AIR®

AMERICAN INSTITUTES FOR RESEARCH®

MECB

Grant Inception Report

Submitted to

Millennium Challenge Corporation

Submitted by

American Institutes for Research

JANUARY 2018

MECB

Grant Inception Report

January 2018

AMERICAN INSTITUTES FOR RESEARCH®

1000 Thomas Jefferson Street NW
Washington, DC 20007-3835
202.403.5000

www.air.org

Contents

Tables

Page

Figures

Page

I. Introduction

This design report details an updated evaluation design of MECB's Smart Safe Water Supply Scheme-Scaling Up project. The project aims to increase women's time savings, reduce the prevalence of water-borne diseases, increase employment and earnings for the target population, and increase the ability and willingness of target households to pay user fees. This will be accomplished by introducing a new water supply system in Jack compound which will provide clean and accessible water to 19,000 residents through household connections and water kiosks. MECB intends to become the main provider of water in Jack compound, where water access is dramatically unreliable with intermittent service supported by a dilapidated infrastructure delivering poor-quality water.

MECB was awarded an Innovation Grant during both Grant Cycle 1 and Grant Cycle 2 of the Innovation Grant Program (IGP) by the Millennium Challenge Corporation (MCC), through its local Millennium Challenge Account Zambia (MCA-Z). This project started in late 2015 and MECB went on to drill two boreholes near Jack compound. However, the project was suspended after water quality testing revealed that the water was of poor quality. The project restarted in February 2017 after the suspension was lifted, and it was awarded additional funds for the second grant cycle of the IGP. Recent discussions suggest that all activities will be completed by September 2018.

MECB is a private provider, but works following a Memorandum of Understanding with the Lusaka Water and Sewage Company (LWSC) public supply, and under National Water Supply and Sanitation Council (NWASCO) regulations. As the first private sector provider of water in Lusaka, this project represents an important learning opportunity to make MECB a case study for private–public partnership for the provision of water and other sanitation services and generate recommendations from their experience. The rapid increase in access to and choice of water suppliers expected in Jack compound also offers the possibility of understanding how households decide on a water source and why, how much they are willing to pay for reliable access to water, the relationship between access to water and hygiene behaviors such as handwashing, and behavior regarding transportation, storage, and handling of water.

In 2016, MCC and AIR signed a contract to evaluate this project. MECB initially was supposed to be a small seed grant covering only about 2,000 people in Jack compound. Since then the situation has changed significantly, and MECB plans to serve the entire compound with a much larger infrastructure investment and quickly generate an increase in access and options for residents.

This proposed qualitative study is designed to address research questions that are rooted in the theory of change. This evaluation will include context analysis, program activities, outputs, and mechanisms connecting outputs with outcomes.

The structure of this inception report is as follows: we will first describe the setting, review the existing literature, and present the theory of change. We will then state the research questions and describe the methods used to respond to these questions. Finally we will discuss the ethical considerations and present a work plan.

II. Setting

Jack compound is a community in Lusaka with approximately 30,000 people within 6,000 households, and currently it has no connection to the main plumbing system from LWSC. The entire compound depends on two old boreholes drilled by CARE long ago and subsequently donated to LWSC—these are old, inefficient boreholes with low flow. Both boreholes feed into one large, severely leaking tank connected to 30 community pumps (of which only 25 are functional) and approximately 304 household connections.

In the past two years load-shedding has been restricting the number of hours available to pump water into the tank significantly. Inefficient boreholes, a leaking tank, and a pump that is only intermittently operational severely restrict water access; water is often not available for the entire day and is available for only two or three hours a day on "good days." Residents have no other alternative than to queue up and try to get the water during those hours, or access water from private vendors operating in Jack, nearby compounds, or farms outside the compound. Depending on the supplier, the price of water may be significantly higher at these sources than that of municipal water sources.

Water quality is also a major challenge in Jack. Water analysis in Jack compound found that the water had high levels of nitrate and did not meet the required minimum standards for consumption. MECB initially attempted to drill boreholes in Jack compound, but found that they could not be used due to poor water quality.

Water is not free in Jack compound. Community pumps charge 0.25 ngwee per liter (5 ngwee per 20 liters), paid to an LWSC attendant, likely through nontransparent practices and with no accountability. The farms typically charge one ngwee per liter. The pump at the market is free but its use is restricted to market purposes.

MECB's Innovation

MECB's Smart Safe Water Supply Scheme-Scaling Up project proposes to install one additional tank system that will address the three problems of the current pump by (a) digging two "high yield" boreholes in a new location several kilometers away with acceptable water quality, which will enable a significant amount of water to be pumped; (b) getting solar pumps, which will not depend on electricity and thus can pump water into the tank at all times; (c) constructing a piping system to carry the water from the boreholes to Jack compound, and (d) distributing it both through direct connections and through water kiosks (located at the current, old water points from LWSC) using a dispensing machine that works with "tokens" (debit-card like) to guarantee accountability. The project will allow water to be available 24/7 with a tank constantly refilling. The price of water still needs to be determined and will be set by NWASCO. It is likely that water provided by MECB will have a slightly higher price than the one currently provided by LWSC.

III. Literature Review

Worldwide, over 650 million people lack access to improved drinking water sources and 1.8 billion people use a fecally-contaminated source of drinking water (World Health Organization, 2015). One symptom of the use and consumption of unsafe water is diarrhea which, in 2013, accounted for nearly 580,000 child deaths worldwide and over 4,500 deaths of children under age 5 in Zambia (Liu et al., 2015). Of these deaths, nearly 90% are directly attributable to poor water, sanitation, and hygiene (WASH) (Bethony et al., 2006). With the high costs of unsafe water in mind, many countries are increasingly focused on improving access to clean water, although a lack of resources often precludes the direct provision of clean water by governments.

The MECB proposal builds on a series of earlier efforts aimed at increasing access to clean water by privatizing water supply networks (Bayliss, 2003). Since the 1990's, the partial or complete privatization of water supply and distribution networks has occurred in at least 14 sub-Saharan African countries (UNDP, 2007). This rapid expansion in privatization activities occurred despite the fact that earlier efforts to implement financially sustainable approaches yielded mixed results (Bayliss, 2003). While privatization is intended to spur efficiencies by profit seeking operators, it also may be the case that private water providers are simply no better than public providers and that both do a poor job (Buds & McGranahan, 2003).

As part of earlier privatization efforts, investors have implemented two main profit generating approaches: increased tariffs and decreased system losses. The notion that higher tariffs would increase profits presumes that consumers are not particularly price responsive and use similar amounts of the utility so that overall revenues increase. However, this strategy is problematic when providing utilities to low-income consumers, as the higher prices may lead consumers to seek cheaper access to water, often through illegal syphons from the same water system. Utility revenues will fall if the value of the additional syphoned water is greater than the income from the higher tariffs (Bayliss, 2011). Instead of higher tariffs, a more sustainable approach to water privatization may instead focus on reducing system losses which, in some contexts, comprise well over half of the utility's usage; a World Bank led water privatization project in Tanzania found that less than 8% of the water consumed in Dar es Salaam was properly billed (WaterAid, 2005). WaterAid Malawi has demonstrated the viability of dramatically decreasing system losses; between January 2005 and January 2006, the organization nearly doubled billing compliance (WaterAid, 2005).

Rather than taking a purely private approach, MECB proposes forming a public-private partnership (PPP) to provide water in Lusaka. The PPP would seek to reