 2018). Therefore, SG such

as Savings and Internal Lending Communities (SILC) can be a more sustainable intervention to increase RHS utilization.

Purpose

The primary purpose of this study is to examine the effect of SILCs, a specific model of SGs developed and implemented by the Catholic Relief Services (CRS), to enhance household wealth and financial resources to access RHSs (Parker et al., 2017; Taneja, 2013). The study will be guided by the social ecological model and uses two different data sets to examine the effect of SILC at the community, interpersonal, and individual levels (Bronfenbrenner, 1979).

Research Questions

Research question: Does SILC participation impact household wealth, financial preparedness for birth, and utilization of RHSs?

Aim 1: Examine how existing SGs have been used as a financial intervention to overcome financial barriers to access RHSs (organization level).

Aim 2: Understand the association between having access to SILC, household wealth, financial preparedness for birth, and utilization of RHSs (community level).

2a. Compare household wealth between baseline and endline data for three different Community Groups (CGs): CG1) communities with access to neither SILCs nor MWHs, CG2) communities with access to MWHs only, and CG3) communities with access to both SILCs and MWHs.
Hypothesis: Women from communities with access to both SILCs and MWHs (CG3) will exhibit greater increase in household wealth compared to women from communities with access to neither MWHs nor SILCs (CG1).

2b. Compare financial preparedness and access to RHSs between baseline and endline and between three CGs.

Hypothesis: Women from communities with access to both SILCs and MWHs (CG3) will have higher odds of being financially prepared for birth (save money for birth) and have higher odds of utilizing various RHSs (ANC visits, PNC visits, MWH utilization, HF delivery, delivery with SP) at endline compared to women from communities with access to neither MWHs nor SILCs (CG1) at endline.

Aim 3: Understand the association between SILC participation, household wealth, and financial preparedness for birth (individual level), and examine the association between sex and financial preparedness for birth (interpersonal level).

3a. Compare household wealth of the SILC participants before and after joining SILCs.

Hypothesis: All SILC participants will have positive changes in their household wealth.

3b. Compare financial preparedness (purchased all birth items for most recent birth) between participants who had their most recent childbirth before joining SILCs and those who had their most recent childbirth after joining SILCs.

Hypothesis: SILC participants who had their most recent childbirth after joining SILCs will be more financially prepared for their own, or their spouse/partner's childbirth than those who had their most recent childbirth before joining a SILC.

3c. Compare financial preparedness between female and male SILC participants.

Hypothesis: Female SILC participants will be more financially prepared than male SILC participants.

Review of Literature

This chapter will provide an overview of the following topics: 1) the burden of maternal mortality and morbidity; 2) the lack of financial resources limiting women's ability to access reproductive health services (RHSs); 3) the variety of Savings Groups (SGs) that have been

implemented in many low-income countries to empower financially excluded populations; 4) the potential for SGs like Savings and Internal Lending Communities (SILCs) to assist women to overcome the financial barriers to accessing RHSs; and 5) the social ecological model that will be guiding the study.

Maternal Mortality

> The International Classification of Diseases (ICD-10) defines maternal death as "[The] death of a women while pregnant or within 42 days of the end of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes" (World Health Organization [WHO], 2010).

Maternal death reveals the greatest gap among rich and poor women both between and within countries (Obaid, 2007). However, maternal health has been largely neglected until the past few decades because those who suffer the most are female, poor, and rural (Kristof & WuDunn, 2014; Nakambale, Nzala, & Hazemba, 2014; Obaid, 2007). Remarkable progress has been made internationally to better understand and promote maternal health since one of the eight Millennium Development Goals (MDGs) focused on improving maternal health (United Nations [UN], 2015). Specifically, MDG 5 aimed to reduce the maternal mortality ratio (MMR) by three quarters between 1990 and 2015 and to achieve universal access to reproductive health care by 2015 (UN, 2015). Despite the significant progress, MDG 5 was only partially achieved in some countries but was not fully reached worldwide (UN, 2015). Globally, MMR was reduced by 45% and universal access to care increased from 59% in 1990 to 71% in 2015 (UN, 2015). Countries in sub-Saharan Africa also made notable improvements, reducing the MMR by 49% and increasing the universal coverage to 52% by 2015 (UN, 2015). However, sub-Saharan Africa

is still one of two regions of the world with the highest rates of maternal mortality (Alkema et al., 2016).

Of all maternal deaths worldwide between 2003 and 2009, 73% were estimated to be caused by direct obstetric causes and 27% by indirect causes (Say et al., 2014). The direct causes of maternal mortality are a result from complications of pregnancy, labor and delivery, or its management (Fildes, Reed, Jones, Martin, & Barrett, 1992). The most common direct obstetric causes are hemorrhage (27%), hypertension (14%), sepsis (11%), abortion (8%), embolism (13%) and other causes such as obstructed labor and ectopic pregnancy (13%) (Say et al., 2014). Indirect causes of death occur when pre-existing health problems are exacerbated by pregnancy; a few of the most common indirect causes are HIV and malaria (Fildes, Reed, Jones, Martin, & Barrett, 1992). Indirect causes are much more difficult to assess due to the frequency of being misclassified as direct causes of maternal mortality (Fildes et al., 1992; Firoz et al., 2013; Nour, 2008; Say et al., 2014).

Maternal Morbidity

The data are less coherent regarding maternal morbidity in low- income countries largely due to the limited resources and infrastructures to properly diagnose, treat, and report (Black, Laxminarayan, Temmerman, & Walker, 2016). The WHO Maternal Morbidity Working Group defines maternal morbidity as "any health condition attributed to and/or aggravated by pregnancy and childbirth that has a negative impact on the women's well-being" (Firoz et al., 2013, p795). It also provides a list with more than 180 diagnoses divided into 14 organ dysfunction categories, ranging from obstetric to cardiac, respiratory, and rheumatology conditions (Firoz et al., 2013). The origins of maternal morbidity occur during pregnancy, but symptoms might take several months to manifest themselves and can severely affect a women's functional status (Black et al.,

2016). Because women are diagnosed when they come in for services and data are collected at the facility level, maternal morbidity is challenging to estimate when women in low-income countries do not seek the necessary care due to various reasons (Black et al., 2016). Furthermore, health facilities lack strong registration systems and infrastructures to properly collect these data (Black et al., 2016).

Most of the studies related to maternal morbidity focus on severe cases, more relevant to morbidities during and right after pregnancy. However, there is a paucity of literature examining mild to moderate postpartum morbidities although the consequences of these morbidities can still be devastating to a woman and her family (Wickramasinghe et al., 2017). Therefore, the prevalence of maternal morbidity and its impact on daily function and productivity experienced by women are not only difficult to estimate, but also are likely to be even worse than what is estimated. Despite the complexity of maternal morbidity, it is generally projected that for every maternal death, approximately 6.2 women experience severe complications from pregnancy and childbirth (Wickramasinghe et al., 2017).

In terms of disease burden, maternal morbidity is cited as the leading cause of Disability-Adjusted Life Years (DALYs) lost among women of reproductive age in low-income countries. The WHO estimates 50 million incidents of pregnancy-related complications resulting in an annual loss of nearly 40 million DALYs (WHO, 2008). Depression and anemia are estimated to be the most common causes of maternal morbidity but prolonged and obstructed labor results in the highest burden of disease (Black et al., 2016).

Financial Barriers to Maternal Health Services

Most maternal mortality and morbidity are preventable, as health-care solutions to prevent or manage complications are well known (Nour 2008; Obaid, 2007; Stenberg et al.,

2014; WHO, 2016). The literature agrees that maternal mortality and morbidity can be significantly reduced when women have access to essential RHSs before, during, and after pregnancy (CSO et al., 2014; Obaid, 2007). However, the cost involved in seeking, reaching, and receiving necessary reproductive health services is one of the most frequently cited barriers in the literature (Borghi et al.,2006; Moyer & Mustafa, 2013; Sacks et al., 2017; Tancred et al.,2016). Therefore, it is not surprising that substantial inequity exists between women of high and low socioeconomic status and that copious studies have found correlations between accessing various RHSs and women's financial status (Borghi et al., 2006; Kyokan et al., 2016; Moyer & Mustafa, 2013; Sacks et al., 2017; Sibanda et al., 2018).

Many countries in sub-Saharan Africa, including Zambia, have introduced 'free' maternal health services so that the impoverished can access and use RHSs (Kalu-umeh et al., 2013; Ministry of Health [MoH] Zambia, 2011). However, studies have shown that while 'free' maternal health services have increased access to antenatal care and delivery services, informal fees are still too great for many women to afford (August et al., 2016; Borghi et al., 2006; Nakambale et al., 2014; Sacks et al., 2017; Scott et al., 2018). For example, the costs involved in transportation is identified as a major barrier for women to access not only facility-based delivery services but also antenatal care and postnatal care services (Kyokan et al., 2016; Sibanda et al., 2018). Furthermore, if women are able to overcome the barrier of finding transportation to the facility, they are often required to pay a small service fee upon arrival, which some households identify as nearly impossible to afford because of their small household income (Kalu-umeh et al., 2013; Sibanda et al., 2018).

Items that women are 'recommended' to bring to the health facility for delivery, such as cotton gauze, a plastic cover for the delivery bed, gloves, and clean baby clothes, can further

discourage women from seeking facility-based delivery (Kalu-umeh et al., 2013; Nakambale et al., 2014; Tancred et al., 2016). Studies suggest that women feel embarrassed and ashamed when they are not able to purchase the items and fear being scolded and mistreated by the health care providers (Sacks et al., 2017). Additionally, women are also responsible for providing the food that they and their family members need throughout the delivery and recovery period at the facility (Nakambale et al., 2014; Sialubanje et al., 2015). The list of financial barriers women of low-income countries face can go on and on, and it is evident that women without many financial resources can be discouraged from seeking various RHSs.

Maternal health in Zambia

Zambia, a landlocked country in sub-Saharan Africa, consists of 10 provinces with 74 districts and a total population of 17.09 million (World Bank, 2019). It has a fertility rate of 4.7 births per woman, with women living in rural areas having two more children on average as compared to those living in urban areas (Central Statistical Office [CSO] et al., 2018). Approximately 29% of Zambian women between 15 and 19 years old have begun childbearing, with women in the lowest wealth quintile (46%) and living in rural areas starting earliest (CSO et al., 2018). Half of all married women of reproductive age use contraceptive methods (CSO et al., 2018). Ninety-seven percent% of mothers see a health professional at least once for ANC visit, 64% of women had four or more ANC visits (CSO et al., 2018). The majority of births (80%) are assisted by skilled health care professionals; however, there is a difference between urban (93%) and rural (79%) areas (CSO et al., 2018). Similarly, 84% of births occur in health facilities with greater percentage of facility deliveries in urban areas (93%) compared to rural areas (79%) (CSO et al., 2018). The majority of women (70%) who have given birth received postnatal care within 2 days after delivery with large gaps between women in urban areas (82%) and rural areas

(64%) and between women from the highest wealth quintile (84%) and those of the lowest wealth quintile (57%) (CSO et al., 2018). Maternal death represents 10% of all deaths among women age 15-49, and close to 20% for women age 20-25 (CSO et al., 2018).

Poverty in Zambia

In 2015, more than 736 million people around the world lived on less than $1.9 USD a day, with approximately half of these populations residing in sub-Saharan Africa (World Bank Group, 2015). Despite the overall reduction in poverty by 24.6 % between 1991 and 2015, Zambia still suffers from a high poverty rate with 40.8% of the population falling within the parameters of extremely poor and 13.6% moderately poor (Ministry of National Development Planning [MNDP], 2017). As in many other countries in sub-Saharan Africa, poverty is concentrated in rural areas with 76.6% of the rural population living below the poverty line (MNDP, 2017). Unfortunately, the countries with high poverty rates are also the ones with the lowest financial inclusion (International Capital Corporation [ICC], 2015). A country's financial system is considered inclusive when financial institutions and the regulatory frameworks are responsive to the needs of the poor, help them use money more productively, and provide them with increased financial security (ICC, 2015). Of the countries in sub-Saharan Africa, Zambia is one of those with the lowest levels of financial inclusion, only after Mozambique, Tanzania, and Rwanda (Bank of Zambia [BoZ], 2015). Approximately 41% of the adult Zambian population (16 years and older) are financially excluded, not having or using any formal or informal financial services (BoZ, 2015). Formal financial service providers include banks and microfinance institutions and informal financial service providers include SGs, Chilimbas (informal rotating savings scheme), and Kaloba (credit provider for the poor) (BoZ, 2015). Financial exclusion is greatest among women in rural areas (BoZ, 2015).

There are a variety of formal financial institutions operating in Zambia, 19 commercial banks and 107 non-bank financial institutions (BoZ, 2015). However, the majority of low-income populations are not able to access formal financial services, because they cannot pay the associated charges and high interest rates, maintain a minimum balance, and navigate around the complex procedures (ICC, 2015). Furthermore, physical access to services is a barrier for rural residents since 75% of financial institutions are located in urban areas (ICC, 2015). It takes more than an hour to reach the nearest financial institution for more than 56% of the rural Zambian population compared to the 85% of urban residents that take less than 30 minutes (ICC, 2015). Women are also disproportionately excluded compared to men due to cultural and societal norms like women's responsibility for various household chores, community work, and productive work (World Bank Group, 2012). The World Bank estimates that Zambian women work 12 hours every day on average compared to the 8 hours men work, and this simply leaves the women with no time to do anything else (World Bank Group, 2012).

Impact of Financial Exclusion on Pregnancy and Childbirth

People who are financially excluded are vulnerable because they have a hard time accessing 'usefully large' amounts of money, which is necessary to deal with expected and unexpected events throughout life (Rutherford & Arora, 2009). Various expected and unexpected events are often put into three categories: life events, emergency events, and opportunistic events (Rutherford & Arora, 2009). Life events are predictable events relevant to one's life stage such as marriage, education, and home building (Black et al., 2016; BoZ, 2015; Rutherford & Arora, 2009). Emergency events are unforeseen events caused by natural disasters such as floods and drought, or by personal and family illness, unemployment, or death (BoZ, 2015; Rutherford & Arora, 2009). Opportunistic events include creating or expanding business, buying land,

equipment, or farming inputs (BoZ, 2015; Rutherford & Arora, 2009). Often, for various life events and opportunistic events, people accumulate resources before they are needed, such as collecting and saving various building materials before proceeding to construct a new house or raising livestock to buy children's uniforms and books for school (Hermes & Lensink, 2011). However, when people face emergency events and have not been able to save enough money, they have to borrow from a money lender or relatives. Furthermore, exorbitantly high interest rates can further push the family into deeper poverty (Borghi et al., 2006; Kristof & WuDunn, 2014).

Childbirth is often thought of as a life event, but unfortunately, it can also become an emergency event. Therefore, while some may argue that the length of a pregnancy is long enough for a household to save money to pay for care, the poor predictability of birth outcomes, ranging from normal delivery to surgical delivery with severe complications, leads to uncertainty in the final price of care which can further deter households from saving (Borghi, et al., 2006).

Poor people living in rural areas are especially vulnerable during pregnancy and childbirth because they have limited access to cash and live farther away from health facilities (Borghi et al., 2006). Because agriculture accounts for 55%-65% of Zambia's total employment, there is often a temporal or seasonal inability to pay (ICC, 2015). This greatly limits the household's ability to access cash at the time of need (ICC, 2015). Moreover, when people have to borrow money from money lenders or relatives, time spent looking for money can delay the decision to seek care and reduce timely access (Thaddeus & Maine, 1994). As examined earlier, there are a variety of fees involved in accessing RHS, including facility-based delivery without any complications. However, when complications do arise, the total cost can be up to three to ten times more than a normal delivery, taking up to 10% of the yearly household income for some

families (Borghi et al., 2006). Therefore, it is undeniable that poverty plays a crucial role in maternal health and that in order to address maternal health, poverty also needs to be addressed.

Formal and Informal Microfinance Services

Many people believe that microfinance, a broad category of services that aim to help the poor and socially marginalized to access a wide range of affordable, high quality financial products and services, is a promising and innovative means for financially excluded people to access 'usefully large' amounts of money (Parker et al., 2017; Shaikh et al., 2017; Taneja, 2013). Microfinance includes both formal and informal sectors. Microfinance institutions (MFIs) are one the most well-known in the formal sector, and various SGs are the most well-known in the informal sector. Microfinance institutions, such as the world famous Grameen bank in Bangladesh founded by Muhammad Yunus, aim to provide credit to small business and primarily serve moderately poor populations in urban areas (Parr & Bachey, 2015; Yunus, 2007). Micro credits, loans, and savings from MFIs have been shown to spur business investment, help firms reduce risks, and have a positive impact on poor people's levels of savings, expenditure, and accumulation of assets. However, there is no consistent evidence whether these programs lead to an overall reduction in poverty or contribute to non-economic benefits such as education outcomes, health care usage, or female empowerment for the poor and their communities (Kanguru, Bell, & Patel, 2014; Karlan et al., 2012; Nwolise, Hussein, Ekirapa-Kiracho et al., 2017). Furthermore, because of the transaction, information, and operational costs that are still too high for many poor people to afford, MFIs are limited in reaching the poorest of the poor that usually reside in rural areas (Hermes & Lensink, 2011; Parr & Bachey, 2015). In 2015, 3.8% of the Zambian adults used services provided by MFIs. Individuals who did not use services provided by MFIs identified insufficient money to justify using MFI services, not being able to

maintain the minimum balance, not knowing how to open an account, and living too far away as some of the biggest barriers (BoZ, 2015).

Savings Groups are low risk, self-managed, and self-financed, informal forms of microfinance that have been recognized for their ability to reach those who lack access to formal financial services and microfinance programs (Karlan et al., 2012; Parr & Bachey, 2015). There are many different models of SGs which have been developed and facilitated by over 70 organizations worldwide (Rippey, Nelson, & Devietti, 2015). Some of the most well-known SGs are: Village Savings and Loan Association (VSLA) by CARE and Plan International; Savings for Change (SfC) by Oxfam America and Freedom from Hunger (FFH); Community Based Savings Group (CBSG) by Aga Khan Foundation; and Savings and Internal Lending Community (SILC) by Catholic Relief Services (CRS) (Annan, Falb, Kpebo, Hossain, & Gupta, 2017; BARA, 2013; Parr & Bachey, 2015; Taneja, 2013). Most of these programs specifically target women, since women and girls suffer the most from poverty (Kristof & WuDunn, 2014; Vanmeenen, 2006). Much of the empirical evidence shows that economic development is associated with women's empowerment and that women are far more efficient in using intra-household resource allocations to benefit their families, since they are more likely to save and invest time, effort, and resources in child development (BoZ, 2015; Taneja, 2013). In 2015, a total of 6.5% of Zambian adults were part of a SGs with the main driver identified as saving and being able to access loans when in financial need (BoZ, 2015).

Despite the numerous models of SGs developed and implemented by various organizations, SGs have their roots in the traditional program Rotating Savings sand Credit Associations (ROSCAs) (BARA, 2013; Karlan et al., 2012; Vanmeenne, 2006). Rotating Savings and Credit Associations, also called the merry-go-round savings group, have existed in

different parts of the world, including many African countries, for hundreds of years (BARA, 2013; Karlan et al., 2012; Vanmeenen, 2006;). In a typical ROSCA, community members come together, and every member contributes a fixed amount of money on a regular basis. During each meeting, every member contributes the predetermined amount and the accumulated sum goes to one member. The members take turns receiving the accumulated sum, and the meetings continue until every member has taken his/her turn. While ROSCAs provide a 'usefully large' amount of money, they are generally poorly organized, lack transparency, and have very limited flexibility for people to access the money for emergency events (BARA, 2013; Karlan et al., 2012; Vanmeenen, 2006). Chilimba, which means strengthening, is Zambia's equivalent of ROSCA (BoZ, 2015). Approximately 12.4% of Zambian adults use Chilimba, the main driver being access to large lump sums of money (BoZ, 2015). While Chilimba increases access to financial services to women, statistics show that women with grade eight or higher education, who are urban resident, salaried workers, and business owners are most likely to use it (BoZ, 2015). Furthermore, while Chilimba is able to reach the poor (second lowest in the wealth quintile), it is not reaching the poorest of the population (BoZ, 2015). Therefore, while the various models of SGs have their roots in ROSCAs, SGs improved upon the methodology, aiming to provide flexibility, transparency, and sustainability to provide financial services to women in rural areas, with low education levels, and among the poorest. (Karlan et al., 2012).

To achieve the above-mentioned benefits, different models of SGs share some of the key characteristics. Each SG consists of 15 to 30 self-selected members, and the group is self-governed, which means members collectively elect the management committee and establish group rules such as the interest rates for loans, meeting schedules, conditions of saving, and how long the group will function (Allen & Staehle, 2011; Ksoll, Lilleør, Lønborg, & Rasmussen,

2016; Parr & Bachey, 2015; Vanmeenen & Bavois, 2011). The pooled savings from regular meetings usually create two types of funds: a loan fund and a social fund. Some models may make the social fund optional (Parr & Bachey, 2015). Members can access loans for any purpose upon the rest of the group's approval, usually for a variety of opportunistic and life events. However, the money must be paid back with the agreed upon interest and time (Parr & Bachey, 2015). Interest rates are usually between 5-10% and the loans are proportionate to member's savings, compared to the interest rate of up to 30% charged by money lenders (Brannen & Sheehan-Connor, 2016). Social funds are for emergency events and members can access these and repay without interest (Parr & Bachey, 2015). The members keep financial records and all transactions are conducted at group meetings in the presence of all members. The physical funds are kept in safe box with multiple locks, each with a key assigned to a different member (Ksoll, Lilleør, Lønborg, & Rasmussen, 2016; Vanmeenen & Bavois, 2011). At the end of the cycle, all the loans must be repaid, and the accumulated interest is shared out proportionately to each members' savings (Parr & Bachey, 2015). The members can decide to disband or continue for another cycle with new members able to join (Parker, Francois, Desinor, Cela, Fleischman, & Foreit, 2017; Taneja, 2013).

Savings Groups (SGs)

Savings Groups have several benefits that distinguish them from other microfinance programs. First, SGs can operate without much outside funding. While different organizations train people to get the groups started and running, the variety of funds that members can access are from the members and the accumulated interest also stays within the group, later distributed among the members (Ksoll et al., 2016). Second, SGs are very flexible since the members can decide the interest rate, frequency of meetings, and priority of the funds. Furthermore, members

that are in need can access the money when they need it without having to wait a long time (Taneja, 2013; Vanmeneen & Bavois, 2011). Third, the funds are easy to access since there is no complicated paperwork or procedures like that which would be required at formal financial institutions. Because SG's methodology targets people of low-income who also often have limited education, record keeping is kept simple so that people with limited literacy and numeracy can comprehend and take part (Burlando, Canidio, & Selby, 2016; Taneja, 2013). Lastly, because SGs are formed by community members and people share ideas and stories during meetings, SGs generate a sense of community and shared understanding (Taneja, 2013). According to the 2015 statistics, a total of 6.5% of Zambian adults use SGs, with both males and females equally likely to be SG members, representative of all age groups, most likely to be rural residents, rely on farming activities for income, and of the lowest two quintiles of the population (BoZ, 2015).

While a number of qualitative studies, case studies, primary research studies without an experimental design, and secondary analyses show that SGs provide the ability to use the loans, social funds, and share out funds for business investments, school fees, health related expenses, household consumptions of food, and purchasing land and livestock, there are inconsistencies when specific economic and non-economic domains of SGs are analyzed to determine a positive impact on the household and the community (Parker et al., 2017; Parr & Bachey, 2015). Furthermore, experts agree that the field of SGs is still new and lacks well-designed experimental studies, especially in peer-reviewed journals (Hermes & Lensink, 2011; Parr & Bachey, 2015). Most of the existing studies are rather short in duration, usually spanning one to three years, which many experts argue is not long enough to examine the significance of many economic and non-economic domains (Parr & Bachey, 2015).

Despite the unique characteristics of SGs to serve the poor, the economic and non-economic benefits are inconsistent in the literature (Nwolise et al., 2014). A randomized control trial that examined the effect of Savings for Change (SfC) in Mali over three years, showed positive but small effects in overall increase in savings, amounts of money borrowed, households' livestock holdings, and food security (BARA, 2013). However, there was no significant difference when savings for health expenses, school enrollment, business development or expansion, agricultural input or household and agricultural assets were assessed (BARA, 2013). Another RCT examining the impact of Village Savings and Loan Association (VSLA) in Ghana, Malawi, and Uganda concluded that VSLA participation increased the likelihood that a woman would run a business and the income from the business also increased significantly; however, there was also a higher likelihood of that business not being successful overall. Furthermore, there was no significant impact on asset accumulation (Karlan et al., 2012). Women participating in the VSLA also showed increased decision-making power regarding food and education within the household. However, there was no significant increase in women's participation in community meetings or their own perceptions of their role in the community and empowerment (Karlan et al., 2012). A cluster RCT conducted in Malawi showed that the VSLA was able to reach some of the poorest households and could improve food security, housing standards, and household assets and increase the number of economic activities carried out and the amount saved. However, there was no significant changes in the total income generated by the economic activities (Ksoll et al., 2016).

Savings and Internal Lending Communities (SILCs)

Savings and Internal Lending Community (SILC) is a type of SG model developed by Catholic Relief Services (CRS), one of the world's largest private voluntary organizations

supporting international relief and development work in 99 countries (Vanmeenen, 2006). Savings and Internal Lending Community has been implemented in India and many countries in Africa, including Zambia (Ferguson, 2012; Taneja, 2013; Vanmeenen, 2006). Like other SG models, the SILC provides a strategy to increase low household income by providing access to self-managed and savings-led financial services, targeting primarily women (Ferguson, 2012; Taneja, 2013; Vanmeenen, 2006). While SILCs share most key characteristics with other SGs, one of the characteristics unique to SILCs is the use of Private Service Providers (PSP) (Ferguson, 2012; Taneja, 2013; Vanmeenen, 20016). Unlike most other SG models where the organizations hire, train, and pay the field agents to form and support SGs, the PSPs from the SILC model provide the same services as the field agents, but are paid by the SILC groups that are accessing the service (Taneja, 2013). The PSP delivery channel is suggested to make the SILC highly sustainable (Taneja, 2013). Furthermore, a randomized control trial conducted in Tanzania, Uganda, and Kenya comparing the two different delivery channels, the fee-for-service PSP model and the project-paid field agent model showed that, generally, SILC groups led by PSPs were more active among entrepreneurs, likely to have both savings and credits linked to business activity, likely to be active in community, and took on higher levels of credit (Ferguson, 2012).

Different models of SGs are prevalent in different countries depending on the organization and the countries in which the work is concentrated. A recent qualitative study conducted in three different provinces of Zambia aimed to understand how SILC members used the three primary funds; loan funds, social funds, and share out funds (Taneja, 2013; Vanmeenen, 2006; Vanmeneen & Bavois, 2011). The study result identified that SILC members most frequently used the loan funds for business investment, farm input, and household

consumptions. The social funds were mostly used for family sickness, school fees, food at home, and funerals. The share out funds were most commonly used for business investments, school fees, and household consumptions. Furthermore, the members identified the low interest rates, ease of access, being able to save and borrow simultaneously, and increased sense of community and ownership as some of the unique benefits of SILCs (Taneja, 2013; Vanmeneen & Bavois, 2011).

Pairing SGs with Health and Developmental Interventions

Because SGs provide important platforms for community members to come together and talk about various issues, organizations started pairing with SGs to provide additional developmental and health interventions (Annan, Bundervoet, Seban & Costigan, 2013; Brunie, Fumagali, Marin, Field, & Rutherford, 2014). For example, CARE and International Rescue Committee (IRC) paired the VSLA and an entrepreneurship education intervention to further increase the economic impact aimed to help poorer populations move beyond subsistence living to more profitable livelihoods (Annan et al., 2013). Moreover, the project paired the VSLA and entrepreneurship education intervention with a family-based intervention called Healing Family and Communities. The intervention taught parents about the different developmental stages of childhood and positive disciplinary methods suitable for each stage. The result of the study showed that the pairing of the three programs brought not only positive economic effect to the family, but also improved children's well-being (Annan et al., 2013). Other studies paired different models of SG and various health interventions targeting specific populations such as HIV patients, female sex workers, people suffering from posttraumatic stress disorder (PTSD) or intimate partner violence (IPV), and women of reproductive age (Annan et al., 2017; Shaikh, Noorani, & Abbas, 2017). While some scholars argue that the impacts are expected to be greater

when SGs are coupled with other developmental strategies, others believe that adding programs to SGs can detract from the groups' economic purpose (Parr & Bachey, 2015). Regardless, the study results are generally positive, showing that adding interventions can further help people save money more purposefully as well as contribute to other positive aspects of their livelihood (Brunie et al., 2014; Nwolise et al., 2014; Parr & Bachey, 2015).

Given the generally limited number of studies in the field of SGs, there is a particular dearth of literature examining the potential of SGs to be paired up with reproductive health interventions (Ekirapa-Kiracho et al., 2017; Jennings et al., 2016; Pitt, Khandker, Mckernan, & Latif, 1999; Shaikh et al., 2017). A study conducted in Pakistan mobilized women of reproductive age to form Community Based Savings Groups (CBSGs) and simultaneously trained community midwives (CMs), pairing each CM with eight to ten CBSGs (Shaikh et al., 2017). The study found that women who participated in CBSGs were not only more aware of the various reproductive health issues and the available services, but their health seeking behavior also significantly increased (Shaikh et al., 2017). Furthermore, the women expressed increased access to money for utilizing CM services and felt empowered to decide to seek care. Additionally, CBSG played a crucial role in helping CMs receive community support and gain recognition of their services, since these CMs, like many other healthcare professionals of low-income countries, were deployed to places outside their native village and faced many challenges. Overall, the CBSGs are shown to provide crucial space for CM and women of reproductive age to network, interact, and support each other (Shaikh et al., 2017).

A systematic review that examined the effect of community-based loan funds in accessing transportation to utilize health facilities for deliveries concluded that the findings are inconclusive with some evidence suggesting that community-based loan funds have some

positive effect in health facility utilization when combined with other interventions (Nwolise et al., 2015). Furthermore, the article suggests that there are very limited studies that examine the effect of such programs in the context maternal health (Nwolise et al., 2015).

In summary, maternal mortality and morbidity is a global issue and low-income countries, especially those of sub-Saharan Africa, suffer disproportionately. Despite the evolving knowledge and health care that can prevent unnecessary deaths and illnesses caused by pregnancy and childbirth, women in many low-income countries identify the lack of financial resources as one of the biggest barriers in accessing necessary reproductive health services. Savings Groups (SGs) have recently been identified as an innovative method to financially empower the poorest of the poor. While various models of SGs have been paired with health-related interventions to target specific populations, very limited work has been done in conjunction with SGs and reproductive health. Furthermore, no studies have examined the effect of SILC in the context of maternal health. Therefore, the proposed study aims to understand the impact of SILC not only on household wealth but also on financial preparedness for accessing RHSs.

Theoretical Framework

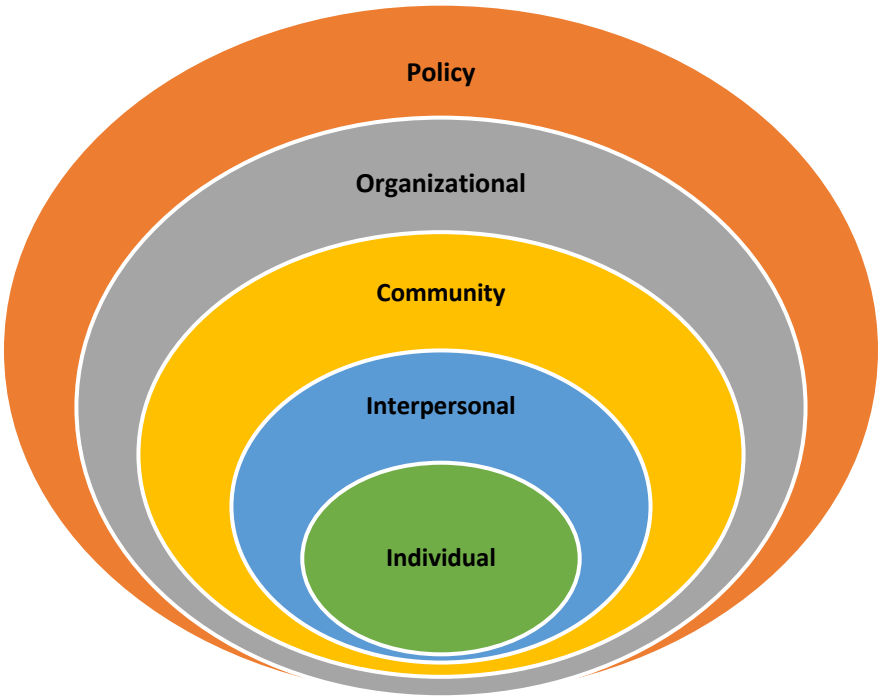
The Social Ecological Model (SEM) has derived from several researchers' work, including Urie Bronfenbrenner's ecological system theory (1979), Kenneth Mc Leroy's ecological model of health behaviors (1988), and Daniel Stokol's social ecological model of health promotion (2003) (Gombachika, Fjeld, Chirwa, Sundby, Malata, & Maluwa, 2012). The SEM has been widely adapted and used in many different fields because it recognizes the intertwined relationship between an individual and his/her environment (Elder et la., 2005; Fleury, J., & Lee, 2006; Gombqchika et al., 2012; Sallis & Owen, 1999; Walcott-McQuigg et al.,

2001). The model purports that while an individual is responsible for adapting certain health behaviors to reduce risk and improve health, the individual's behavior is influenced by a number of factors at the policy, organizational, community, interpersonal, and individual levels (Elder et al., 2005; Gombachika et al., 2012). It also aims to show the interdependence among people, their behavior and their environment (Banks- Wallace, 2000; Fleury, J., & Lee, 2006; Sallis & Owen, 1999; Walcott-McQuigg et al., 2001). While the SEM is most often used to identify the multiple levels of influence that foster the adoption or maintenance of a specific behavior, the proposed study will use the modified SEM to understand the impact of SILC at different levels. Within SILC, interventions such as removal of fees, insurance, and conditional cash transfers are started at the policy level and ultimately aim to influence the individuals. Alternatively, SGs are interventions targeted at the individual level that can theoretically influence community's wealth status (Borghi et al., 2006). To the best of our knowledge, no studies have examined the impact of SGs beyond the individual/household level in the context of maternal health.

While there are a number of versions of the SEM using slightly varying classification for the different levels, for the purpose of this study, CDC's classification of the SEM will be used to examine the level of impact from SILC. The five different levels are: policy, organizational, community, interpersonal, and individual. Policy level influence is the most comprehensive level, meant to influence local, national, or global laws and policies. The next level of influence is the organizational level, which influences organizations and/or social institutions guided by set rules and regulations. A community level impact influences a group of people sharing a specific geographical location as residential space, while the interpersonal level impacts one's close social circle such as family and friends. Lastly, individual level influences one's personal condition.

The presented study specifically examined the impact of SILC on household wealth and access of RHSs at the organization level, community level, interpersonal, and individual levels. At the organization level, the first manuscript aimed to understand the impact of SGs as a financial intervention in the context of RHS utilization. At the community level, the second manuscript aimed to understand the association of SILCs participation and utilization of RHSs by stratifying the community groups between those who had access to SILCs and those that did not have access to SILCs. At the interpersonal level, the third manuscript aimed to understand the how SILC participation of husbands/partners that had their wives/partners recently give birth financial preparedness for birth. Furthermore, at the individual level, the third manuscript also examined the association between SILCs participation and financial preparedness for birth amongst women who had their most recent childbirth before and after joining SILCs.

Figure 1.1: Socioecological model



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Chapter 2

Manuscript 1

The Effect of Savings Groups on Reproductive Health Services Access and Utilization: A Scoping Review

Abstract

Background: Lack of financial resources remains a critical barrier to accessing necessary reproductive health services (RHSs) (e.g., antenatal care, postnatal care, family planning services or products, and institutional delivery) for women in low-and middle-income countries (LMICs). Savings Groups (SGs) are a type of informal microfinance mechanism identified as an innovative intervention to empower the poor. While literature suggest that SGs may lead to increased access to RHSs by increasing knowledge, awareness, women's agency and decision-making power, there are limited studies examining SGs as a financial intervention to overcome financial barriers in accessing RHSs.

Methods: We searched Ovid MEDLINE, Embase, Scopus, Cochrane Library, Global Health, Women's Studies International, and grey literature for studies on SGs and access and utilization of RHSs. Inclusion criteria were 1) SGs conducted in LMICs, 2) SGs meet predetermined characteristics, 3) SGs used as financial intervention rather than social platform to deliver additional intervention. Information regarding the country in which the study was conducted,

study design, implementation period, aim of the study, sample size, and results was extracted using a structured checklist.

Results: A total of 10 final articles were included. The publication years ranged from 2002 to 2020 and represented three countries: India, Uganda, and Pakistan. All but one article included SGs as part of multi-component interventions; thus, it is difficult to differentiate between the effect of SGs versus other components of interventions. There is significant variability in how SGs are defined and utilized; however, participating in SGs increases women's access to and utilization of RHSs such as institutional delivery, antenatal visits, postnatal visits, and contraceptive methods. It also led to increased health knowledge, awareness of services, and health behaviors in women who participated in SGs. These positive changes are augmented when interventions included additional health education programs

Conclusion: The results suggest that SGs are a promising intervention to help women of LMICs overcome financial barriers in accessing RHSs. More studies are needed to understand the mechanisms explaining the effects of SGs on women' access and utilization of RHSs.

Introduction

The complex intersection of political, economic, and socio-cultural variables directly and indirectly influences maternal deaths (United States Agency for International Development [USAID], 2007). The burden of maternal death is disproportionately heavier in low-income and low-and middle-income countries (LMICs) (Black, Laxminarayan, Temmerman, Walker, & Bustreo, 2016; United Nations International Children's Emergency Fund [UNICEF], 2020). Financial barriers are a prevalent impediment for women of LMICs who desire access to necessary reproductive health services (RHSs), as a majority of maternal deaths are preventable through access to high quality care before, during, and after pregnancy and childbirth (Say et al., 2014).

In LMICs, access to RHSs is lower among poorer subgroups; the proportion of births attended by skilled health personnel differs by up to 80% between the richest and poorest populations (World Health Organization [WHO], 2016). Women of LMICs have identified high fees as a barrier to services that promote reproductive health such as accessing antenatal care (ANC) services, postnatal care (PNC) services, and maternity waiting homes (MWHs) (Sacks et al., 2015; Sibanda, Bernays, Weller, Hakim, & Cowan, 2018; Tancred, Marchant, Hanson, Schellenberg, & Manzi, 2016). These costs are often tied to transportation, food, screenings for sexually transmitted diseases, prescribed medicines, waiting times, and loss of workdays (Sacks et al., 2015; Tancred et al., 2016). To effectively reduce financial constraints in accessing RHSs, interventions and policies not only need to be targeted at the national, regional, and health facility levels but also at the individual and household levels (Agarwall & Sarasua, 2002).

A Savings Group (SG) is an umbrella term used to describe a type of informal microfinance mechanism for saving and credit. It has been identified as an innovative intervention to financially empower the poor, those who live on less than $2/day, in rural areas (Parker, Francois, Desinor, Cela, & Fleischman Foreit, 2017; Rooyen, Stewart, & Wet, 2012). Unlike formal microfinance mechanisms, SGs can begin without much external funding. While a similar mechanism of saving and lending exists in many LMICs in the form of rotating savings and credit associations (ROSCAs), SGs are unique in their flexibility, transparency, and sustainability (Karlan et al., 2012; USAID, 2015). While most SGs are established and facilitated by non-governmental and non-profit organizations, more government programs are emerging to alleviate the poor and rural from poverty and to ultimately link SG members to banks and other formal financial institutions (Desai & Olofsgård, 2019). Currently, there are more than 74 government initiatives in the SGs sector, across 20 countries in sub-Saharan Africa alone (Jarden & Rahamatali, 2018).

Emerging evidence show that pairing of SGs with other health and developmental programs have created non-financial benefits, such as improved hygiene, nutrition, knowledge, and health, since SGs have the unique ability to generate a sense of trust and community (Brunie, Fumagalli, Martin, Field, & Rutherford, 2014; Jarden & Rahamatali, 2018; USAID, 2013; Saha, 2017). These effects were found particularly when SGs were utilized as a social platform to deliver health education (Annan, Falb, Kpebo, Hossain, & Gupta, 2017; Shaikh, Noorani, & Abbas, 2017; USAID 2013). However, there is a dearth of literature examining whether financial resources gained from SG participation can help poor and rural women in LMICs overcome financial barriers to accessing RHSs. Therefore, the purpose of this literature review is to understand the financial effect of SGs in accessing or utilizing RHSs in LMICs.

Methods

We conducted a scoping review using the framework developed by Arksey and O'Malley (2005) and modified by Levac, Colquhoun, and Obrien (2010) in six databases – Ovid MEDLINE, Embase, Scopus, Cochrane Library, Global Health, and Women's Studies International – using a list of keywords and synonyms. Ovid MEDLINE, Embase, Scopus, and Cochrane Library are well-known databases that contain comprehensive literature in the fields of medicine, nursing, dentistry, technology, and social sciences. Global Health is a public health database that provides information on international health, biomedical life sciences, and non-communicable diseases. Women's Studies International contains the latest scholarship in feminist research in the areas of sociology, political science, economics, public policy and international relations. PubMed, which is a frequently searched database for biomedical and life sciences literature, was not searched since it primarily provides access to the MEDLINE database and thus overlaps with Ovid MEDLINE. Additionally, a combination of key terms such as 'savings groups' and 'reproductive health' were used to search the websites of organizations that implement SGs and websites of organizations that fund, monitor, or actively assist in the field.

The search for the keywords was conducted through phrases, proximity searching, synonyms, and Mesh headings. The search did not limit publication date since the scientific journals in the field of SG are rather new. The references of retrieved articles were further hand searched to ensure that no related articles were missed. The searches were completed in March 2020. The list of the final search terms used for each database is shown in *Table 2.1*.

To be included in the review, the articles had to include at least one model of a SG as an intervention or as part of a set of interventions. Furthermore, the description of SGs had to meet

the following criteria: 1) be self-financed, without significant outside funding and the generated interests remaining internal; 2) be self-managed, with its own rules and a member elected management committee; and 3) be flexible for individual members of the SGs in the amount of savings and loans they can contribute and access. Additionally, the articles had to use SGs as a financial intervention to increase access to RHSs such as explicitly stating participants using savings and loans from SGs to access RHS. The studies were required to analyze access to or utilization of RHSs (e.g., antenatal care, postnatal care, family planning services or products, and institutional delivery) as an outcome variable or as part of the study results. The study had to be implemented in LMICs, defined by the Word Bank (2021). Lastly, the articles were required to be full text research articles written in English that included a results or evaluation section.

Results

Search results

An initial total of 2,409 articles were retrieved from the six databases. By screening out titles and abstracts, applying the inclusion criteria, and reviewing the full texts, ten final articles remained. A Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) diagram depicting the process is shown in **Figure 2.1** (Moher, 2009). The majority of the studies were excluded because they did not mention SGs as a financial mechanism to enhance access to RHSs. Rather, studies examined SGs as a social platform to deliver education and raise awareness. Studies that utilized SGs as both financial intervention and social platform to deliver education were included. Study characteristics such as country of which the study was conducted, study design, implementation period, aim of the study, sample size, and results, were extracted. Then, in alignment with the purpose of this scoping review, we summarized and reported the included articles to understand 1) defining SGs, 2) pairings of SG interventions, 3)

access to and utilization of RHSs, 4) other reproductive health benefits, and 4) non-health benefits of SG participation.

Study characteristics

A summary of the study characteristics is shown in **Table2.2** Eight of the ten published in the past five years. Studies were conducted in three countries: six in India, three in Uganda, and one in Pakistan. Three were qualitative studies, one a secondary analysis, one a post-experimental, one a mixed method, three quasi-experimental, and one a program evaluation. The implementation periods ranged from 12 months to two years. It is important to note that three of the articles from Uganda are from the same study (Ekirapa-Kiracho et al., 2016; Ekirapa-Kiracho et al., 2017a; Ekirapa-Kiracho et al. 2017b) and two of the articles from India are from the same study (Hazra et al., 2020; Walia, Irani, Chaudhuri, Atmavilas, & Saggurti, 2020).

Defining SGs

While the SGs described in all ten articles met predetermined characteristics of inclusionary factors, they were defined and utilized somewhat differently by each of the studies. For example, three studies conducted in Uganda defined and assessed 'SGs' the same way this scoping review does – as an umbrella term to include all models of SGs that are self-financed, self-managed, and flexible – whereas the studies conducted in India used the term microfinance-based self-help groups (SHGs). Technically, SGs and SHGs differ slightly in their approach and purpose, but in practice, both function in similar capacities. Similar to this scoping review, the study conducted in Uganda defined the term 'SG' by referring to a wide range of SG models that share the aforementioned fundamental characteristics (Ekirapa-Kiracho et al., 2016; Ekirapa-Kiracho et al., 2017a; Ekirapa-Kiracho et al. 2017b).

In short, the term ‘SG’ is not defined and utilized consistently throughout the literature. ‘Savings group’ can refer to a specific model or a wide range of SGs models. Terms such as ‘SHG’ are often used interchangeably with SGs (Hazra et al., 2020; Saggurti et al., 2018; Saha, Anneear, & Pathak, 2013; Walia et al., 2020). Furthermore, similar to the term ‘SG’, the term ‘SHG’ can refer to a specific model implemented by a specific organization or institution or a wide range of SHG models. To add to the confusion, specific models of SGs can also be referred to with a specific name such as ‘CBSG’ and ‘community-based health funds.’

Pairing of SGs interventions

Only one study examined SGs as its sole intervention of interest while the rest included SGs as part of multi-component interventions (Walia et al., 2020). SGs were paired with various reproductive interventions at different capacities. For example, one study identified and trained community midwives (CMWs) (Annan et al., 2017). The study paired each CMW with eight to ten SGs, aiming to increase awareness, understanding, and utilization of various RHSs. The CMW were identified, recruited, trained, and deployed to a village. They used the SGs as a platform for the village women to discuss their reproductive health issues with each other to learn about the importance and availability of the RHSs. Similarly, SGs were paired with eight discrete sessions of maternal and child health education as part of the intervention group whereas the participants from the comparison group were only part of SGs (Saggurti et al., 2018).

Other studies included SGs as part of more complex and multisectoral interventions. For example, the three studies conducted in Uganda assessed SGs that were part of a large project called Maternal and Neonatal Implementation for Equitable Systems (MANIFEST) (Ekirapa-Kiracho et al., 2016; Ekirapa-Kiracho et al., 2017a; Ekirapa-Kiracho et al. 2017b). This project used a participatory action research framework to involve multiple stakeholders such as

households, SGs, sub-county and district leaders, transporters, and village health teams to enhance maternal and newborn health. The effect of combining a health program designed to improve health behaviors and outcomes with SGs was also examined (Saha et al., 2015). The health program consisted of mobile health camps, health education and training, hygiene programs, and insurance schemes at different capacities in participating villages.

There was only one study that examined the effect of SGs alone by conducting a secondary analysis using national data to determine the effect of women's participation in SGs on access to RHSs (Saha et al., 2013). Although the article described the SG, it stated that the data analyzed for the study did not include an explicit definition of SGs in the manual.

Nine of the ten articles included SGs as part of multi-component interventions, but at different capacities. Three studies paired SGs directly with other health education programs to enhance reproductive health (Saggurti et al., 2018; Shaikh et al. 2017; Walia et al., 2020). Other studies included SGs as part of a much more complex intervention that aimed not only to enhance reproductive health but also build community capacities (Agarwal & Sarasua, 2002; Ekirapa-Kiracho et al., 2016; Ekirapa-Kiracho et al., 2017a; Ekirapa-Kiracho et al., 2017b; Hazra et al., 2020; Saha et al., 2015). Only one secondary analysis examined the effect of SGs alone in women's access to RHSs (Saha et al., 2013).

Access to and utilization of RHSs

The types of RHSs accessed and utilized included institutional delivery, ANC visits, PNC visits, and contraceptive methods. One study reported that participation in SGs led to increased utilization of RHSs provided by the CMWs, such as ANC visits and delivery (Shaikh et al., 2017). Another study found that women from villages with SGs were 19% more likely to have delivered in a health care facility, along with higher utilization of family planning products and

services (Saha et al., 2013). Three articles reported that participating in SGs financially helped households providing the means to meet transportation costs and purchase other items needed for birth (Ekirapa-Kiracho et al., 2016; Ekirapa-Kiracho et al., 2017a; Ekirapa-Kiracho et al., 2017b). Additionally, one of the three articles found that women from communities with the intervention package were 8% more likely to attend ANC in their first trimester and deliver at a facility (Ekirapa-Kiracho et al., 2017b). While the article reported that attending four or more ANC visits and saving for reproductive health as intervention elements predicted facility delivery, it did not expand on whether women that participated in SGs were more likely to save for reproductive health services or not (Ekirapa-Kiracho et al., 2017b).

Four studies with comparison groups (only SGs) found that the pairing of SGs with additional health education programs were more effective in allowing women to access RHSs (Haza et al., 2020; Saggurti et al., 2018; Saha et al., 2015; Walia et al., 2020). Studies found that the intervention group had higher odds of delivering at a health care facility and a higher likelihood of women to use contraceptive methods, access ANC and PNC, and uptake of facility-based delivery (Saggurti et al., 2018; Saha et al., 2015). Furthermore, studies found that women from intervention areas had significantly higher improvement in attending at least four ANC visits (Hazra et al., 2020; Walia et al., 2020). Women who were most marginalized (no formal education, low caste, lowest or low on wealth index) had significant increase for ANC checkups and current use of contraception (Hazra et al., 2020).

Overall, the majority of the studies agreed that participation in SGs increases women's access to and utilization of RHSs such as institutional delivery, ANC visits, PNC visits, and contraceptive methods. Further, access and utilization of these services were increased when SGs were paired with health education programs.

Other reproductive health benefits

Multiple studies showed that participating in SGs or SG-involved interventions led to other reproductive health benefits, such as increased reproductive health knowledge, awareness, and behavior (Ekirapa-Kiracho et al., 2016; Ekirapa-Kiracho et al., 2017a; Hazra et al., 2020; Saggurti et al., 2018; Saha et al., 2015; Shaikh et al., 2017; Walia et al., 2020;). Women who participated in SGs that were linked with CMWs or other health programs reported better awareness of health issues than before, including the importance of good diet and rest during pregnancy (Shaikh et al., 2017). Two studies conducted by Ekirapa-Kiracho and colleagues reported that by partaking in the SG-involved intervention package, both men and women gained increased awareness regarding the importance of nutritious diets for pregnancy (Ekirapa-Kiracho et al., 2016; Ekirapa-Kiracho et al., 2017a). They also gained increased awareness on the importance of saving for transportation and delivery. Health education interventions for not just pregnant women but all SG members in the intervention area also encouraged other SG members to understand the importance of ANC services and to accompany pregnant women to access ANC services (Walia et al., 2020).

Several studies also reported better health behaviors in women who participated in SGs. Three studies found that women who participated in SGs were more likely to practice skin-to-skin, initiate timely breastfeeding, and feed colostrum to their children (Saggurti et al., 2018; Shaikh et al., 2017; Saha et al., 2015). One study also reported a 20% increase in clean cord care and 8% increase in delayed bathing (Ekirapa-Kiracho et al., 2017b). Furthermore, compared to women who only participated in SGs, women who participated in SGs paired with health programs reported an even higher likelihood to engage in these positive health behaviors. In fact, women from villages with SGs showed a higher use of family planning products and fed their

children colostrum at a higher rate (Saha et al., 2013). Similarly, women that accessed both SGs and health education intervention had significantly higher improvement in clean cord care and timely initiation of breastfeeding (Hazra et al., 2020; Walia et al., 2020).

As such, participating in SGs also led to other reproductive health benefits such as increased health knowledge and awareness of services for not only women but also other participating community members. Furthermore, women practiced better health behaviors which were made easier with increased knowledge, awareness, and involvement among men and other community members. These positive effects were once again significantly higher when SGs were combined with other health interventions.

Non-health Benefits

Studies unanimously reported on the social benefit of participating in SGs. Three studies commented that women expanded their social capital by participating in SGs because SGs allowed a space for community interaction (Agarwal & Sarasua, 2002; Saggurti et al., 2018; Shaikh et al., 2017). While participating in SGs, women also discussed shared community concerns such as access to safe drinking water, sanitation, child education, as well as marriages and funerals within the community (Saha et al., 2015). As such, SGs were shown to be conducive platforms for village women to discuss not only health related issues but also shared joys and difficulties. Trust, solidarity, collective efficacy, and a sense of belonging were outcomes shared by women who participated in SGs (Saha et al., 2013; Saha et al., 2015).

Results on the effects of SGs on financial empowerment and gender equity were closely intertwined and complex. A few articles reported that participation in SGs led to financial autonomy for women and increased men's participation in preparing for birth (Ekirapa-Kiracho et al., 2016; Shaikh et al., 2017). Men used the financial gain from SGs to provide nutritious

diets for their partners, purchase birth items, and save for childbirth (Ekirapa-Kiracho et al., 2016). THe women-centric approach of the SGs promoted women's participation in household decision-making processes and control over resources (Saha et al., 2015). However, such financial empowerment sometimes led to men feeling that their dominance was being threatened, leading to family tension and intimate partner violence. Additionally, while the funds saved through SGs were shown to provide easy access to cash for transportation and purchasing birth items, the initial investment needed to participate in SGs were also shown to pose a barrier especially if the woman needed to ask her partners for money (Ekirapa-Kiracho et al., 2017a; Shaikh et al., 2017).

It is clear from the literature that SGs are an effective social platform to not only disseminate health information to positively influence health behaviors but also to build a sense of trust, solidarity, collective efficacy, and social belonging among participants. While there is evidence to suggest that SG participation also increases women's financial empowerment and gender equity, there is also countering evidence and deliberation amongst experts.

Discussion

The general field of SGs is still new. Mechanisms of saving and lending similar to SGs have existed in many LMICs for a long time. However, it was not until the past few decades that the effectiveness of various SG models and other similar mechanisms on poverty alleviation have been studied in the scientific literature. Therefore, it is not surprising that there is limited literature on SGs and RHSs utilization, specifically examining how SGs as financial intervention allow participants access RHSs, as supported by the fact that eight of ten articles in this scoping review were published in the last five years. The paucity of literature is compounded by the fact that existing studies were rather short in duration (Beverly, Hilgert, & Hogarth, 2003; USAID,

2015). All of the interventions implemented by the articles in this scoping review were conducted between one to two years. Many experts argue that this is a rather short period of time to examine the significance of multiple effects that can result from SGs participation (USAID, 2015).

There is significant variability in how the terminology 'SGs' are defined and utilized. The terms 'SGs' and 'SHG' have been used to describe both one specific model and a variety of models, adding to the ambiguity of defining those terms. Furthermore, some of the organizations that implement SGs refer to them using their own specific terminology (e.g., CBSG). Given the current state of the SG research field, there is an urgent need for the development of consistent terminology. This will allow researchers across disciplines to build on existing evidence.

Because factors that inhibit women from accessing fundamental RHSs are multidimensional, the solutions targeting the area are also often multi-faceted and multi-sectoral (Saha, 2017). This scoping review found that SGs are frequently included as part of multi-component interventions. A few studies specifically paired SGs with additional health education programs to enhance women's health. In these studies, the SGs functioned not only as a financial intervention but also as a platform for women to gather together to learn and practice collectively (Saggurti et al., 2018; Shaikh et al., 2017; Walia et al., 2020). Others included SGs as part of multisectoral intervention that involved not only the SGs participants but also their family members, community members, community leaders, and health care professionals to enhance reproductive health (Agarwal & Sarasua, 2002; Ekirapa-Kiracho et al., 2016; Ekirapa-Kiracho et al., 2017a; Ekirapa-Kiracho et al., 2017b; Hazra et al., 2020; Saha et al., 2015). Since SGs were mostly examined as part of larger interventions the effect of SGs cannot be analyzed separately.

This scoping review indicates that SG participation enhances women's ability to access and utilize RHSs. However, articles that reported on the increased ability to access and utilize RHSs included SGs as part of a larger intervention and additionally reported on increased knowledge and awareness regarding maternal and child health issues (Hazra et al., 2020; Ekirapa-Kiracho et al., 2016; Ekirapa-Kiracho et al., 2017a; Ekirapa-Kiracho et al., 2017b; Saha et al., 2013; Saha et al., 2015; Shaikh et al., 2017; Walia et al., 2020). Therefore, it is unclear whether the increased RHS utilization is due to increased financial resources from SG participation or increased knowledge and awareness of other health education interventions that used SGs as a social platform. While it is well established that knowledge does not necessarily translate into behavior, it does play an important role in behavior change (Beverly et al., 2003). The increased financial resources from SGs participation combined with increased knowledge and social capital may have played a role in women's ability to access and utilize various RHSs.

Participation in SGs positively influenced women's reproductive health knowledge, awareness of services, access to, and utilization of RHSs. However, the two articles that compared women who only accessed SGs and those who accessed both SGs and health education programs found that the latter group of women generally exhibited a higher increase in health knowledge and positive health behaviors (Saggurti et al., 2018; Saha et al., 2015). Therefore, pairing SGs with another intervention that specifically targets reproductive health can potentially augment positive reproductive health effects. Yet, once again, these results need to be interpreted with caution as the interventions described in the articles consisted of multiple components and thus cannot claim positive changes occurred only due to SG participation.

The social benefits of SGs are well established (Brunie et al., 2014; USAID 2013). Savings groups provide an important platform for members to come together and build a sense of

community. It is one of the main reasons why various organizations started pairing SGs with additional health and non-health interventions. Similarly, some authors found that participation in SGs allowed women to gather on a regular basis to discuss various issues including topics that relate to reproductive health (Agarwal & Sarasua, 2020; Saggurti et al., 2018; Saha et al., 2013; Saha et al., 2015; Shaikh et al., 2017). Such opportunities have been shown to build trust and networks and thus improve the efficiency of community by facilitating coordinated action. Therefore, the majority of the studies reported participating in SGs offered a social benefit.

Results regarding the effect of SGs on financial empowerment and gender equity are mixed. There is some evidence suggesting that financial empowerment through SG participation increased women's decision-making power within households (Agarwal & Sarasua, 20020; Shaikh et al., 2017). Simultaneously, however, there was evidence that showed such empowerment could lead to family tension and violence (Saha et al., 2015). Membership in SGs was shown to increase women's independence and financially empower them, which in turn led to greater respect from both the family and community members (Noorani et al., 2013; Pitt, Khandkere, & Cartwright, 2006). On the other hand, studies also showed SGs that mainly addressed women's needs created a negative situation with men who were unable to access the benefits from the project (Manderson & Mark, 1997). Therefore, it is important to target men as well as women in SGs programs, since men are often the family head and primary decision makers (Ekirapa-Kiracho et al., 2016; Ekirapa-Kiracho et al., 2017a; Pitt et al., 2006).

This scoping review has several limitations. Relevant articles could have been missed because of the variability in defining and utilizing the term 'SGs'. Because many articles included SGs as part of a larger intervention, articles that did not mention SGs in their titles and abstracts may have also been also missed. Additionally, this review also excluded articles written

in languages other than English, which may have further limited the articles retrieved. However, the final search strategy for each database was very comprehensive, especially given the six databases used are some of the largest and most comprehensive databases available. Therefore, we believe the literature retrieved presents a substantial overview of the science.

While the articles with SHGs are included in this review, 'SHG' is also a comprehensive term that can include different models. These are often defined as a membership-based group consisting of 10-20 members who meet regularly to pool small amounts of money into a common savings fund until there is sufficient capital to begin lending in small amounts to those same members (Dsai & Olofsgård, 2019). Hence, SHGs meet the general SG criteria set for the review: 1) self-financed, 2) self-managed, and 3) flexible. Yet some may argue that SHGs and SGs are different because many SHGs aim to be ultimately linked with formal financial or microfinance institutions once the groups mature and have a larger amount of money to save and lend (Flynn & Sumberg, 2017). Of the five included articles about SHGs, one specifically describes the mechanism (Saha, 2017) and the other four briefly mention it (Hazra et al., 2020; Saggurti et al., 2018; Saha et al., 2015; Walia et al., 2020). There is a small chance that the SHGs mentioned in these articles do not completely meet the inclusion criteria, which can weaken conclusions drawn by this scoping review.

Originally, one of the inclusion criteria was to examine SGs as a financial intervention only. However, there were so few studies that specifically examined the impact of financial gain from SGs and access to RHSs. Therefore, studies that examined SGs as both financial intervention and social platforms were included, limiting the conclusions that can be drawn regarding the effects of SGs as a financial intervention on access and utilization of RHSs.

Conclusion

The research conducted in the field of SGs and RHSs is recent and limited. There are a wide range of SG-related terms, models, and definitions that can cause confusion as scientists build future research on currently existing evidence. Pairing of SGs with other components of interventions that aim to enhance reproductive health showed that women who participated in both SGs and paired health interventions had a higher increase in knowledge, behavior, and access to RHSs compared to women who only participated in SGs. However, because SGs were often used as both a financial intervention and a social platform to deliver additional maternal and child health education, it is difficult to attribute increase of RHSs utilization to one specific characteristic of SGs. Overall, current research provides evidence that financial gains of SGs can lead to increased access to and utilization of RHSs for women in LMICs. Considering how widely SGs are implemented globally, the findings of the scoping review provides important implication regarding the international priority to reduce the global maternal mortality.

Figure 2.1 Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) diagram for the process of the article extraction.

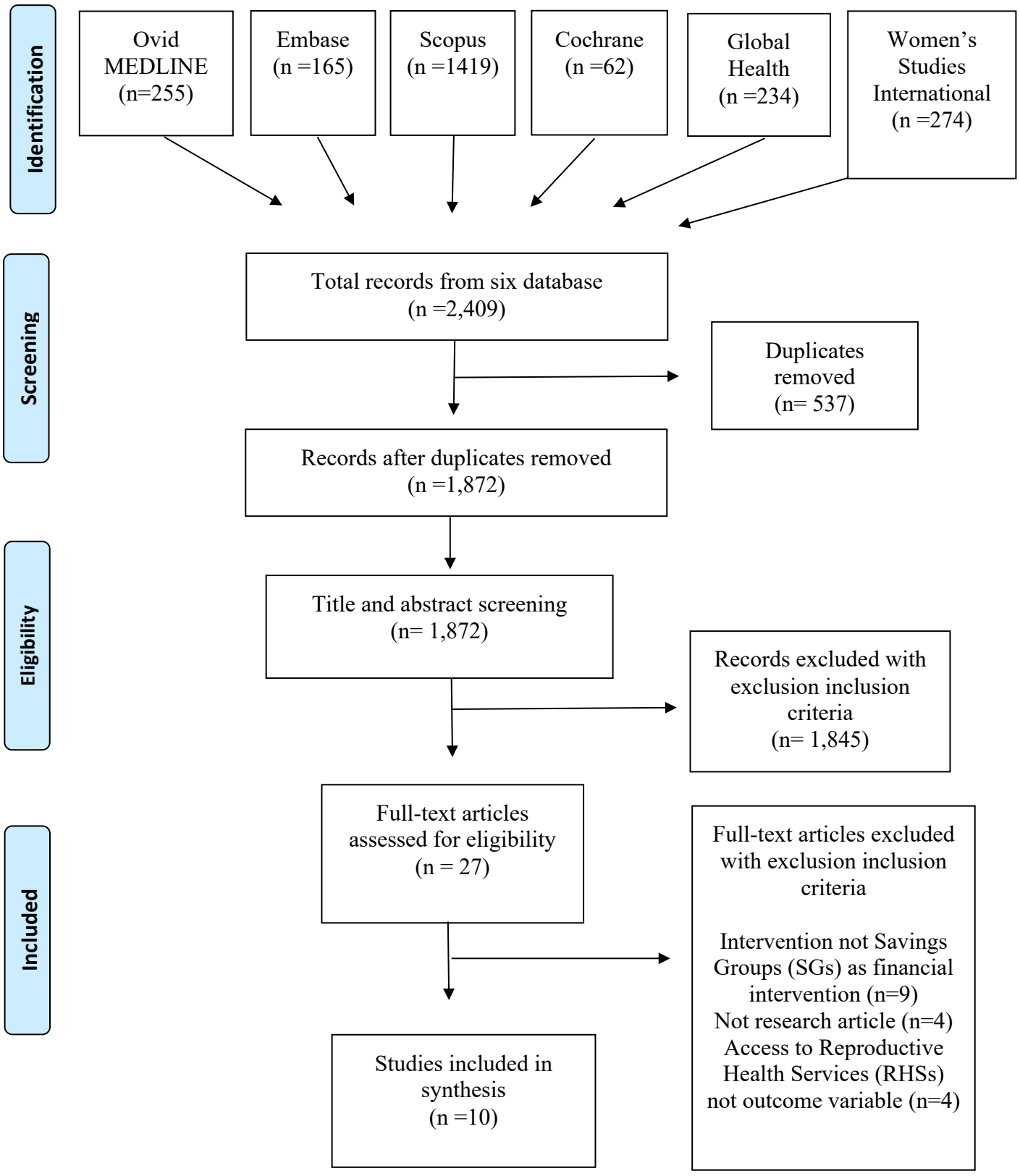

Table 2.1 Final search terms for six databases.

Ovid MEDLINE
((((saving or savings or lending or lend or lends or lender or loan or loans or loaning or loaned or fund or funds or funding or WORTH or CBG or self-help) adj3 (group or groups or community or communities or village or villages or association or associations)) or SILC or VSLA or SfC or "Savings for Change" or CBSG).ti,ab. and (reproducti* or maternal or neonatal or newborn or pregnan*or prenatal or postpartum or mother*).ti,ab.) not (exp Animals/ not Humans/)
Embase
((((saving or savings or lending or lend or lends or lender or loan or loans or loaning or loaned or fund or funds or funding or WORTH or CBG or self-help) NEAR/3 (group or groups or community or communities or village or villages or association or associations)) or SILC or VSLA or SfC or "Savings for Change" or CBSG):ti,ab AND (reproducti* or maternal or neonatal or newborn or pregnan*or prenatal or postpartum or mother*):ti,ab) not ('animal '/exp NOT 'human'/exp)
Scopus
TITLE-ABS-KEY ((((saving OR savings OR lending OR lend OR lends OR lender OR loan OR loans OR loaning OR loaned OR fund OR funds OR funding OR WORTH OR CBG OR self-help) W/3 (group OR groups OR community OR communities OR village OR villages OR association OR associations)) OR SILC OR VSLA OR SfC OR "Savings for Change" OR CBSG) AND (reproduction OR maternal OR neonatal OR newborn OR pregnant OR prenatal OR postpartum OR mother) AND NOT (animal AND NOT human))
Cochrane
((((saving or savings or lending or lend or lends or lender or loan or loans or loaning or loaned or fund or funds or funding or WORTH or CBG or self-help) NEAR/3 (group or groups or community or communities or village or villages or association or associations)) or SILC or VSLA or SfC or "Savings for Change" or CBSG):ti,ab and (reproducti* or maternal or neonatal or newborn or pregnan*or prenatal or postpartum or mother*):ti,ab) not (MeSH animals not MeSH humans)
Global Health
((((saving OR savings OR lending OR lend OR lends OR lender OR loan OR loans OR loaning OR loaned OR fund OR funds OR funding OR WORTH OR CBG OR self-help) N**3** (group OR groups OR community OR communities OR village OR villages OR association OR associations)) OR SILC OR VSLA OR SfC OR "Savings for Change" OR CBSG) AND (reproducti* OR maternal OR neonatal OR newborn OR pregnan* OR prenatal OR postpartum OR mother*)) NOT (DE “animals” NOT DE “man”)
Women’s Studies International*
((((saving* OR lend* OR loan* OR fund* OR WORTH OR CBG OR self-help) adj3 (group* OR communit* OR village* OR association*)) OR SILC OR VSLA OR SfC OR "Savings for Change" OR CBSG):ti,ab AND (reproducti* OR maternal OR neonatal OR newborn OR pregnan* OR prenatal OR postpartum OR mother*):ti,ab) NOT ('animal '/exp NOT 'human'/exp)

*Search for women’s studies international was done via SmartText searching

Table 2.2 Effect of savings groups (SGs) in access to or utilization of reproductive health services (RHSs)

Authors, year	Country	Study design	Implementation time period	Aim	Sample size	Results
Agarwal and Sarasua 2002	India: Madhya Pradesh State	Program evaluation	15 months	To examine the community-based health financing as a strategy to empower communities to make decisions and actions to improve their health and well-being and thus help achieve community and gov goals of increased access to health care services and facilities.	Community Based Organization (CBO)s formed in 345 of 447 project villages, health funds operation in 203 villages.	From the 203 villages with health funds, 292 persons benefited from the health funds through loans for treatment of obstetric complications and infant illness. Fifty-six percent of the loans were repaid within the low interest period. Process of contributing and accessing health funds empowered village women to make decisions and act to improve their well-being
Ekirapa-Kiracho et al. 2016	Uganda: Kamuli, Pallisa, and Kibuku districts	Qualitative: project experience, documentation, individual interviews with community and district stakeholders, and 12 FGD with women who had recently delivered and men whose wives had recently delivered.	From 2013 to 2015	To reflect on gains, challenges, and lessons learned while support community capacity for maternal and newborn health.	20 individual interviews, and 12 FGDs with 12 participants per FGD (n= 144)	Women and men reported increased awareness about birth preparedness, improved newborn care practices and more male involvement in maternal and newborn health. Saving groups and other saving modalities were strengthened, with money saved used to

						meet transport costs, purchase other items needed for birth and other routine household needs. Linkages between savings groups and transport providers improved women's access to health facilities at reduced cost.
Ekirapa-Kiracho et al. 2017a	Uganda: Kamuli, Pallisa, and Kibuku districts	Qualitative: FGDs and key informant interviews	From 2013 to 2015	To describe saving practices, factors that encourage and constrain saving with savings groups, and lesson learnt while supporting communities to save through saving groups	15 focus group discussions (6-12 participant per group) and 18 key informant interviews.	Awareness of the importance of saving, safe custody of money saved, flexible saving arrangements and easy access to loans for personal needs including transport during obstetric emergencies increased willingness to save with SG. Efficient running of SG requires that they have a clear management structure.
Ekirapa-Kiracho et al. 2017b	Uganda: Kamuli, Pallisa, and Kibuku districts	Pre-post quasi-experimental design	From 2013 to 2015	To analyze the effect of the intervention (community mobilization and empowerment, and health provider capacity building) on the utilization of maternal and	Baseline (n=2237) endline (n=1946) interviewer-administered structured questionnaires	Early ANC attendance and facility delivery increased in intervention area. Clean cord care and delayed bathing were also increased in intervention area.

				newborn services and care practices. The SGs are one of four parts of community mobilization and empowerment component.		The intervention elements that predicted facility delivery were attending four ANC visits and saving for maternal health. Facility delivery and village health team home visits predicted for clean cord care and skin-to-skin care.
Hazra et al. 2020	India: Uttar Pradesh	Pre-post quasi-experimental design	From 2015 to 2017	To assess the effects of health behavior change intervention (maternal and child health information dissemination and various community outreach activities) intervention through women's SHGs on maternal and newborn health behaviors and socio-economic inequalities.	Baseline (n=4615) endline (n=4250) interviewer-administered structured questionnaires	Intervention areas have significantly higher improvements over time in attending at least 4 ANC visits, 3 tests during pregnancy, PNC check up with a week of delivery, current use of contraceptives, clean cord care, and timely initiation of breastfeeding. The increase was also most significant among the most marginalized (no formal education, low caste, lowest or low wealth index) than least marginalized (formal education, high caste, middle, high, or highest wealth index) for ANC checkups, consumption of iron

						folic acid tables for at least 100 days, current use of contraception, cord care, timely initiation of breastfeeding.
Saggurti et al. 2018	India: Bihar State	Pre-post quasi-experimental design	12 months	To evaluate an 8-session behavior change health intervention with women's self-help groups aimed to promote maternal health and newborn practices among the more socially and economically marginalized group	Group leaders and women from the intervention group (n=568) and leaders from the control group (n =176) were surveyed at baseline and endline. Data reported at the group level.	Women from the SHGs with health intervention, relative to controls over time, were more likely to: use contraceptive methods, have institutional delivery, practice skin-to-skin care, delay bathing for 3 or more days, initiate timely breastfeeding, exclusively breastfeed the child, and provide age-appropriate immunization. Additionally, women from the SHGs with health intervention when compared to the control group over time were more likely to report: collective efficacy, support through accompanying SHG members for antenatal care, receive a visit from SHG

						member within 2 days post-delivery, and receive reproductive, maternal, neonatal and child health information from an SHG member.
Saha et al. 2013	India	Secondary analysis of national District Level Household Survey from 601 districts	N/A	To assess the impact of the presence of SHGs on maternal health service uptake	22,825 villages; 643,944 ever-married women	Villages with a SHG were 19 percent more likely to have delivered in an institution, 8 percent more likely to have fed newborns colostrum, have knowledge and utilized family planning products and services. These results are significant after controlling for individual and village-level heterogeneities and are consistent with existing literature that the social capital generated through women's participation in SHGs influences health outcome.

Saha et al. 2015	India: Gujarat and Karnataka districts	Mixed method	12 months	To investigate the effect of combining a health program designed to improve health behaviors and outcomes with a microfinance-based self-help group (SHG) program.	Baseline and follow up surveys with 472 individuals (219 from intervention villages, and 253 from comparison villages), 17 key informant interviews and 17 FGD	Compared to a matched comparison group, women in SHGs that received the health program had higher odds of delivering their babies in an institution, feeding colostrum to their newborn, and having a toilet at home. However, while the change was in the expected direction, there was no statistically significant reduction in diarrhea among children in the intervention community, and the hypothesis that the health program would result in decreased out-of-pocket expenditures on treatment was not supported
Shaikh et al. 2017	Pakistan; Chitral district	Qualitative: FGD with women who delivered within last quarter & member of Community Based Savings Group (CBSG); husbands of women CBSG and delivered within last quarter; women who delivered within last	12 months	To understand whether membership in CBSGs contributes to increased awareness of service availability, understanding of Maternal, Neonatal, and Child Health (MNCH) issues, in	16 FGDs with 6-10 men or women	Improved MNCH awareness and practices; Greater utilization of CMW services; Social benefits of CBSGs such as networking and extending community support; Hesitations and barriers perceived by non-CBSG member

		quarter not member of CBSG; husbands of women not CBSG and delivered within last quarter		addition to greater utilization of MNCH services in the community, specifically those offered by Community Midwives (CMW)		women and their husbands
Walia et al. 2020	India: Bihar	Post intervention study	12 months	To measure the association of a health intervention (health message delivered once a month, in one of four weekly SHG meetings) to SHG members with their ANC behaviors	1204 SHG (n=597, SHG and health intervention, n=607, only SHG).	Exposure to a health intervention is associated with increased likelihood of at least 4 ANC visits, consumption of iron folic acid for at least 100 days, and complete ANC (at least 4 ANC, iron folic acid for at least 100 days, two Tetanus toxoid injections) when compared to women in SHG but not exposed to the health intervention

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Chapter 3

Manuscript 2

The Role of Savings and Internal Lending Communities (SILCs) in Improving Community-level Household Wealth, Financial Preparedness for Birth, and Utilization of Reproductive Health Services (RHSs) in Rural Zambia

Abstract

Introduction: Savings Groups (SGs) are an informal microfinance mechanism to financially empower poor people living in rural areas. Savings and Internal Lending Communities (SILCs) are a type of SG widely adapted in Zambia. Social and financial benefits of SGs participation have been studied in many countries and have been paired with health and non-health related interventions. However, limited studies have examined SGs in the context of maternal health and no studies have examined the extended social and financial benefits of SGs within the non-SGs participants in a community. The study aimed to understand the association between having access to SILCs and 1) household wealth, 2) financial preparedness for birth, and 3) utilization of reproductive health services (RHSs).

Methods: Secondary analysis was conducted on baseline and endline household survey data collected to understand the impact of Maternity Waiting Homes (MWHs) in twenty rural communities across seven districts of Zambia. A total sample of 4,711 (baseline: 2,381 endline: 2,330) was analyzed. The sample data were stratified into three community groups (CGs): CG1) communities with neither MWH nor SILC, CG2) communities with only MWH, and CG3)

communities with both MWH and SILC. Multiple linear regression models and binary logistic regression models were fit to assess the unadjusted and adjusted relationship between CGs, timepoint, and 1) household wealth, 2) financial preparedness for birth, and 3) utilization of RHSs. Interaction effect of CG and timepoint on the outcome variables were also examined. Utilization of RHSs included antenatal care (ANC) visits, postnatal care (PNC) visits, MWHs, health facility (HF) based delivery, and skilled provider (SP) assisted delivery.

Results: CGs had significant association with household wealth, saving for most recent delivery and utilizing all 4 PNC visits. However, the interaction effect of CGs and timepoint were significantly associated only with MWH utilization, HF delivery, and SP delivery. Compared to women from CG1, women from CG2 (AOR:1.82; 95%CI: 1.31-2.53) and CG3 (AOR: 2.78; 95%CI: 1.99-3.88) had higher odds of utilizing MWHs at endline. Additionally, women from CG3 had higher odds of delivering at a HF (AOR: 1.96 95%CI: 1.13-3.41) with a SP (AOR:2.91; 95%CI: 1.76- 4.81).

Conclusion: Utilizing the full continuum of RHSs is critical to ensure safe pregnancy and delivery. Limited financial resources are one of the main causes for the underutilization of RHSs. SILCs are a promising intervention that can help poor and rural communities overcome financial barriers to utilize RHSs.

Introduction

Utilization of reproductive health services (RHSs) during pregnancy, childbirth, and the postnatal period are critical to ensure women and their babies reach their full potential for health and well-being (World Health Organization [WHO], 2020). These services include but are not limited to: antenatal care (ANC) visits, postnatal care (PNC) visits, maternity waiting homes (MWHs), health facility (HF) delivery, and skilled provider (SP) assisted delivery. Timely access to quality RHSs is able to prevent most maternal injury and death (Richard, Witter, & Brouwere, 2010). Yet in 2017, more than 295,000 women died worldwide both during and following pregnancy and childbirth (WHO, 2020). Approximately 94% of all maternal deaths occur in low and middle-income countries (LMICs) and 68% from countries of sub-Saharan Africa (United Nations Children's Fund [UNICEF], 2019). Zambia, a country located in southern Africa, also suffers from high maternal mortality, with 213 maternal deaths per 100,000 live births (Gianetti et al., 2019). Limited financial resources are one of the main causes for delays in seeking, reaching, and receiving RHSs (Richard et al., 2010).

Access and utilization of essential RHSs remain highly inequitable and varies markedly with women's socioeconomic status (Langlois, Miszkurka, Zunzunegui, Ghaffar, Ziegler, & Karp, 2015; Richard et al., 2010; Titaley, Dibley, & Roberts, 2010). Studies have found strong and consistent evidence that utilization of various RHSs are higher among women with more financial resources (Langlois et al., 2015; Sacks et al., 2017, Sibanda, Bernays, Weller, Hakim, & Cowan, 2018; Titaley et al. 2010). A recent systematic review examining the determinants of ANC utilization in sub-Saharan Africa found income and employment as an enabler to utilize

ANC (Okedo-Alex, Akamike, Ezeanosike, & Uneke, 2019). Similarly, another systematic review analyzing the inequities in PNC service utilization in LMICs also found that use of PNC services was higher among women with more household wealth who could afford medical, non-medical, and opportunity costs of postnatal care (Langlois et al., 2015). Utilization of MWHs, a dwelling place for pregnant women to await delivery, often requires fees for accommodation, food, and transportation for women and her accompanying family that also adds to the financial barrier (Getachew & Liabsuetrakul, 2019; Kaiser et al., 2019a). Women of LMICs often identify transportation cost, informal service fees, and purchase of birth items such as baby blankets and plastic sheets for delivery that the health facility may not provide as barriers to HF delivery and SP assisted delivery (Kaiser, et al., 2019b; Kyei-Nimakoh, Carolan-Olah & McCann, 2017).

Savings Groups (SGs), a self-managed community-based intervention to financially empower individuals and communities in rural areas of LMICs, have been identified as a promising intervention to address the financial barriers to accessing RHSs (Lee, Munro-Kramer, Maffioli, Veliz, & Lori, 2020). Savings Groups allow participants to access basic financial services to save and borrow in order to generate income or to pay for life events such as pregnancy and childbirth (Lee et al., 2020). Savings Groups allow community members to meet on a regular basis to save and borrow, which also leads to sharing of ideas and stories, and generating a sense of belonging and trust (Annan, Falb, Kpebo, Hossain, & Gupta, 2017). Studies consistently find that SGs increase social capital, often defined as networks of social interaction that are linked to resource exchange (Bourdieu, 1986; Musinguzi et al., 2015).

Because SGs are shown to build trust, solidarity, and collective efficacy, SGs are often used as a social platform to deliver various health and non-health interventions (Brunie, Fumagali, Marin, Field, & Rutherford, 2014; Shaikh, Noorani, & Abbas, 2017). Studies that

have paired SGs with maternal health also often use SGs as a social platform to deliver maternal and child health educational interventions. However, limited studies examine SGs as a financial mechanism to help overcome the financial barriers to accessing and utilizing RHSs (Annan et al., 2017; Lee et al., 2020; Shaikh et al., 2017). Therefore, the purpose of this paper is to understand the association between access to SILCs and 1) household wealth, 2) financial preparedness for birth, and 3) utilization of RHSs (ANC, PNC, MWHs, SP delivery, HF delivery) (Ferguson, 2012; Taneja, 2013;).

Method

Design

A secondary analysis was conducted on baseline and endline household survey (HHS) data collected as part of a Maternity Waiting Homes (MWHs) project in rural Zambia. The primary goal of MWHs is to improve maternal and infant outcomes for women living far from HFs (Perosky, Munro-Kramer, Lockhart, Musonda, Naggayi, & Lori, 2019). The project aimed to understand the impact of MWHs on reproductive health service access. Both baseline and endline HHS data were collected from 40 different communities in seven rural districts of Zambia using a multistage random sampling method. The details of the MWH study design and data collection process are described elsewhere (Lori et al., 2018; Scott et al., 2018). Because the baseline and endline data were collected from two different samples that went through two separate randomizations, the outcome variables – 1) household wealth (assessed with four different measures), 2) financial preparedness for birth (saving for most recent delivery), and 3) utilization of RHSs (ANC visits, PNC visits, MWH utilization, HF delivery, and SP delivery) – collected are not intended to capture the individual level difference between those who participated in SILC and those who did not. Rather, the associations with the outcomes

(household wealth, financial preparedness for birth, and utilization of RHSs) will show the difference at the community-level, between those who were from the communities that had access to SILCs and those who did not. The baseline data were collected between April and May of 2016 and the endline data were collected between August and September of 2018.

It is important to note that MWHs have existed in Zambia for decades with generally low quality and no specific policy to keep them at a particular standard (Scott et al., 2018). Therefore, the parent study implemented MWHs using a MWH core model with specific standards and policies. The characteristics of the MWH core model developed in the parent study (Scott et al., 2018) is shown in **Figure 1.** The baseline and endline HHS data were stratified into three community groups (CGs): CG1) communities with neither MWH nor SILC (communities from group 1 do not have a MWH with the specific standards developed in the parent study, but may still have a type of MWH), CG 2) communities with only MWH, and CG 3) communities with both MWH and SILC.

The SILCs were first implemented in January 2016 in three Zambian districts: Lundazi, Mansa, and Chembe. The University of Michigan partnered with Africare-Zambia, a local non-governmental organization to conduct a Maternity Waiting Homes (MWHs) project in rural Zambia. Africare-Zambia implemented the SILCs. By the end of October 2017, there were more than 310 active SILCs with 6,711 participants from the 10 different communities with the MWHs core model.

Ethical approvals for the MWH project were obtained from University of Michigan and Boston University's Institutional Review Boards (IRB), as well as from the ERES Converge Research IRB, a private local ethics board in Zambia.

Study Setting

The baseline and endline HHS from the parent study was collected from seven primarily rural districts: Nyimba, Lundazi, Choma, Kalomo, and Pemba, Mansa and Chembe. The SILC were implemented in Lundazi, Mansa, and Chembe districts. Of the seven districts, Kalomo, Mansa, Nyimba, and Lundazi were part of the first phase of Saving Mothers Giving Life (SMGL) initiative (CSO Zambia, 2017). Saving Mothers Giving Life is a 5-year initiative that was implemented from 2012 to 2016 as a public-private partnership to reduce maternal and new-born mortality (CSO Zambia, 2017). The SMGL initiative included a variety of interventions such as training community health workers responsible for improving the knowledge and access to RHSs within their local communities, and mentoring health facility staff to increase quality of care, improving the referral system, and investing in supply chain and facility equipment (Jacobs et al., 2018; Kaiser et al. 2019a; Kruk et al., 2014; Sialubanje, Massar, Hamer, & Rutier, 2017). The baseline HHS data were collected in April and May of 2016, overlapping with the SMGL initiative which ended December of 2016 (CSO Zambia, 2017).

Sample

The parent study (Scott et al., 2018) used a multistage random sampling procedure for both baseline and endline HHS data (sample goal of 2,400 women) with a probability proportionate to population size randomly selected. Household was defined as a group of people who regularly cook together. The inclusion criteria for the households were: 1) located 10 km or farther away from the closest health facility, 2) had a woman who had delivered a baby within the past 12 months, 3) the woman had to be 15 years or older to participate in the survey, and 4) if the woman was not available to participate, the proxy participant must be 18years or older (Scott et al., 2018). Trained research assistants literate in both English and local languages were trained in qualitative and quantitative research methods and human subjects protections. With

community volunteers and village leaders, the research assistants visited each eligible household, explained the study to potential participants and requested permission from the household head or most senior woman in the household to screen for eligibility. Once household eligibility was confirmed, the study team proceeded with the informed voluntary consent process with the household head or senior woman. Once the consent form was obtained and documented, the household head or senior woman responded to the demographics part of the survey for approximately 15 minutes. Then, the research assistant read the informed consent to the eligible woman who had delivered a baby in the past 12 months. Women who gave consent completed the rest of the survey (Scott et al., 2018).

It is important to note that HHS data were not collected from the same participants at baseline and endline, but instead were collected from the same community that shared the healthcare facilities. The total sample was separated into three CGs: CG1) communities with neither MWH nor SILC (20 communities), CG2) communities with only MWH (10 communities), and CG3) communities with both MWH and SILC (10 communities). Of the 2,381 participants from baseline HHS data, 1,031participans were from CG1, 597 participants from CG2, and 756 participants from CG3. Of the 2,330 participants from endline, 1,113 participants were from CG1, 610 participants from CG2, and 598 participants from CG3.

Data and Measures

To understand the associations between access to SILCs and 1) household wealth, 2) financial preparedness for birth, and 3) utilization of RHSs, variables regarding demographics, household wealth, financial preparedness for birth, and utilization of RHSs were extracted from the baseline and endline HHSs.

Demographic variables such as women's age, marital status, number of pregnancies, number of livebirths, and education level were assessed.

Household wealth was assessed by four different measures using the comprehensive list of wealth indicator variables. These variables included ownership of household assets and quality of housing and water supply that are similar to the variables used in the Demographic and Health Survey (DHS) (Kolenikov & Angeles, 2009). Using household assets, hygienic facilities, and construction materials of dwelling places is a common methodology to assess socioeconomic status of a household (Kolenikov & Angeles, 2009). Most commonly, principal component analysis (PCA) is used to assign weights to each of the wealth indicator variables which are then summed and created into quintiles – poorest, poor, middle, rich, and richest (Filmer & Pritchett, 2001; Kolenikov & Angeles, 2009). The methodology is used by the World Bank and more than 76 countries where the standard DHS surveys are implemented (Kolenikov & Angeles, 2009).

Similarly, three of the four methods used in this paper to assess household wealth used the PCA to assess household wealth. First, wealth^1, the only method that did not use PCA, was created by simply coding each of the 52 household asset variables as 'owned' or 'not owned' and the five quality of housing and water supply variables as 'improved' or 'not improved.' The dichotomized variables were then summed for each sample and treated as a continuous variable. Second, another continuous variable, wealth^2, was created by using the PCA on the 57 dichotomized household asset and facility variables. Third, the wealth index^1 was created by adding up wealth^1 and dividing it into quintiles: poorest, poor, middle, rich, and richest. Wealth index^1 was also treated as a continuous variable. Lastly, the wealth index^2, categorical variable, was created by dichotomizing the quintiles into poorest versus the poor, middle, rich, and richest.

Financial preparedness for birth was determined by whether women saved any money for their most recent delivery or not.

Utilization of RHSs was examined by the number of ANC visits, PNC visits, utilization of MWH, HF delivery, and SP delivery. The five variables were dichotomized as 'utilized' versus 'not utilized'. Women who attended four or more ANC contacts were categorized as 'utilized' for ANC visits. Even though the 2016 WHO ANC model recommends a minimum of eight ANC contacts, the guideline was not yet widely implemented in rural Zambia (WHO, 2016). Therefore, the previous guideline of four or more ANC visits was used to examine the attendance of ANC visits. Similarly, if a woman attended all four PNC visits, first within 24 hours of delivery, second within 3 days postpartum, third between 7-14 days postpartum, and fourth before six weeks postpartum, she utilized PNC visits (WHO, 2015). If the woman stayed at a MWH at any point of her pregnancy, she utilized a MWH. Moreover, if the woman delivered her most recent baby at a health post, health facility, or a hospital, and/or with a doctor, clinical officer, nurse, or midwife, it was coded as utilized a HF and/or delivered with a SP. Each of the RHSs variables were examined individually.

One may argue that utilization of MWHs often increase delivery at HF with SP, and that delivery at HF and delivery with SP are interchangeable. However, because of the limited number of SP, women delivering at a HF does not always lead to delivery with SP (Ahmed & Jakaria, 2009). Similarly, in many sub-Saharan African countries, SP travel to women's homes for delivery in cases of emergency, which means that sometimes women can deliver with a SP without delivering at a HF (Were, Were, Wamai, Hogaan & Galarraga. 2017). Hence, both variables were included as part of the utilization of RHSs.

Data Analysis

The aim of the analysis was to examine the relationship between access to SILCs and: 1) household wealth, 2) financial preparedness for birth, and 3) utilization of RHSs. To compare the changes in the outcome variables over time between the communities that had access to SILCs and those that did not, samples from the HHS data were stratified by three CGs: CG1) with neither MWH nor SILC, CG2) with only MWH, and CG3) with both MWH and SILC. Furthermore, interaction effects of CGs and timepoint was used. We hypothesized that women from CG3 compared to women from CG1 will have higher household wealth, higher likelihood to be financially prepared for birth, and higher utilization of RHSs – ANC visits, PNC visits, MWH, HF delivery, and SP delivery – at endline.

Descriptive statistics were analyzed with the means and standard deviation (SD) provided for the overall baseline and endline sample as well as the stratified sample between the CGs at baseline and endline. A set of Chi-square tests of independence and independent sample t-tests were analyzed to examine the differences in demographic and outcome variables between the baseline and endline participants and participants from the three CGs at baseline and endline.

Linear regression models (ordinary least squares), and binary logistic regression analyses were used to assess the association between access to SILCs and 1) household wealth, 2) financial preparedness for birth, and 3) utilization of RHSs. The key independent variables were the three community groups: CG1) neither MWH nor SILC, CG2) only MWH, CG3) both MWH and SILC and timepoint. Dependent variables were 1) household wealth (assessed with four different measures: wealth[1], wealth[2], wealth index[1], and wealth index[2]), 2) financial preparedness for birth (saving for most recent delivery), and 3) utilization of RHSs (ANC visits, PNC visits, MWH utilization, HF delivery, and SP delivery). Moreover, interaction effects of CGs and timepoint (i.e., baseline versus endline) were used to control for the differences in the outcome

variables but the differences could remain constant overtime. All adjusted models included age, marital status, number of pregnancies, number of live births, education level, indicators for CGs and timepoint.

Similarly, to assess the association between access to SILCs and financial preparedness for birth, binary logistic regressions and the interaction effect of CGs and timepoint on saving money for childbirth were conducted. Furthermore, to assess the association between access to SILC and utilization of RHSs, binary logistic regression models were run on ANC visits, PNC visits, utilization of MWH, delivery at HF, and delivery with SP. The interaction effect of CGs and timepoint on each of the RHSs variables were also examined.

All adjusted logistic regression models included age, marital status, number of pregnancies, number of live births, education level, wealth (quintile), and timepoint. Logistic regression models provided adjusted odds ratios (AORs) and 95% confidence intervals (95%CI) and linear regression models provided unstandardized regression coefficient (b), standard error (SE), and standardized regression coefficient (B). All statistical analysis was conducted in Stata 15.0 (StataCorp, College Station, TX, USA).

Results

Sample Demographic Characteristics

A total sample of 4,711 women were included in the analysis. Approximately half of the sample were from baseline HHS data (n= 2,371) and the other half from endline (n=2,330) HHS data. The mean age of the baseline sample was 26 years old (SD:6.96) and majority were married or cohabiting (87.86%). Average number of pregnancies was 3.86(SD:2.54) and live births was 3.59 (SD: 2.35). Approximately 61% of the women had some level of primary education and 24% had secondary education. At baseline, marital status ($p<0.001$), and education level

(p<0.001) were statistically different amongst the three CGs. The mean age of the endline sample was 26.08 (SD: 6.94) and 86% were married or cohabiting. Average number of pregnancies was 3.75 (SD: 2.42) and 3.38 (SD: 2.39) live births. Close to 59% of the women had some level of primary education and 28% secondary education. At endline, marital status (p<0.001), number of pregnancies (p=0.008), number of live births (p=0.005), and education(p<0.001) were statistically different among the three CGs. The comparison of the three CGs at baseline and endline is shown in **Table 3.1**.

Household Wealth

Table 3.2 examines the association between the CG, timepoint, and household wealth. Household wealth was assessed using four different methods. Multiple linear regression models and logistic regression models show that CG2 had higher household wealth when compared to CG1, while CG3 had lower household wealth when compared to CG1. The negative correlation between CG3 and household wealth is stronger than the positive correlation between CG2 and household wealth. For wealth[1], which had a scale of 0 to 57, women from CG2 had an average of 1.12 (B=0.08, p<0.001) more of the 57 wealth indicator items and women from CG3 had an average of 1.95 (B=-0.12, p<0.001) fewer wealth indicator items compared to women from CG1. For wealth[2], which ranged from -1.56 to 4.94, women from CG2 had 0.29 (B=0.10, p<0.001) increase of wealth and women from CG3 had an average of 0.31 (B=-0.14, p<0.001) decrease of wealth compared to women from CG1.

When wealth index[1] was used to assess household wealth, women from CG2 had an 0.38 (B=0.12, p<0.001) increase of belonging in a higher wealth quintiles and women from CG3 were 0.45 (B-0.14, p<0.001) decrease of belonging higher wealth quintiles. Lastly, the logistic regression model for wealth index[2] indicates that women from CG2 had roughly three times

greater odds (AOR: 2.74; 95%CI: 2.33-3.82) of belonging in the non-poorest wealth quintile when compared to CG1, whereas women from CG3 had lower odds (AOR: 0.61, 95%CI: 0.51-0.72) of belonging in the non-poorest wealth quintile when compared to CG1.

In regards to timepoint, no significant relationship was found between timepoint and household wealth except for wealth[1], which showed 0.34 (B=0.03p<0.05) increase in wealth indicator item at endline. However, the effect size shows that the association is rather weak. **Table 3.3** shows there is no interaction effect between CGs and timepoint on household wealth.

Financial preparedness for birth

In **Table 3.4**, CGs and timepoint were used to predict the odds of financial preparedness for the most recent birth. Financial preparedness for birth was assessed by women saving money for the most recent birth. Compared to women from CG1, those from CG3 had the higher odds (AOR: 1.49; 95%CI: 1.21-1.83) of being financially prepared for birth. However, all women in general were less likely to be financially prepared at endline (AOR:0.66; 95%CI: 0.56-0.78). **Table 5** shows there is no interaction effect between CGs, timepoint, and financial preparedness for birth.

Utilization of RHSs

Findings reported in **Table 3.4** through **Table 3.7** show the association between CGs, timepoint, and utilization of RHSs. There was no significant association between the CG and women attending four or more ANC visits, but all women in general had higher odds of attending four or more ANC at endline (AOR: 1.68; 95%CI:1.46-1.93). For PNC visits, women from CG3 had higher odds of attending four or more PNC visits (AOR: 1.46; 95%CI: 1.06-2.00) compared to CG1. In general, all women were also more likely to attend all four PNC visits at endline (AOR:2.11; 95%CI:1.61-2.77). **Table 3.5** showed that CGs and timepoint did not have

significant interaction effect on attending four or more ANC visits and attending all four PNC visits.

In **Table 3.6**, CGs and timepoint were used to predict MWH utilization, HF delivery, and SP delivery. Women from CG2 (AOR: 1.70; 95%CI: 1.44-2.01) and CG3 (AOR: 1.69; 95%CI: 1.43-1.99) had higher odds of utilizing MWHs compared to women from CG1. Women from CG3 also had greater odds of delivery at a HF (AOR: 1.48: 95%CI:1.15-1.91) and deliver with a SP (AOR: 2.09; 95%CI: 1.71-2.54) compared to women from CG1. At endline, all women had almost two times greater odds to utilize MWH (AOR: 1.89; 95%CI: 1.64-2.16) and delivery at a HF (AOR:2.09; 95%CI: 1.71-2.54), and 2.5 times more greater odds to deliver with a SP when compared to baseline.

Table 3.7 shows the interaction effect of CGs and timepoint on MWH utilization, HF delivery, and SP delivery. Women from CG2 and CG3 at endline had 1.82 (95%CI: 1.31-2.53) and 2.78 times (95%CI: 1.99-3.88) greater odds to utilize MWHs than women from CG1 at endline. Furthermore, women from CG3 at endline had two times greater odds to deliver at a HF (AOR: 1.96 95%CI: 1.13-3.41) and three times greater odds to deliver with a SP (AOR:2.91; 95%CI: 1.76- 4.81) compared to women from CG1 at endline. In other words, the odds of utilizing RHSs for CG3 significantly increased from baseline to endline when compared to CG1.

In summary, interaction effects of CGs and timepoint were only observed on MWH utilization, HF delivery, and SP delivery. Compared to women from CG1, women from CG2 and CG3 had higher odds of utilizing MWHs at endline. Additionally, women from CG3, with the least amount of financial resource amongst the three groups of women, had higher odds of delivering at a HF with a SP. CGs and timepoint together had no effect on household wealth, financial preparedness for birth, four or more ANC visits, and all four PNC visit.

Discussion

The purpose of the paper was to examine the relationship between having access to SILCs and 1) household wealth, 2) financial preparedness for birth, and 3) utilization of RHSs at the community level. Women from three CGs (CG1=neither MWHs nor SILCs, CG2= only MWHs, CG3=both MWHs and SILCs) were compared. We hypothesized that women from CG3 will have higher household wealth, higher likelihood to be financially prepared for birth, and higher utilization of RHSs – ANC visits, PNC visits, MWH, HF delivery, and SP delivery – at endline.

Household wealth

The results showed that while women from communities with access to only MWHs were more likely to have increased household wealth and women from communities with both MWHs and SILCs less likely, CG and timepoint together had no significant association with household wealth. This finding does not support our hypothesis that women from communities with SILCs would have been able to accumulate more household wealth. However, the result adds to the ongoing dispute regarding the economic impact of SGs (Bureau of Applied Research in Anthropology [BARA], 2013; Nwolise, Hussein, Kangurru, Bell, & Patel, 2014). A three-year randomized control trial examining the impact of SGs in Mali found no change in income and health expenditures, with marginally significant increase in education expenditures and livestock holdings (BARA, 2013). A cluster randomized evaluation study conducted in Ghana, Malawi, and Uganda concluded that SGs lead to improvement in household business outcomes but no impact on average consumption or other livelihoods (Karlan, Svonitto, Thuysbaert, & Udry, 2017).

One explanation for the results showing no significant association between access to SILCs and household wealth maybe due to the measure used to capture wealth. Using household assets and quality of housing and water supply is a valid and common measure to be used as a proxy for economic status (Chakraborty, Fry, Behl, & Longfield, 2016). We hypothesized that women from CGs with SILCs may have used the savings and loans from SILCs to purchase additional household assets and/or improve housing quality. These purchases and improvements are often mentioned when SG participants usage of funds are analyzed (Karlan et al., 2017; Ksoll, Lilleør, Lønborg, & Rasmussen, 2016). However, there are other expenditures such as education and food that may not have been captured in the survey.

Another possible explanation may be the implementation period. The SILCs were first implemented in early 2016, and the endline data were collected in August and September of 2018. Two and a half years of implementation period is not short considering many SG implementation periods generally range from one to three years (BARA, 2013; Karlan et al., 2017). However, many experts argue that this is a rather short period of time to examine the significance of financial effects that can result from SGs participation (Lee et al., 2020). For example, the randomized control trial conducted in Mali over three years suggested that the study may have been too short to capture any changes produced by savings cycles (BARA, 2013). Considering that at baseline, women from CG3 with both MWHs and SILCs, were already the poorest of the three CGs and remain the poorest at endline, this may suggest that the economic benefit of SILCs has not yet been produced within the two-year span.

In summary, our results show there is no significant association between access to SILCs and household wealth, adding to the inconsistent results among the literature regarding the

economic impact of SGs. The results should be interpreted cautiously considering the limitation in the measure of household wealth and the potentially short implementation period.

Financial preparedness for birth

Financial preparedness for birth, assessed by saving any amount of money for the most recent delivery, was shown to be higher for women from CG3 and lower at endline. Furthermore, CGs and timepoint together had no effect on financial preparedness for birth. While SILC participation may have allowed participants to better understand and prioritize financial resources to prepare for birth, it may not have led to enough increase in wealth to save for the most recent delivery at endline. Savings Groups like SILCs are shown to be a conducive platform for participants to discuss personal and communal joys and difficulties, including various health issues such as pregnancy and childbirth (Lee et al., 2020). Such communal discussions and sharing have shown to increase understanding and knowledge with behavioral implications such as increase in facility delivery (Lee et al., 2020). However, the lack of a significant increase in household wealth may contribute to the limited ability to save money for birth.

Utilization of RHSs

Overall, women were significantly more likely to utilize RHSs at endline, and women with access to both MWHs and SILCs were more likely to attend all four PNC visits, utilize MWHs, deliver at HF, and deliver with SP compared to women with access to neither MWHs nor SILCs. However, CGs and timepoint together were significantly associated only with utilizing MWHs, delivering at a HF, and delivering with a SP.

One potential explanation for the lack of significant association between CGs and timepoint for ANC and PNC visits may be due to the conservative measure of the two variables.

Per WHO guidelines during the implementation period, ANC was captured as women attending four or more ANC visits, and PNC as attending all four PNC visits (WHO 2016; WHO, 2014). For the survey to have captured women's utilization of ANC and PNC visits, women had to travel to the HF multiple times, potentially requiring multiple out of pocket costs and opportunity costs. A recent systematic review examining the cost of various RHs in low- and middle-income countries found the average cost per service, excluding transportation costs and productivity loss ranged between US$7.24-$31.42 for ANC and US$5.04 for PNC (Banke-Thomas, Abejirinde, Ayomoh, Banke-Thomas, Eboreime, & Ameh, 2020). Considering that all of the communities included in the present study are predominantly rural and far from the nearest HFs, recurring expenses such as transportation and the loss of productivity for each ANC and PNC visits may have deterred women from prioritizing the financial resource to attend all of the required ANC and PNC visits (Langlois et al., 2015).

With standardized high-quality MWHs implemented by the parent study, it is not surprising that communities with access to MWHs had higher likelihood of MWH utilization. However, women from communities with both MWHs and SILCs had higher odds of delivery at the HF and with SP. This result may be due to the community's increased social capital. Social capital is often defined as dense networks of social interaction that may emerge as individuals deliberately choose to join groups or evolve naturally among friends (Häuberer, 2014; Musinguzi et al., 2017). Such networks lead to a wide range of shared awareness, knowledge, and information that can have tangible effects such as increased contraceptive use and increased child survival (Gayen & Raeside, 2010; Musinguzi et al., 2017). It is well-established how SGs can increase participants social capital to ultimately influence their health and their family's health (Annan et al., 2017; Brunie et al., 2014). Similarly, with the increased

opportunities to share about pregnancy and childbirth experiences and resources, communities with SILCs may have increased knowledge and awareness regarding the importance of HF delivery and delivery with SP.

While wealth assessed using household assets and housing quality may not have increased significantly, SILCs may still have allowed women to set aside financial resources for HF delivery and delivery with SP. Of the costs related to various RHSs, costs related to delivery are often the highest, ranging from US$14.3 to $378.94 in low- and middle-income countries depending on the facility type, provider type, and complexity of care (Banke-Thomas et al., 2020). A study conducted in rural Zambia showed the average out-of-pocket cost for delivery was US$28.76, approximately one third of monthly household income of the poorest Zambian households (Kaiser et al., 2019). Therefore, when financial resources are scant and women are not able to access the full continuum of RHSs combined with the increased collective awareness regarding the importance of HF delivery and delivery with SP, women from communities with both MWH and SILCs may have prioritized their resources for delivery related expenses.

Limitations

This study has several limitations. First, because different forms of SGs are prevalent throughout rural Zambia, it is subject to contamination. Considering that World Vision alone has implemented approximately 25,000 SGs across Zambia, it is possible that there were SGs in CG1 (no MWH or SILC) and CG2 (MWH only) (World Visions, 2020). Second, the three CGs had significantly different baseline characteristics that may have influenced the results. However, interaction terms were used to control for the differences in the outcome variables that could have remained over time. Additionally, these different characteristics have been adjusted in all of the statistical models. Third, the baseline HHS data were collected April and May of 2016, a few

months after the SILCs were first introduced in the communities in January 2016. However, the impact of SGs is often assessed after at least of one full cycle, usually ranging from ten to twelve months of SILC participation. Therefore, a few months of SILC participation will not have had a significant effect when baseline data were collected. Lastly, the HHS did not capture the true number of survey participants from different communities who actually participated in the SILCs. Therefore, the results should be interpreted as having access to SILCs, not participating in them.

Conclusion

The present study aimed to understand the association between having access to SILCs and utilization of RHSs. This study found that CGs had a significant but small effect on household wealth. CG2 had slightly higher household wealth and CG3 had lower household wealth when compared to CG1. Furthermore, CG3 had significantly higher odds of saving for most recent delivery and utilizing all four PNC visits compared to CG1. However, CG and timepoint together did not lead to a significant increase in household wealth, saving for the most recent delivery, utilization of four or more ANC visits, or all four PNC visits. This may be due to the short implementation period that was not enough to lead to drastic change in household wealth.

In regard to utilization of MWHs, HF delivery, and SP delivery, CGs with access to SILCs and MWHs (CG2 and CG3) had significantly higher utilization of MWHs, HF delivery, and SP delivery at endline. This result may be due to the increased social capital of communities with access to SILCs, increased sharing of knowledge and information stemming from a stronger sense of community and trust. With increased knowledge and awareness but limited financial resources, women from communities with access to SILCs may have chosen to prioritize

resource for delivery rather than ANC and PNC. More effort needs to be dedicated to understanding and empowering poor women living in rural areas to access the full continuum of RHSs. Additionally, future studies should aim to understand the social impact of SGs that goes beyond the participants. In sum, the present study holds crucial implications regarding the social and economic potential of SILCs to help women of low-income countries to access fundamental RHSs to protect and promote both their and their babies' health.

Figure 3.1 Maternity waiting home core model developed by the parent study for intervention sites.

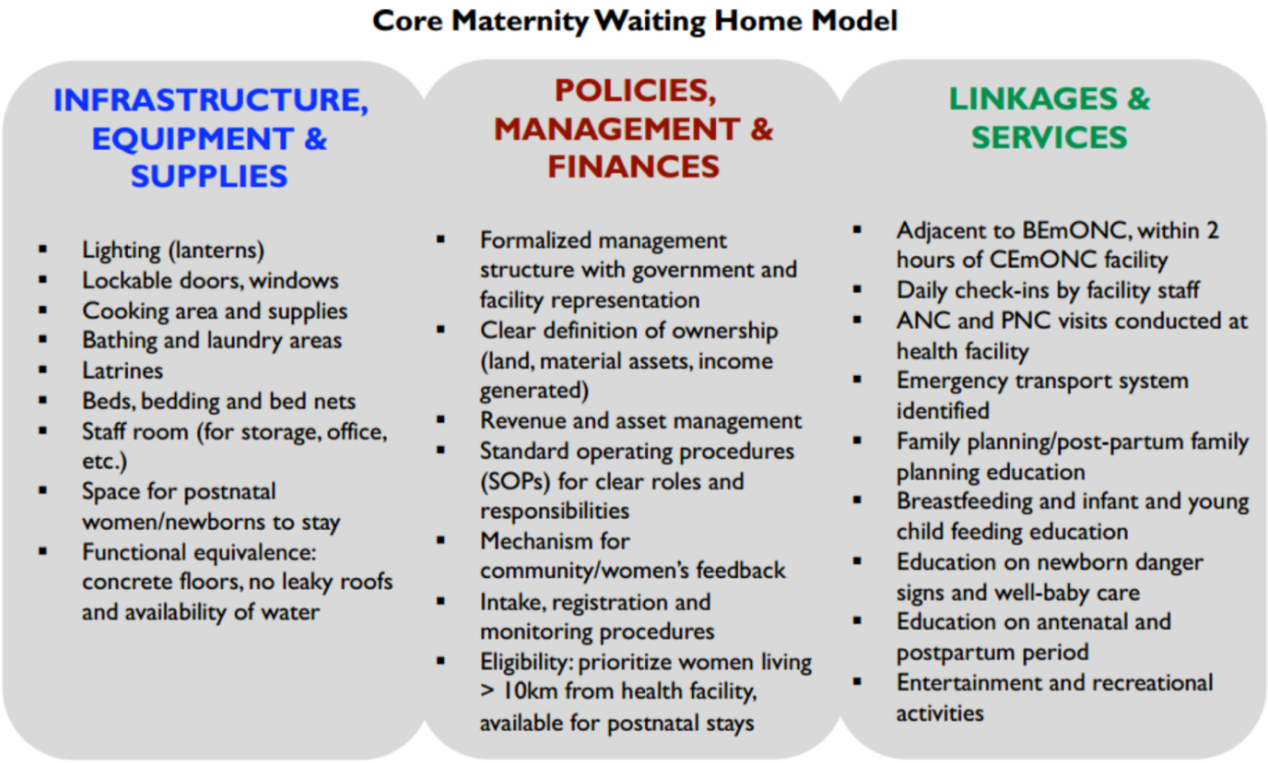

Table 3.1 Demographic characteristics between Community Groups at baseline and endline.

	Baseline					Endline				
		Community Groups					Community Groups			
	Overall	1= neither MWH nor SILC	2= only MWH	3= both MWH and SILC	p-value	Overall	1= neither MWH nor SILC	2= only MWH	3= both MWH and SILC	p-value
Total n (%)	2,381 (50.54)	1,031 (43.30)	594 (24.95)	756 (31.75)		2,330 (49.46)	1,113 (47.77)	619 (26.57)	598 (25.67)	
Age					0.716					0.379
Mean (SD)	26.11 (6.96)	26.22 (7.11)	25.93 (6.71)	26.09 (6.97)		26.08 (6.94)	25.97 (6.92)	26.35(7.03)	26.01 (6.88)	
Missing n (%)	9 (0.38)	1 (0.10)	3 (0.51)	5 (0.66)		35 (1.50)	12 (1.08)	4 (0.65)	19 (3.18)	
Marital Status n (%)					<0.001***[a, b]					0.001***[a,b]
Divorced/ Separated/ Widowed	125 (5.25)	53 (5.14)	29 (4.88)	43 (5.69)		118 (5.06)	62 (5.57)	31 (5.01)	25 (4.18)	
Single	159 (6.68)	86 (8.34)	52 (8.75)	21 (2.7)		180 (7.73)	95 (8.54)	63 (10.18)	22 (3.68)	
Married/ Cohabiting	2,092 (87.86)	890 (86.32)	511 (86.03)	691 (91.40)		2,005 (86.05)	946 (85.00)	522 (84.33)	537 (89.80)	
Missing	5 (0.21)	2 (0.19)	2 (0.34)	1 (0.13)		27 (1.16)	10 (0.90)	3 (0.48)	14 (2.34)	
Number of pregnancies					0.400					0.008**[b]
Mean (SD)	3.86 (2.54)	3.95 (2.61)	3.85 (2.44)	3.75 (2.51)		3.75(2.42)	3.74 (2.46)	3.94 (2.41)	3.57 (2.33)	
Missing n (%)	2 (0.08)	1 (0.13)	-	1 (0.13)		1 (0.04)	-	-	1 (0.17)	
Number of live births					0.068 [a]					0.005** [b]
Mean (SD)	3.59 (2.35)	3.68 (2.43)	3.64 (2.28)	3.42 (2.28)		3.38 (2.39)	3.39 (2.38)	3.55 (2.46)	3.16 (2.33)	

Missing n (%)	2 (0.08)	1 (0.13)	-	1 (0.13)		1 (0.04)	-	-	1 (0.17)	
Education n (%)					<0.001*** a, b					P<0.001*** a, b
None	362 (15.20)	160 (15.52)	83 (13.97)	119 (15.74)		280 (12.02)	152 (13.66)	63 (10.18)	65 (10.87)	
Primary	1,444 (60.65)	603 (58.49)	332 (55.89)	509 (67.33)		1,370 (58.80)	628 (56.42)	350 (56.54)	392 (65.55)	
Secondary	568 (23.86)	266 (25.80)	177 (29.80)	125 (16.53)		650 (27.90)	323 (29.02)	203 (32.79)	124 (20.74)	
Missing	7 (0.29)	2 (0.19)	2 (0.34)	3 (0.40)		30 (1.29)	10 (0.90)	3 (0.48)	17 (2.84)	

OLS regression performed for continuous variables and Pearson chi-square test performed for categorical variables; *p<0.05; ** p <0.01; ***p<0.001
a: statistical significance between community group 1 (neither MWH nor SILC) and community group 3(both MWH & SILC).
b: statistical significance between community group 2 (only MWH) and community group 3 (both MWH & SILC).
c: statistical significance between community group 1 (neither MWH nor SILC) and community group 2 (only MWH)

Table 3.2 Community Groups and time point as predictors of wealth.

	Wealth[1]		Wealth[2]		Wealth Index[1]		Wealth Index[2]	
Community groups	Unadjusted b (SE) [B] N=4,054	Adjusted b (SE) [B] N=3,689	Unadjusted b (SE) [B] N=4,061	Adjusted b (SE) [B] N=3,695	Unadjusted b (SE) [B] N=4,061	Adjusted b (SE) [B] N=3,695	OR (95% CI) N=4,061	AOR (95% CI) N=3,695
1= neither MWH nor SILC	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
2= only MWH	1.50 (0.21) [0.11] ***	1.12 (0.20) [0.08] ***	0.29 (0.03) [0.13] ***	0.23 (0.03) [0.10] ***	0.48 (0.05) [0.15] ***	0.38 (0.05) [0.12] ***	2.98 (2.33 - 3.82) ***	2.74 (2.10 - 3.57) ***
3= both MWH and SILC	-1.95 (0.20) [-0.15] ***	-1.64 (0.20) [-0.12] ***	-0.37 (0.03) [-0.16] ***	-0.31 (0.03) [-0.14] ***	-0.53 (0.05) [-0.16] ***	-0.45 (0.05) [-0.14] ***	0.61 (0.51 - 0.72) ***	0.67 (0.55 - 0.81) ***
Time point								
Baseline	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Endline	0.46 (0.17) [0.04] **	0.34 (0.17) [0.03] *	0.08 (0.03) [0.04] *	0.04 (0.03) [0.02]	0.07 (0.04) [0.02]	0.02 (0.04) [0.00]	0.97 (0.83 - 1.13)	0.92 (0.77 -1.00)

Wealth[1] summed wealth indicator variables. Linear regression performed.
Wealth[2] principal component analysis conducted on wealth indicator variables without compiling into quintiles. Linear regression performed.
Wealth Index[1] principal component analysis conducted on wealth indicator variables and divided into quintiles: poorest, poor, middle, rich, and richest. Linear regression performed.
Wealth Index[2] principal component analysis conducted on wealth indicator variables and divided into quintiles: poorest, poor, middle, rich, and richest. Then the quintiles were further dichotomized to poorest versus the poor, middle, rich, and richest. Logistic regression performed. (0 as poorest; 1 poor, mid, rich, richest).
*p<0.05 ** p<0.01 ***p<0.001
b: Unstandardized coefficient SE: Standard error; B: Standardized coefficient; OR: Odds ratio; AOR: Adjusted odds ratio; CI: Confidence interval; MWH: Maternity waiting homes; SILC: Savings and internal lending communities.
All adjusted logistic and linear regression models controlled for age, marital status, gravida, parity, education, community group, and timepoint. Please refer to Table 3.1 for more details on these variables.

Table 3.3 Interaction effect of community groups and time point on wealth.

	Wealth[1]	**Wealth[2]**	**Wealth index[1]**	**Wealth index[2]**
Community groups	Adjusted b (SE) [B]	Adjusted b (SE) [B]	Adjusted b (SE) [B]	AOR (95% CI)
1= neither MWH nor SILC	Ref	Ref	Ref	Ref
2= only MWH	0.74 (0.29) [0.05] *	0.18 (0.05) [0.07] **	0.34 (0.07) [0.10] ***	2.42 (1.68 – 3.50) ***
3= both MWH and SILC	-1.45 (0.29) [-0.11] ***	-0.27 (0.05) [-0.12] ***	-0.39 (0.07) [-0.12] ***	0.75 (0.57- 0.98) *
Time point				
Baseline	Ref	Ref	Ref	Ref
Endline	0.20 (0.25) [0.01]	0.03 (0.04) [0.01]	0.03 (0.06) [0.01]	0.95 (0.74 - 1.22)
Community group X time point				
1= neither MWH nor SILC X End Line	Ref	Ref	Ref	Ref
2= only MWH X End Line	0.73 (0.41) [0.04]	0.10 (0.07) [0.03]	0.07 (0.10) [0.01]	1.30 (0.76 - 2.22)
3= both MWH and SILC X End line	-0.24 (0.41) [-0.01]	-0.06 (0.07) [-0.02]	-0.11 (0.10) [-0.02]	0.82 (0.56 - 1.21)

Wealth Index[1] principal component analysis conducted on wealth indicator variables and divided into quintiles: poorest, poor, middle, rich, and richest. Then the quintiles were further dichotomized to poorest versus the poor, middle, rich, and richest. Logistic regression performed. (0 as poorest; 1 poor, mid, rich, richest).
Wealth Index[2] principal component analysis conducted on wealth indicator variables and divided into quintiles: poorest, poor, middle, rich, and richest. Linear regression performed.
Wealth[1] summed wealth indicator variables. Linear regression performed.
Wealth[2] principal component analysis conducted on wealth indicator variables without compiling into quintiles. Linear regression performed.
*p<0.05 ** p<0.01 ***p<0.001
AOR: Adjusted odds ratio; CI: Confidence interval; b: Unstandardized coefficient SE: Standard error; B: Standardized coefficient; MWH: Maternity waiting homes; SILC: Savings and internal lending communities.
All adjusted logistic and linear regression models controlled for age, marital status, gravida, parity, education, community group, and timepoint. Please refer to Table 2.1 for more details on these variables.

Table 3.4 Community groups and time point as predictors of saving for most recent delivery, antenatal care visit, and postnatal care visits.

	Saved for most recent delivery		≥ 4 or more ANC visits		All 4 PNC visits	
Community groups	OR (95% CI) N=4,686	AOR (95% CI) N= 3,679	OR (95% CI) N= 4,700	AOR (95% CI) N= 3,694	OR (95% CI) N= 4,615	AOR (95% CI) N= 3,633
1= neither MWH nor SILC	Ref	Ref	Ref	Ref	Ref	Ref
2= only MWH	0.97 (0.82 - 1.16)	0.93 (0.76 - 1.13)	0.94 (0.81 - 1.09)	0.89 (0.75 - 1.05)	1.18 (0.90 - 1.56)	1.30 (0.95 - 1.79)
3= both MWH and SILC	1.24 (1.04 - 1.47) *	1.49 (1.21 - 1.83) ***	0.83 (0.72 - 0.96) *	0.87 (0.74 - 1.04)	1.69 (1.32 - 2.17) ***	1.46 (1.06 - 2.00) *
Time point						
Baseline	Ref	Ref	Ref	Ref	Ref	Ref
Endline	0.67 (0.58 - 0.78) ***	0.66 (0.56 - 0.78) ***	1.75 (1.55 - 1.98) ***	1.68 (1.46 - 1.93) ***	1.55 (1.25 - 1.93) ***	2.11 (1.61 - 2.77) ***

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

OR: Odds ratio; AOR: Adjusted odds ratio; CI: Confidence interval; MWH: Maternity waiting homes; SILC: Savings and internal lending communities; ANC: Antenatal care; PNC: Postnatal care.

All adjusted logistic regression models controlled for age, marital status, gravida, parity, education, wealth (quintiles), community group, and timepoint. Please refer to Table 3.1 for more details on these variables.

Table 3.5 Interaction effect of community groups and time point on saving for most recent delivery, antenatal care visit, and postnatal care visits.

	Saved for most recent delivery	**≥ 4 or more ANC visits**	**All 4 PNC visits**
Community groups	AOR (95% CI)	AOR (95% CI	AOR (95% CI)
1= neither MWH nor SILC	Ref	Ref	Ref
2= only MWH	0.88 (0.65 - 1.18)	0.79 (0.62 - 0.99) *	0.90 (0.52 - 1.55)
3= both MWH and SILC	1.37 (1.01 - 1.85) *	0.91 (0.73 - 1.15)	1.03 (0.61 - 1.71)
Time point			
Baseline	Ref	Ref	Ref
Endline	0.62 (0.49 -0.79) ***	1.63 (1.33 - 2.00) ***	1.52 (1.00 - 2.30) *
Community group X time point			
1= neither MWH nor SILC X End Line	Ref	Ref	Ref
2= only MWH X End Line	1.10 (0.74 - 1.64)	1.29 (0.92 - 1.81)	1.77 (0.91 - 3.47)
3= both MWH and SILC X End line	1.13 (0.75 - 1.70)	0.88 (0.63 - 1.22)	1.70 (0.90 - 3.23)

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

AOR: Adjusted odds ratio; CI: Confidence interval; MWH: Maternity waiting homes; SILC: Savings and internal lending communities; ANC: Antenatal care; PNC: Postnatal care.

All adjusted logistic regression models controlled for age, marital status, gravida, parity, education, wealth (quintiles), community group, and timepoint. Please refer to Table 3.1 for more details on these variables.

Table 3.6 Community groups and time point as predictor for utilization of maternity waiting homes, delivery at a health facility, and delivery with skilled provider.

	Utilization of MWHs		Most recent delivery at HF		Most recent delivery with SP	
Community groups	OR (95% CI) N=4,692	AOR (95% CI) N=3,682	OR (95% CI) N=4,706	AOR (95% CI) N= 3,694	OR (95% CI) N=4,094	AOR (95% CI) N=3,309
1= neither MWH nor SILC	Ref	Ref	Ref	Ref	Ref	Ref
2= only MWH	1.79 (1.55 - 2.07) ***	1.70 (1.44 - 2.01) ***	0.86 (0.71 - 1.04)	0.81 (0.65 - 1.01)	1.07 (.89 - 1.30)	0.98 (0.79 - 1.21)
3= both MWH and SILC	1.55 (1.35 - 1.78) ***	1.69 (1.43 - 1.99) ***	1.33 (1.08 - 1.63) **	1.48 (1.15 - 1.91) **	1.16 (.96 - 1.40)	1.37 (1.09 - 1.71) **
Time point						
Baseline	Ref	Ref	Ref	Ref	Ref	Ref
Endline	2.05 (1.82 - 2.31) ***	1.89 (1.64 - 2.16) ***	1.99 (1.68 - 2.36) ***	2.09 (1.71 - 2.54) ***	2.34 (2.00 - 2.75) ***	2.46 (2.05 - 2.96) ***

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

OR: Odds ratio; AOR: Adjusted odds ratio; CI: Confidence interval; MWH: Maternity waiting homes; SILC: Savings and internal lending communities; HF: Health facilities; SP: Skilled provider

All adjusted logistic regression models controlled for age, marital status, gravida, parity, education, wealth (quintiles), community group, and timepoint. Please refer to Table 3.1 for more details on these variables.

Table 3.7 Interaction effect of community groups and time point on utilization of maternity waiting homes, delivery at a health facility, and delivery with skilled provider.

	Utilization of MWHs	**Most recent delivery at HF**	**Most recent delivery with SP**
Community group	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
1= neither MWH nor SILC	Ref	Ref	
2= only MWH	1.22 (0.96 - 1.55)	0.73 (0.55 - 0.98) *	0.98 (0.73 - 1.33)
3= both MWH and SILC	0.97 (0.76 - 1.23)	1.18 (0.87 - 1.60)	0.96 (0.73 - 1.27)
Time point			
Baseline	Ref	Ref	Ref
Endline	1.20 (0.98 - 1.47)	1.70 (1.29 - 2.24) ***	1.97 (1.52 - 2.55) ***
Community group X time point			
1= neither MWH nor SILC X End Line	Ref	Ref	Ref
2= only MWH X End Line	1.82 (1.31 - 2.53) ***	1.26 (0.81- 1.98)	0.98 (0.64 - 1.50)
3= both MWH and SILC X End line	2.78 (1.99 - 3.88) ***	1.96 (1.13 - 3.41) *	2.91 (1.76 - 4.81) ***

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

AOR: Adjusted odds ratio; CI: Confidence interval; MWH: Maternity waiting homes; SILC: Savings and internal lending communities; HF: Health facilities; SP: Skilled provider

All adjusted logistic regression models controlled for age, marital status, gravida, parity, education, wealth (quintiles), community group, and timepoint. Please refer to Table 3.1 for more details on these variables.

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Chapter 4

Manuscript 3

The Role of Savings and Internal Lending Communities (SILCs) in Improving Household Wealth and Financial Preparedness for Birth in Rural Zambia

Abstract

Savings and Internal Lending Communities (SILCs) are a type of informal microfinance mechanism adapted in many low- and middle-income countries (LMICs) to improve financial resources for poor and rural communities. Although SILCs are often paired with other health and non-health related interventions, few studies have examined SILCs in the context of maternal health. This study examined the association between SILC participation, household wealth, and financial preparedness for birth. The study also examined the association between sex and financial preparedness for birth. A secondary analysis was conducted on individual survey data collected from SILC participants in two rural districts of Zambia between October 2017 and February 2018. A convenience sample of 600 participants (Lundazi: n=297 Mansa: n=303) was analyzed. Descriptive analyses were run to examine SILC participation and household wealth. Multiple binary logistic regression models were fit to assess the unadjusted and adjusted relationship between 1) SILC participation and household wealth, 2) SILC participation and financial preparedness for birth, and 3) sex and financial preparedness for birth. The result show that SILC participation led to an average increase of 7.32 items of the 13 household wealth items. SILC participants who had their most recent childbirth after joining SILCs were more

likely to be financially prepared for birth (AOR: 2.99; 95% CI:1.70-5.26; $p<0.001$) than participants who had their most recent childbirth before joining SILCs. Females were more likely to be financially prepared for birth than male if they had their most recent birth before joining a SILC (AOR: 1.79; 95% CI: 1.16-2.66; $p<0.01$). SILC participation is shown to increase household wealth and financial preparedness for birth for both men and women. SILCs are a promising intervention that can help poor and rural populations by increasing financial resources and financially preparing parents for birth.

Introduction

Of the 295,000 maternal deaths that occur around the world every year, 99% occur in low-income countries and 66% in sub-Saharan Africa (Markos & Bogale, 2014; World Health Organization [WHO], 2019). Nearly all maternal deaths can be prevented, as evidenced by the huge disparities found between the maternal death rates in high- and low-income countries (Nour, 2008; Obaid, 2007). Women in low-income countries face a disproportionately high burden of maternal deaths: the chance of a woman in a low-income country dying while giving birth is as high as 1 in 13, while the chance of a woman dying in a high-income country is 1 in 4100 (WHO, 2019). In Zambia, maternal deaths represent 10% of all deaths among women ages 15-49, with approximately 252 maternal deaths per 100,000 live births (Central Statistical Office [CSO], 2020).

There are numerous reasons why women in low- and middle-income countries (LMICs) are not seeking, reaching, and receiving appropriate care in time (Black, Laxminarayan, Temmerman, & Walker2016). However, scholars agree the lack of financial resources is one of the greatest barriers to accessing fundamental reproductive health services such as antenatal care, postnatal care visits, family planning interventions, and facility-based delivery (Borghi, Ensor, Somanathan, Lissner, & Mills, 2006; Moyer & Mustafa, 2013; Sacks et al., 2017). Therefore, women with fewer financial resources are more likely to bear the burden of preventable maternal deaths and mortality as compared to women with greater financial resources (Jennings et al., 2017; Obaid, 2007).

While the lack of financial resources makes it challenging for rural and poor women in low-income countries to access facility-based delivery, sociocultural factors can exacerbate these issues. In many low-income countries in sub-Saharan Africa, spouses and older family members strongly influence a woman's ability and decision to deliver at a health facility (Kalu-umeh, Mph, Sambo, Fwacp &Idris, 2013; Shaikh, Noorani & Abbas, 2017). In most sub-Saharan African countries, males are still the primary income earners and the decision makers of family finances (Sacks et al., 2017; Sialubanje et al., 2015; Tancred, Marchant, Hanson, Schellenberg, & Manzi, 2016). Therefore, women often rely on their husbands or partners to purchase required birth items and provide other necessary financial resources to prepare for birth (Sacks et al., 2017; Sialubanje et al., 2015; Tancred et al., 2016).

A study examining household savings during pregnancy showed that 90% of the women who reported saving any money for their most recent birth had a husband or parent contribute to their savings (Chiu et al., 2019). Those who saved any money, compared to those who did not save for birth, were significantly more likely to deliver at a health facility (Chiu et al., 2019). When male partners either fail or refuse to provide financial support, women are less likely to access facility-based delivery despite their personal desires (Tancred et al., 2016). Alternatively, even when husbands or partners know and desire to support women to deliver at a health facility, they may not be able to because of limited or unstable income (Scott et al., 2018; Tancred et al., 2016). Therefore, innovative and culturally competent interventions financially empowering both women and their husband or partner to prepare for birth are critically needed.

Savings Groups (SGs) – low risk, self-managed, self-financed, and informal forms of microfinance – have been recognized for their ability to reach the extremely poor (those earning less than 1.90/day) in rural areas. They show great potential as a type of intervention that can

financially empower both women and husbands or partners to prepare for birth (Parr & Bachey, 2015). There are many different models of SGs that have been developed and facilitated by over 70 organizations worldwide (Rippey, Nelson, & Devietti, 2015).

Formed by community members, SGs also function as a social group for the participants to share ideas and stories during meetings, generating a sense of community (Taneja, 2013). Studies that have used SGs to enhance maternal health often include SGs not only as a financial intervention to help overcome financial barriers to access RHSs, but also as a social platform for the women to discuss their reproductive health issues with each other to learn about the importance and availability of RHSs (Saggurti et al., 2018; Shaikh et al., 2017). However, studies generally focus on SGs as a social platform to deliver maternal and child health educational interventions rather than a financial mechanism to help overcome the financial barriers to accessing and utilizing reproductive health services (Lee, Munro-Kramer, Maffioli, Veliz, & Lori, 2020). Therefore, the present study aims to examine SGs as a financial mechanism to overcome financial barriers to safe delivery.

This study specifically examines the impact of the Savings and Internal Lending Communities (SILCs), a SG model developed by Catholic Relief Services, one of the most widely implemented models of SGs in Zambia (Ferguson, 2012; Taneja, 2013; Vanmeenen, 2006). Like other SGs, the SILCs primarily target women and provide a strategy to increase household income through self-managed and savings-led financial services (Ferguson, 2012; Taneja, 2013; Vanmeenen, 2006). Zambia's SILCs not only target women but also men, allowing us to examine the SILCs' impact on wealth and financial preparedness for birth, from the perspectives of both the participating women and their husbands or partners.

The purpose of the paper is to examine the association between SILC participation, household wealth and financial preparedness for birth. Furthermore, the study also examined the association between sex and financial preparedness for birth. Financial preparedness for birth is often defined as saving money for birth-related expenses, assessed by asking the woman and/or her husband or partner whether she/he was able to purchase required supplies (e.g., baby clothes, gloves, plastic sheet) for the woman to deliver at health facilities (Chiu et al., 2019; Tancred et al., 2016).

Methods

Overview

A secondary analysis was conducted on cross-sectional SILC impact survey data collected from SILC participants in two Zambian districts: Lundazi and Mansa.[1] The authors partnered with a local non-governmental organization (NGO) to implement SILCs as part of the Maternity Waiting Homes (MWH) project in rural Zambia. The MWH project aimed to understand the impact of MWHs on reproductive health service access and maternal outcomes for women living far (>10km) from health facilities (Lori et al., 2016; Scott et al., 2018). The local partner implemented the SILCs and collected the survey data. The selection process of ten communities – five from Lundazi and five from Mansa– where SILCs were implemented is the same as that of the MWHs project (Lori et al., 2016; Scott et al., 2018). SILCs were first implemented in January 2016, and data were collected between October 2017 and February 2018 depending on the how long the SILCs have been running.

Sample

[1] At the time of the SILC implementation and impact survey, data was collection from Lundazi and Mansa. Part of Mansa has now been split to make a new district (Chembe) but this change occurred after the implementation of the SILC and does not affect the results.

A convenience sample of 600 participants was sought from a total pool of 6,711 participants from the ten different communities in which SILC groups were implemented. Five of the communities are located in Lundazi (n=297) and five in Mansa (n=303)[2]. The local NGO's program evaluators met the groups on their monthly meeting dates. The description of the study was provided at the end of the regular SILCs meetings and the SILC members were asked to voluntarily participate in the survey. There were volunteers representing each of the ten different communities. Volunteers for the survey provided verbal consent and the survey was collected through in-person interviews in either English or the local dialect (e.g., Bemba, Nyanja, Tonga). The process was repeated for each SILC meeting until data reached 300 participants for each district. Inclusion criteria for participants were age 18 years or older and SILC group membership (must have participated for at least one cycle of committed timeline).

Ethical approvals for the MWH project were obtained from the authors Institutional Review Boards (IRB), as well as from the ERES Converge Research IRB, a private local ethics board in Zambia.

Measures

The purpose of the SILC impact survey was to understand how loan and share-out funds from SILCs were used, how the funds affected the members' livelihood, and how SILC members

[2] While the original study was not purposefully powered to address the specific research question, the current sample was sufficient to address the study aims. Namely, the sample included 513 respondents who had a child during the study period, 411 (80.1%) had a child before joining SILC, and 102 (19.9%) had a child after joining SILC. Using financial preparedness at time of birth as an example, 56% (n=230) of respondents (those who had a child before joining SILC) indicated being financially prepared when their child was born, while 77% (n=79) of respondents (those who had a child after joining SILC) indicated being financially prepared when their child was born. In order to detect a difference of this magnitude (with respect to financial preparedness) between respondents who had a child born before or after joining SILC (i.e., OR = 2.60) at a 0.01 significance level with 90% power, the anticipated minimum effective sample size needed would be 170 respondents (allowing for inclusion of covariates that explain up to 20% of the variance). Given the current sample size, we have sufficient power to detect these differences in both the full sample and when stratified between the two districts.

perceived SILCs. The SILC impact survey included four domains: 1) demographics, 2) economic outcomes, 3) non-economic outcomes, and 4) financial preparedness for birth.

Demographic domain: The demographic domain included information such as participant's age, sex, district of residence, month and year of the participants most recent childbirth (for male participants we asked for their wife/partner's most recent childbirth), and the month and year when they joined SILC.

Economic domain*:* The economic domain included information on the amount of the first loan, usage of the loan and share-out funds, and engagement in agriculture, business, and/or animal husbandry. Furthermore, data about the specific amounts of investments and gain from agricultural, business, and animal husbandry before and after joining SILC were gathered. The survey information regarding what materials comprised house and roofing structures before and after joining SILC were also included. These questions were included in the economic domain because they are used to create a wealth index by many low-income countries' Demographic and Health Surveys (DHS) (Kolenikov & Angeles, 2009).

Non-economic domain*:* The non-economic domain included variables such as the ability to pay for child school fees, uniforms, and shoes, food security, and ability to purchase all the required supplies for the most recent delivery. The survey ends with open-ended questions asking for examples of how membership in the SILC has helped the participant or their family, whether they would recommend SILC to their family, and why they would or would not recommend the SILC membership.

Financial preparedness for birth*:* Lastly, the financial preparedness for birth was assessed by asking the participants whether he/she was able to purchase all required supplies – plastic sheet, gloves, baby hat, baby clothes, wrap, etc – for the most recent delivery. The

question asked for most recent delivery since one participant may have multiple children and we wanted to assess their preparedness for the most recent childbirth. The participants who answered 'yes' to the question were categorized as financially prepared birth and those who answered 'no' were categorized as not financially prepared for birth.

Because many people in low-income countries like Zambia often lack regular income, household wealth is frequently assessed by counting assets, and assessing the quality of housing, sanitation facility, and/or water supply (Kolenikov & Angeles, 2009). Similarly, to capture the impact of SILCs on household wealth, the 'increase of wealth index' variable was created using both the economic and non-economic variables.

Using these variables from the economic and non-economic domains, a total of 13 new discrete indicators were created. Each indicator was compared across two time points –before and after joining SILCs. Post-SILCs participation improvements were coded as '1.' No change or post-SILCs participation decline/decrease were coded as '0.' The 'increase of wealth index' was then created by summing the 13 new indicators. Using the United States Agency for International Development (USAID)'s guideline for housing conditions (2016), brick and cement were considered improved housing material (Foley & Cameron, 2016). Metal and cement were considered improved roof material. If participants reported having these improved materials for housing and/or roofing after joining SILCs, the two variables were coded as '1.' The reliability coefficient for the increase of wealth index was 0.86 ($0.8 > \alpha \geq 0.7$=acceptable; $0.9 > \alpha \geq 0.8$=good; $\alpha \geq 0.9$= excellent).

To understand the impact of SILC participation on financial preparedness for birth, all SILCs participants were divided into two groups: those who had (or their wife/partner had) their most recent childbirth before joining a SILC and those who had (or their wife/partner had) their

most recent childbirth after joining a SILC. The sample was dichotomized by most recent childbirth date and SILC initial join date to assess how income earned through SILCs influence financial preparedness for birth.

Analysis

The aim of this analysis was to describe SILC participation and household wealth for birth and to examine the association between: 1) increase of wealth and financial preparedness for birth and 2) sex of the participants and financial preparedness for birth. Descriptive statistics were analyzed with means and standard deviations (SD) provided for the overall sample as well as the stratified sample between those who were financially prepared for birth and those who were not. A set of Chi-square tests of independence and two sample t-tests were conducted to examine the differences between participants who were financially prepared and participants who were not for the overall and stratified samples. The financially prepared sample was further stratified by sex.

Means and SD were calculated for the overall and stratified samples from Lundazi and Mansa. Several binary logistic regression models were fit to assess the unadjusted and adjusted relationship between increased wealth index and financial preparedness for birth. Adjusted logistic regression models included age, sex, district of residence, and the period of most recent childbirth as covariates. All logistic regression models provided adjusted odds ratios (AOR) and 95% confidence intervals (95%CI).

To understand the relationship between sex and financial preparedness for birth, logistic regression models were fit between those who had their most recent childbirth before and after joining SILCs. The data were analyzed using Stata 15.0 (StataCorp, College Station, TX, USA).

Results

Sample Characteristics

Table 4.1 presents descriptive statistics for the total sample of 600 SILC participants (Lundazi:297 Mansa: 303). Approximately half of the sample resided in Lundazi (49.50%) and the other half in Mansa (50.50%). More females (64.67%; n= 388) than males were included the sample. Approximately 30% of the sample was between 26 - 35 years old (n= 183), closely followed by 36 to 45-year-olds (28.55%; n= 171). About one fifth (19.88%) of the overall sample had their most recent childbirth after joining SILCs. On average, the increase of wealth index was 7.32, which means that, on average, SILCs participants had approximately 7.3 of the 13 economic and non-economic indicators increase after SILC participation.

Of the 600 participants, 64.85% were considered financially prepared for the most recent birth. When comparing the two groups – financially prepared for birth and not financially prepared for birth – the result showed a significant difference in the district of residence ($p<0.001$), sex distribution ($p=0.009$), the timepoint at which the most recent childbirth occurred ($p<0.001$), and increase in wealth ($p=0.002$). Samples that were financially prepared for most recent birth had a higher percentage of participants from Mansa (51.01%) compared to 32.09% of those not financially prepared. The financially prepared sample also had more female (68.12 %) and more participants delivering a child after joining SILCs (25.57%) compared to 56.68% female and 12.20% participants delivering after joining SILCs from the not financially prepared sample. The financially prepared sample had, however, a lower increase of wealth, with an average increase of 7.54 wealth index compared to 8.52 from the not financially prepared. While we find no evidence that increase of wealth is significantly different between financially prepared and not financially prepared SILCs participants from Lundazi, a large gap existed in the increase of wealth index between the two districts, with participants from Lundazi (10.49)

having greater increase of wealth index in the sample that were financially prepared compared to those from Mansa (2.04).

Table 4.2 shows the association between demographic variables, increase of wealth, and 13 economic and non-economic indicators and financial preparedness for birth. Participants from Mansa had significantly higher odds of being financially prepared (AOR: 3.15; 95%CI: 1.41-7.03) than participants from Lundazi. Furthermore, females (AOR:1.76; 95%CI: 1.16-2.66) compared to males, and those who had their most recent delivery after joining SILCs (AOR: 2.99; 95%CI: 1.70-5.26) compared to those who had their most recent delivery before joining SILCs, had greater odds of being financially prepared for birth. The association between the increase of wealth and financial preparedness for birth was statistically significant for the participants from Mansa (AOR: 1.26; 95%CI: 1.03-1.55) but not for the participants from Lundazi (AOR: 0.90 95%CI:0.79 - 1.04).

Table 4.3 and **Table 4.4** examines the association between demographic variables, increase of wealth, and the 13 economic and non-economic indicators, and financial preparedness for birth. The participant or the participant's wife/partner having the most recent childbirth after joining a SILC increased the odds of financial preparedness when compared to participants who had their most recent childbirth before joining a SILC; this was found for both participants from Lundazi (AOR: 2.42; 95%CI: 1.31-4.47) and Mansa (AOR: 10.15; 95%CI: 1.28-80.12). In addition, an increase in the wealth index was shown to be significantly associated with an increase in the odds of indicating financial preparedness for birth in Mansa only (AOR: 1.26; 95%CI: 1.03-1.55).

In **Table 4.5,** sex of the participants was used to predict the odds of being financially prepared for the most recent birth. Females had greater odds of reporting being financially

prepared for birth (AOR: 1.68; 95% CI: 1.07-2.65) than males for those who had their most recent childbirth before joining SILCs. For the participants who had their most recent childbirth after joining SILCs, sex had no statistically significant association with financial preparedness for birth.

Discussion

Overall, the results show that participating in SILCs led to increased household wealth (indicated by individual wealth indicators and increased wealth index) and financial preparedness for birth. Furthermore, being a female was positively associated with financial preparedness for birth, only if they had their most recent birth before joining a SILC.

SILCs participation and household wealth

The results show that SILC participation was positively associated with household wealth as evident in the increase of wealth index (average 7.32). This finding is congruent with the general literature, which suggests SGs are able to reach poor people living in rural areas to provide them the means to access basic financial services such as loans, social funds, and share-out funds (Hermes & Lensink, 2011; Karlan et al., 2017). This financial revenue allows them to invest in business, purchase land and livestock, pay for children's school, and purchase food (Hermes & Lensink, 2011; Parr & Bachey, 2015). However, it is important to note that the data do not show the amount increase for each of the economic and non-economic indicators because participants did not use a standardized unit to report the increase. Hence, the data was not comparable across the participants. A cluster randomized control trial conducted in Malawi found that the SGs were able to reach some of the poorest households and could improve food security, housing standards, household assets, and increase the number of economic activities and savings. However, there were no significant changes in the total income generated through

economic activities (Ksoll et al., 2016). Another randomized control trial examining the effect of SGs in Mali over three years showed positive but small effects in overall savings, amounts of money borrowed, households' livestock holdings, and food security (Innovations for Poverty Action (IPA), Bureau of Applied Research in Anthropology [BARA], University of Arizona, 2013). Once again, there were no significant differences when assessing for various savings, health expenses, school enrollment, business development or expansion, and agricultural assets (IPA et al., 2013). Although the present results show SILC participation and wealth increase were positively associated, with the data available we cannot measure the magnitude of increase for each of the 13 wealth indicators.

SILC participation and financial preparedness for birth

Compared to the participants who had their most recent childbirth before joining SILCs, those who had their, or their wife/partner had most recent childbirth after joining SILCs were almost three times more likely to be financially prepared for birth, determined by the participants ability to purchase all the required supplies for the most recent delivery. Out-of-pocket costs relating to childbirth can range up to one-third of the monthly household income for the poorest Zambian households (Kaiser et al., 2019). Poor families in rural areas are even more financially vulnerable during pregnancy and childbirth because they have limited access to cash and live farther away from health facilities (Borghi et al., 2006). A study conducted in seven rural districts of Zambia – including Lundazi and Mansa– showed that baby clothes/blankets, delivery supplies such as disinfectant or cord clamps, and transportation were the most common expenditure related to delivery (Kaiser et al., 2019). Furthermore, the study showed the average spending per childbirth was approximately $28.760 USD, calling attention to programs that can help alleviate these expenses to increase accessibility to facility-based delivery (Kaiser et al.,

2019). The positive association between SILC participation and financial preparedness for birth shows the potential of SILCs as an innovative solution to overcome financial barriers related to childbirth.

The positive association between giving birth after joining SILCs and financial preparedness for birth was mostly replicated in the stratified analyses between Lundazi and Mansa. The likelihood of being financially prepared for birth was approximately 2.5 times higher for those whose most recent childbirth occurred after joining a SILC in Lundazi and 10 times higher in Mansa. Furthermore, the increase in the wealth index was significantly associated (Tables 2 and 3) with financial preparedness for birth only in the Mansa sample. However, as wealth increased for Lundazi sample, the odds of being financially prepared for birth did not increased. These differences between the districts may be due to the difference in rurality, which may suggest a difference in education level, a covariate frequently shown to predict birth preparedness (Markos & Bogale, 2014). According to 2018 statistics, the median number of school years completed among Zambian males is 6.9 years and 6.8 years among Zambian females (CSO, 2020). Not surprisingly, a large difference of schooling years, 2.7 years for females and 1.7 years for males, exists between Zambians living in rural and urban areas (CSO, 2020). Therefore, the Mansa sample may have a higher level of education on average, which may then influence financial resource prioritization for birth preparedness. Unfortunately, the SILC impact survey data did not include information such as education level to support these speculations.

Sex and financial preparedness for birth

Overall, females were more likely to be financially prepared for birth than males for participants who had their most recent childbirth before joining SILCs. Effect of sex on financial

preparedness for birth was not significant for participants who had their most recent childbirth after joining SILCs. One potential explanation maybe the function of SILC as a social platform. SGs like SILC are shown to be conducive platforms for participants to discuss various issues that develops trust, solidarity, collective efficacy, and a sense of belonging within the group (Saha, Annear, & Pathak, 2013; Saha, Kermode, &Annear, 2015; Lee et al., 2020). Studies have shown the participating in SGs not only led to financial autonomy for females but also increased male's participation in preparing for birth (Shaikh et al., 2017; Ekirapa-Kiracho, et al., 2016; Lee et al., 2020). Therefore, females sharing their concerns and difficulties regarding pregnancy and childbirth during SILC meetings may have allowed the males to use their financial gain from SILCs to financially prepare for birth (Ekirapa-Kiracho et al., 2016; Lee et al., 2020).

When the sample was stratified, between those who had their most recent delivery before joining SILCs and those who had their most recent delivery after joining SILCs, the odds of females indicating being financially prepared for birth were 68% times higher when compared to males. For SILC participants who had their most recent delivery after joining SILCs, sex was no longer associated with financial preparedness for birth. While SILCs were not directly paired with specific educational interventions, SGs have been shown to provide important platforms for community members to network, interact, and share various life events with each other (Shaikh et al., 2017). During regular SILC meetings, participants can share information about personal life events, such as pregnancy and childbirth. This experience can then inform males about the decision to prioritize financial resources for preparing for birth. It is well established that male's knowledge and involvement with maternal and child health are directly associated with improved utilization of reproductive health services and maternal health outcomes (Yargawa & Leonarddi-Bee, 2015). While male involvement is gradually improving in many sub-Saharan African

countries, gender roles in society and cultural beliefs that pregnancy and childbirth are solely females' responsibility still prevent males from gaining increased knowledge on pregnancy and childbirth (Dudgeon & Inhorn, 2004). Previous studies that paired SGs with maternal health education interventions have shown that participating in SGs leads to increased health knowledge and awareness of services not only for females but also for other participating community members. As such, females who participated in SGs were able to practice better health behaviors due to the increased knowledge, awareness, and involvement among males and other community members who had also participated in the SGs (Ekirapa-Kiracho et al., 2017). Therefore, a social platform where both males and females can converse about various issues, including pregnancy and childbirth, could have better informed males about the importance of preparing financially for birth.

Limitations

While there were many strengths in the current study, several limitations need to be addressed. First, because the SILC impact survey was collected cross-sectionally at the end of the cycle, approximately 9 to 12 months since the beginning of the SILC cycle, it is subject to recall bias. Questions asked retrospectively on the investments and gain from agriculture, business, and animal husbandry in relation to two different timepoints (before and after joining SILCs) are especially prone. Social desirability could have also impacted the outcomes, given that the surveys were collected through face-to-face interview with the local NGO's program evaluators rather than anonymously filled by participants. Thus, the participants may have overreported on the gain from the SILCs. However, the interview format was unavoidable, due to the overall limited literacy in rural Zambia.

Second, the increase of wealth index is limited in its ability to capture wealth. Since responses were not recorded according to a specific unit for the investments and gain from agriculture, business, and animal husbandry, the answers varied across participants. Some answered in Kwacha, while others responded in number of bags, kilograms, gallons, and other units for indicators such as amount of crops harvested before and after joining SILCs. Therefore, while the study showed the overall increase of wealth in all SILCs participants, it is unclear what the magnitude of increase was for each variable. Moreover, the survey did not capture other information that could have also shown an increase such as health care expenses. However, for many people in Zambia that lack regular income, assessing household wealth via counting the assets and quality of housing and water supply is a common methodology (Kolenikov & Angeles, 2009).

Lastly, the lack of demographic variables such as the participants' education level, marital status, and number of children also limits the conclusions that can be drawn from the study. Moreover, variables such as expenditure on different birth supplies, transportation, drugs, and diagnostic tests were not included in the survey. These variables would have provided deeper insights regarding the expenditures related to pregnancy and birth of a child. However, we believe that financial preparedness for birth was captured by asking the participants to report their perception whether they were able to purchase all the necessary birth items for their most recent childbirth since types of expenditure needed for pregnancy and childbirth may differ by individuals (e.g., expenditure for transportation may not be necessary for all childbirth).

Conclusion

The study found that participating in SILCs increased household wealth and the likelihood to be financially prepared for birth. In addition, female SILC participants were more

likely to be financially prepared for birth only for the participants who had their most recent childbirth before joining SILCs. This finding suggests that SILC may be functioning as a social platform for females to share their concerns regarding childbirth, which allowed both male and female to prioritize gains from SILCs to financially prepare for birth. In sum, the study suggests that SILCs are a promising intervention not only to increase wealth for the poor and rural populations, but also to help participants be financially prepared for birth. As such, the present study holds important implications for improving maternal health by helping poor males and females living in rural areas to overcome financial barriers to access fundamental reproductive health services.

Table 4.1 Descriptive statistics for overall demographics and stratified sample of participants who identified as financially prepared for birth.

	Overall	Not financially prepared for birth	Financially prepared for birth	p-value
Total n (%)	600	187 (35.15)	345 (64.85)	
District n (%)				<0.0001***
Lundazi	297 (49.50)	127 (67.91)	169 (48.99)	
Mansa	303 (50.50)	60 (32.09)	176 (51.01)	
Sex n (%)				0.009 **
Male	212 (35.33)	81(43.32)	110 (31.88)	
Female	388 (64.67)	106 (56.68)	235 (68.12)	
Age n (%)				0.552
18-25	138 (23.04)	41 (22.04)	81 (23.48)	
26-35	183 (30.55)	60 (32.26)	108 (31.30)	
36-45	171 (28.55)	51(27.42)	104 (30.14)	
>46-55	107 (17.86)	34 (18.28)	52 (15.07)	
Child born period, n (%)				0.001 **
Before joining SILC	411 (80.12)	144 (87.80)	230 (74.43)	
After joining SILC	102 (19.88)	20 (12.20)	79 (25.57)	
Increase of wealth index, mean (SD)	7.32 (3.77)	8.52 (3.61)	7.54 (3.44)	0.002 **
Lundazi	10.55 (1.76)	10.71 (1.56)	10.42 (1.89)	0.161
Mansa	4.15 (2.20)	3.88 (1.95)	4.77 (2.04)	0.003 **
Increased after joining SILC n (%)				
Business	450 (75.00)	155 (82.89)	272 (78.84)	0.263
Food	301 (50.17)	126 (67.38)	156 (45.22)	<0.001 ***
Roof material improved	187 (31.17)	73 (39.04)	113 (32.75)	0.147
Home material improved	198 (33.00)	70 (37.43)	125 (36.23)	0.784
Land	489 (81.50)	151 (80.75)	301 (87.25)	0.045 *
Seed bought	436 (72.67)	144 (77.01)	264 (76.52)	0.900
Fertilizer bought	424 (70.67)	144 (77.01)	259 (75.07)	0.619
Harvest amount	460 (76.67)	148 (79.14)	286 (82.90)	0.286
Live stocks	409 (68.17)	142 (75.94)	253 (73.33)	0.512
New bicycle	247 (41.17)	111(59.36)	129 (37.39)	<0.001 ***

Uniform for children	250 (41.67)	94 (50.27)	150 (43.48)	0.134
School fee for children	248 (41.33)	109 (58.29)	134 (38.84)	<0.001 ***
Shoes for children	293 (48.83)	127 (67.91)	160 (46.38)	<0.001 ***

Chi square tests and two sample t-tests were conducted to examine the difference between participants who were financially prepared and participants who were not. *p<0.05; **p<0.01; ***p<0.001

Table 4.2 Predictors of financial preparedness for the overall sample.

	Financial preparedness for birth	Financial preparedness for birth OR (95% CI)	Financial preparedness for birth AOR (95% CI)
Total n/N	345/600		473/600
District n (%)			
Lundazi	169 (48.99)	Reference	Reference
Mansa	176 (51.01)	2.20 (1.51 - 3.19) ***	3.15 (1.41 - 7.03) **
Sex n (%)			
Male	110 (31.88)	Reference	Reference
Female	235 (68.12)	1.63 (1.13 - 2.35) **	1.76 (1.16 - 2.66) **
Age mean (SD)	35.02 (10.42)	0.99 (0.97 - 1.01)	1.00 (0.98 - 1.02)
Child born period n (%)			
Before joining SILCs	230 (74.43)	Reference	Reference
After joining SILCs	79 (25.57)	2.47 (1.45 - 4.21) **	2.99 (1.70 - 5.26) ***
Increase of wealth index mean (SD)	7.54 (3.44)	0.92 (.87 - .97) **	1.01 (0.90 - 1.13)
Lundazi	10.42 (1.89)	0.90 (0.79 - 1.03)	0.90 (0.79 - 1.04)
Mansa	4.77 (2.04)	1.24 (1.07 - 1.45) **	1.26 (1.03 - 1.55) *
Increased after joining SILC [a] n (%)			
Business	272 (78.84)	0.76 (0.48 - 1.21)	1.33 (0.75 - 2.36)
Food	156 (45.22)	0.39 (0.27 - 0.57) ***	0.55 (0.33 - 0.92) *
Roof material improved	113 (32.75)	0.76 (0.52 - 1.10)	1.02 (0.62 - 1.68)
Home material improved	125 (36.23)	0.94 (0.65 - 1.37)	1.51 (0.91 - 2.50)
Land	301 (87.25)	1.63 (1.00 - 2.64) *	2.88 (1.41 - 5.91) **
Seed bought	264 (76.52)	0.97 (0.63 - 1.48)	1.32 (0.70 - 2.50)
Fertilizer bought	259 (75.07)	0.89 (0.59 - 1.36)	2.00 (0.96 - 4.13)
Harvest amount	286 (82.90)	1.27 (0.81 - 2.00)	2.49 (1.21 - 5.11) *
Livestock	253 (73.33)	0.87 (0.57 - 1.31)	1.52 (0.81 - 2.84)
New bicycle	129 (37.39)	0.40 (0.28 - 0.58) ***	0.46 (0.26 - 0.82) **
Uniform for children	150 (43.48)	0.76 (0.53 - 1.08)	1.03 (0.60 - 1.75)
School fee for children	134 (38.84)	0.45 (0.31 - 0.65) ***	0.54 (0.32 - 0.90) *
Shoes for children	160 (46.38)	0.40 (0.28 - 0.59) ***	0.38 (0.21 - 0.70) **

Adjusted model accounted for participants sex, age, district, time of most recent birth, and increase of wealth, but the 13 individual wealth variables were not part of the adjusted model.

SD: Standard Deviation; SILC: Savings and Internal Lending Community; OR: Odds Ratio; CI: Confidence Interval; AOR: Adjusted Odds Ratio; *p<0.05; **p<0.01; ***p<0.001

Table 4.3 Predictors of financial preparedness for the Lundazi sample.

	Financial preparedness for birth (Lundazi)	Financial preparedness for birth OR (95% CI)	Financial preparedness for birth AOR (95% CI)
Total n/N	169/ 297		293/297
Sex n (%)			
Male	52 (30.77)	Reference	Reference
Female	117 (69.23)	1.56 (0.96 - 2.52)	1.79 (1.08 - 2.97) *
Age mean (SD)	33.01 (8.41)	0.99 (0.96 - 1.01)	1.00 (0.97 - 1.03)
Child born period n (%)			
Before joining SILCs	120 (71.01)	Reference	Reference
After joining SILCs	49 (28.99)	2.25 (1.24 - 4.07) **	2.42 (1.31 - 4.47) **
Increase of wealth index mean (SD)	10.42 (1.89)	0.90 (0.79 - 1.03)	0.90 (0.79 - 1.04)
Increased after joining SILC n (%)			
Business	147 (86.98)	0.69 (0.33 - 1.46)	0.85 (0.38 - 1.91)
Food	128 (75.74)	0.80 (0.46 - 1.40)	0.91 (0.48 - 1.73)
Roof material improved	97 (57.40)	1.16 (0.73 - 1.85)	1.56 (0.88 - 2.76)
Home material improved	105 (62.13)	1.46 (0.92 - 2.34)	2.11 (1.18 - 3.77) *
Land	163 (96.45)	1.11 (0.33 - 3.73)	1.66 (0.46 - 5.96)
Seed bought	153 (90.53)	0.07 (0.00 - 0.58) *	0.08 (0.01 - 0.65) *
Fertilizer bought	166 (98.22)	1.33 (0.26 - 6.74)	1.38 (0.25 - 7.42)
Harvest amount	162 (95.86)	0.18 (0.02 - 1.51)	0.20 (0.02 - 1.72)
Livestock	157 (92.90)	0.42 (0.13 - 1.35)	0.43 (0.13 - 1.43)
New bicycle	118 (69.82)	0.45 (0.25 - 0.81) **	0.47 (0.24 - 0.91) *
Uniform for children	123 (72.78)	1.41 (0.86 - 2.33)	2.15 (1.12 - 4.13) *
School fee for children	114 (67.46)	1.02 (0.62 - 1.67)	1.21 (0.65 - 2.27)
Shoes for children	129 (76.33)	0.33 (0.16 - 0.67) **	0.30 (0.12 - 0.73) **

Adjusted model accounted for participants sex, age, district, time of most recent birth, and increase of wealth, but the 13 individual wealth variables were not part of the adjusted model.
SD: Standard Deviation; SILC: Savings and Internal Lending Community; OR: Odds Ratio; CI: Confidence Interval; AOR: Adjusted Odds Ratio; *p<0.05; **p<0.01; ***p<0.001

Table 4.4. Predictors of financial preparedness for Mansa sample.

	Financial preparedness for birth (Mansa)	Financial preparedness for birth OR (95% CI)	Financial preparedness for birth AOR (95% CI)
Total n/N	176/303		180/303
Sex n (%)			
Male	58 (32.95)	Reference	Reference
Female	118 (67.05)	1.90 (1.04 - 3.45) *	1.60 (0.76 - 3.39)
Age mean (SD)	36.96 (11.74)	0.98 (0.95 - 1.00)	0.99 (0.96 - 1.02)
Child born period n (%)			
Before joining SILCs	110 (78.57)	Reference	Reference
After joining SILCs	30 (21.43)	10.63 (1.40 - 80.62) *	10.15 (1.28 - 80.12) *
Increase of wealth index mean (SD)	4.77 (2.04)	1.24 (1.07 - 1.45) **	1.26 (1.03 - 1.55) *
Increased after joining SILC n (%)			
Business	125 (71.02)	1.22 (0.65 - 2.29)	1.57 (0.64 - 3.80)
Food	28 (15.91)	0.26 (0.13 - .50) ***	0.28 (0.11 - 0.68) **
Roof material improved	16 (9.09)	1.09 (0.38 - 3.14)	0.36 (0.10 - 1.27)
Home material improved	20 (11.36)	2.43 (0.69 - 8.50)	0.91 (0.22 - 3.72)
Land	138 (78.41)	3.88 (2.08 - 7.22) ***	2.63 (1.00 - 6.92) *
Seed bought	111 (63.07)	3.98 (2.11 - 7.49) ***	3.31 (1.32 - 8.30) *
Fertilizer bought	93 (52.84)	2.24 (1.21 - 4.13) *	1.40 (0.52 - 3.75)
Harvest amount	124 (70.45)	4.11 (2.22 - 7.63) ***	4.72 (1.69 - 13.18) **
Livestock	96 (54.55)	2.58 (1.39 - 4.81) **	2.44 (1.04 - 5.72) *
New bicycle	11 (6.25)	0.73 (0.24 - 2.20)	1.01 (0.18 - 5.67)
Uniform for children	27 (15.34)	0.80 (0.37 - 1.74)	0.25 (0.09 - 0.71) **
School fee for children	20 (11.36)	0.19 (0.09 - 0.38) ***	0.13 (0.04 - 0.35) ***
Shoes for children	31 (17.61)	0.85 (0.40 - 1.79)	0.53 (0.20 - 1.39)

Adjusted model accounted for participants sex, age, district, time of most recent birth, and increase of wealth, but the 13 individual wealth variables were not part of the adjusted model.
SD: Standard Deviation; SILC: Savings and Internal Lending Community; OR: Odds Ratio; CI: Confidence Interval; AOR: Adjusted Odds Ratio; *p<0.05; **p<0.01; ***p<0.001

Table 4.5 Sex predicting financial preparedness for birth between participants who had their most recent delivery before joining SILC and participants who had their most recent delivery after joining SILC.

	Financial preparedness for birth AOR (95% CI)	
	Child born before joining SILC	**Child born after joining SILC**
Sex		
Male	Reference	Reference
Female	1.68 (1.07 - 2.65) *	2.04 (0.69 - 6.01)

SILC: Savings and Internal Lending Community; CI: Confidence Interval; AOR: Adjusted Odds Ratio; Adjusted model accounted for participants age, district, and increase of wealth. *p<0.05

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Chapter 5

Synthesis and Conclusion

Summary of Main Research Findings

The lack of financial resources is a significant barrier for poor women living in rural areas to access fundamental reproductive health services (RHSs) (Borghi et al., 2006; Moyer & Mustafa, 2013; Sacks et al., 2017; Sibanda et al., 2018). Not utilizing RHSs such as antenatal care (ANC), Health Facility (HF)-based delivery, and postnatal care (PNC) due to out-of-pocket costs contributes to the significant maternal mortality and morbidity disparity between high-income and low-income countries (Sacks et al., 2015; Sibanda et al., 2018; Tancred et al., 2016). Savings and Internal Lending Communities (SILCs) are an informal microfinance mechanism shown to increase financial resources for extremely poor people living in rural areas (Vanmeenen, 2006). Because SILCs and other Savings Groups (SGs) provide an excellent platform for community members to gather on a regular basis to share ideas and concerns, they are often used to deliver various maternal health interventions (United States Agency for International Development [USAID], 2013). However, few studies examine SILCs as a financial intervention to overcome financial barriers, by providing women with additional resources to access RHSs. Furthermore, the impact of SILCs is frequently examined only at the participant level, which attempts to understand the change in knowledge, attitude, and behavior of the participants, but not the broader context in which the participants live (Ferguson, 2012; Taneja, 2013; Vanmeenen, 2006).

The presented study used Centers for Disease Control and Prevention (CDC)'s modified Social-Ecological Model (SEM) originally developed by Bronfenbrenner (1979) to understand the impact of SILCs at the organizational, community, interpersonal, and indiviudal levels. At the organization level, the first manuscript aimed to examine different models of SGs beyond SILCs that have been used as a financial intervention to increase access to RHSs. At the community level, the second manuscript examined the difference in household wealth, financial preparedness for birth, and utilization of multiple RHSs across communities with and without SILCs. At the interpersonal (women's partner/spouse) and individual level (women), the third manuscript examined the change in household wealth and financial preparedness for birth between female and male participants and between participants who had their most recent childbirth before joining SILCs and after joining SILCs.

The first manuscript, *The effect of Savings Groups (SGs) on Reproductive Health Services (RHSs) access and utilization: A scoping review*, examined the existing body of literature to understand the impact of SGs as a financial intervention to overcome financial barriers to accessing RHSs. The review searched six database and grey literature for studies on SGs beyond SILCs that have been developed and implemented by different organizations in relation to access and utilization of RHSs.

The scoping review found that SGs in the context of maternal health are rarely examined as a financial intervention. Only ten articles met all of the inclusion criteria: 1) being conducted in low-and middle-income country 2) meeting all the SGs characteristics, 3) including access and utilization of RHSs as an outcome variable. The review found that even with very limited articles, there are a wide range of SG-related terms, models, and definitions put forth and utilized by different researchers and organizations. Furthermore, only one article examined SGs as its

sole intervention of interest (Saha et al., 2013) while the remainder included SGs as a component of multi-factored maternal health interventions. The types of RHSs accessed and utilized included ANC, PNC, HF-based delivery, and contraceptive methods. The included studies agreed that participation in SGs increased access to and utilization of RHSs in varying degrees including increased knowledge, awareness, and behaviors (e.g., healthy diet, rest, breastfeeding practices). However, women who participated in interventions that included SGs as a multi-component intervention had a higher increase in knowledge, behavior, and access to RHSs compared to women who only participated in SGs (Saggurti et al., 2018; Saha et al., 2015). Therefore, while SGs as a financial intervention do improve access to and utilization of RHSs it is uncertain how much of the service uptake can be contributed to the financial resources gained from the SGs. Overall, the scoping review showed the financial gains of SGs can lead to increased access and utilization of RHSs for women in LMICs.

The second manuscript, *The role of Savings and Internal Lending Communities (SILCs) in improving community level household wealth, financial preparedness for birth, and utilization of Reproductive Health Services (RHSs) in rural Zambia,* aimed to understand the community level association between having access to SILCs and 1) household wealth, 2) financial preparedness for birth, and 3) utilization of RHSs. A secondary analysis was conducted using baseline and endline household survey data collected from seven districts of Zambia. The data were stratified into three community groups: 1) communities with access to neither maternity waiting homes (MWH) or SILC, 2) communities with access only to MWH, and 3) communities with access to both MWH and SILC. Multivariate models were fit to assess the unadjusted and adjusted relationship between community groups, timepoint, and three outcomes 1) household wealth, 2) financial preparedness for birth, and 3) utilization of RHSs. Household wealth was

assessed by four different measures using the comprehensive list of wealth indicator variables similar to the variables used in Demographic and Health Surveys (DHS) (Central Statistical Office (CSO) Zambia, 2020). Financial preparedness for birth was assessed by whether women saved any money for their most recent delivery or not. Utilization of RHSs was examined based on whether the women attended four or more ANC, attended all four PNCs, stayed at a MWH, delivered in a HF, and delivered with a Skilled Provider (SP) for the most recent delivery.

The study found the relationship between community groups and timepoint together had no effect on household wealth, financial preparedness for birth, but were significantly associated with MWH utilization, HF delivery, and SP delivery. When compared to women from communities that had access to neither MWHs nor SILCs, women from communities with only MWHs and communities with both MWHs and SILCs had higher odds of utilizing MWHs, delivering at a HF with a SP at endline.

Additionally, the study found community and timepoints had no effect of household wealth, financial preparedness for birth, four or more ANC, and all four PNC. These findings add to the ongoing debate regarding the financial benefit of SGs, that while there are different increments of increase in household wealth, the overall increase may not be enough to alleviate households from poverty (Nwolise et al., 2014). Furthermore, while SILC participation may have allowed participants to better understand the importance of saving for RHSs, there may not have been enough to save and to further access the full continuum of RHSs. Therefore, the lack of significant increase in household wealth may contribute to the limited ability to save and access only the most critical services related to childbirth such as staying at a MWH and delivering at a HF with a SP.

The third manuscript, *The role of Savings and Internal Lending Communities (SILCs) in improving household wealth and financial preparedness for birth in rural Zambia*, examined the association between SILC participation and household wealth and financial preparedness for childbirth. A secondary analysis was conducted on individual survey data collected from 600 SILC participants in three rural districts of Zambia. Whether there was a change in household wealth was assessed by comparing the pre- and post- SILC investments and gain from agriculture, business, animal husbandry and quality of housing. Multiple binary logistic regressions were used to assess the unadjusted and adjusted relationship between 1) SILC participation and financial preparedness for birth and 2) sex and financial preparedness for birth. In the third manuscript, financial preparedness for birth was defined as the SILC participant answering whether she/he was able purchase all birth-related items (e.g., baby clothes, plastic sheets, cotton gauze).

The study found that participating in SILCs increased household wealth by an average of 7.32 of the 13 household wealth items. Participants who had their most recent childbirth after joining SILCs were more likely to be financially prepared for birth. For the participants who had their most recent delivery before joining SILCs, females were more likely to be financially prepared for birth than males. However, sex was no longer significantly associated with financial preparedness for birth for participants who had their most recent delivery after joining SILCs. This result showed that participating in SILCs does increase household wealth and financial preparedness for birth. Furthermore, participating in SILCs allowed not only females to financially prepare for birth but also allowed males to financially prepare for birth.

Even though this study did not specifically examine the policy level impact of SILCs and other SGs, it identifies important policy level implications. Currently in many LMICs, different

models of SGs are implemented by different organizations, leading to diverse names and models, implementation strategies, emphasis on how to use the financial gains, and the types of data collected. Hence, policies that aim to implement SGs to specifically enhance utilization of RHS can help participants prioritize the financial gains for RHSs. Additionally, standardized data collected at the national level can help researchers and policy makers further understand the amount of time needed for SGs to significantly effect household wealth and use of RHSs, the different types and amounts of fees required to access the full continuum of RHSs, and the types of SG funds most beneficial to utilizing RHSs. Furthermore, pairing local healthcare providers with SGs can be an effective intervention to utilize SG as both a social platform and a financial intervention. Allowing healthcare providers to be part of SGs will further increase the SGs participant's awareness and understanding of the RHSs available and the importance of utilization. Such set up will also increase a sense of trust and community not only amongst the participants but also with the healthcare providers. Lastly, there should be an emphasis at the policy level to include both men and women in these SGs to emphasize that pregnancy and childbirth are both parents' decision and responsibility and that both partners should be involved in the entire process.

Future Directions for Research

This study provides vital information about SILCs as a financial intervention to overcome economic barriers for women to access and utilize RHSs in rural Zambia. The three manuscripts in combination indicate that SILCs alone are a promising yet insufficient intervention to overcome the financial barriers to accessing RHSs. Further exploration is needed to understand what components of SILCs as a financial intervention facilitates saving to access the full continuum of RHSs. One feasible project would be to conduct semi-structured focus group (FG)

interviews with the SILC participants who had their most recent delivery after joining SILCs. These FG interviews can explore: 1) What characteristics of SILCs were helpful for you to become financially prepared for birth? 2) What aspects of pregnancy and childbirth require money (transportation, birth items, food, loss of income while traveling, etc)? 3) What RHSs are necessary for safe pregnancy and childbirth? 4) How early and how much would you aim to save to access all the necessary RHSs? 5) If you do not have enough money to access all the important RHSs, what RHSs would you prioritize? Which would be unlikely for you to access? 6) How can SILCs be helpful for newly pregnant women and their spouses/partners to prepare for safe pregnancy and childbirth? And 7) What influenced your decision to use money earned through SILCs to financially prepare for birth? Separate FG interviews should be conducted for men and women to further examine the similarities and differences between the groups.

Educating women about the importance of saving money has been incorporated as a component of antenatal care education (WHO, 2016). However, there are no significant guidelines on how to educate and encourage women to financially prepare for birth (Lee et al., 2020). Therefore, from the information gathered from the FG interviews, a pilot intervention focusing on the financial preparedness during pregnancy and childbirth could be created. Six to eight education sessions would be an ideal number of sessions for SILC participants, allowing them to understand the importance of utilizing available RHSs, identify the areas where financial resources would be needed, and guide them to utilize SILCs to save early and frequently.

A feasibility study of this Financial Preparedness for Pregnancy and Childbirth (FPPC) intervention can be delivered to newly pregnant women and their spouses/partners identified from pre-existing SILC groups. Testing the FPPC intervention would allow feedback to further improve and develop the education material. Then, a pilot study could be conducted comparing

two groups of first time SILC participants consisting of newly pregnant (or their wives/partners are) or married males and females within their 20s and 30s. The control would receive education related to establishing and functioning of SILCs and the intervention group would receive FPPC education addition to the education related to SILCs.

Future studies should also continue to examine the potential of SILCs and other SGs as social platforms to deliver various maternal health education program for both male and female participants. Many studies that used SGs as a social platform to deliver education indicated improved knowledge, awareness, and behavior regarding a variety of maternal and child health topics for both male and female participants (Saggurti et al., 2018; Saha, Annear, & Pathak, 2013; Shaikh, Noorani, & Abbas, 2017). Furthermore, when midwives and local healthcare professionals were matched with each SGs, increased level of trust and acceptability of the various RHSs provided by the midwives and healthcare professions were seen (Shaikh et al., 2017). Therefore, studies should continue to explore the potential of SGs as both a social platform and a financial intervention to improve maternal health for the poorest women living in rural areas.

Conclusion

In summary, the three manuscripts indicate that SILCs alone are a promising but insufficient intervention to overcome the financial barriers women face when accessing and utilizing the full continuum of RHSs fundamental to ensuring safe pregnancy, childbirth, and post-delivery. While SGs such as SILCs have been identified as a promising intervention to financially empower the poorest people living in rural areas, limited studies have examined SGs as a financial intervention to improve access and utilization of RHSs. This research project discovered that SGs are frequently paired with other maternal interventions, making it difficult to

attribute the change to the impact of SGs as a financial intervention. Furthermore, the positive changes in uptake of RHSs, knowledge, awareness, and behavior were accentuated when SGs were combined with other maternal health interventions. This research project also found that having access to SILCs at the community level did not necessarily lead to increased household wealth, financial preparedness for birth, and utilization of ANCs and PNCs. However, it did significantly increase MWH utilization, HF delivery, and SP assisted delivery. Furthermore, this project showed that SILCs participation increased household wealth and financial preparedness for birth for families (both male and female participants).

Taken together, the results of this project support SILCs and other similar SGs as a promising yet limited intervention to financially equip individual women, and their spouses/partners, and surrounding community to overcome the financial barriers to access fundamental RHSs.

While nursing research is often thought of as research directly addressing issues that affect nursing practice such as patient care and administration, a growing number of nurses are pushing boundaries to battle healthcare problems in novel settings, populations, and subject areas (Polick et al., 2021). This research project is a prime exemplar of nursing research that is versatile, builds on other disciplines' work, and has important implications beyond nursing. The presented study is built on previous work done in other fields including public health, health economics, and international development. As nurse scientists, we are taught to think critically and holistically to better understand and promote health for all people, pushing us to think beyond patient care and the quality of service at the bedside to the context beyond our patients. This research study specifically examined SILCs as an innovative intervention to overcome financial barriers to accessing RHSs in rural Zambia. Furthermore, it aimed to understand the

women's surrounding beyond herself (interpersonal, community, organization levels). Therefore, I believe the implications of this study go beyond nursing.

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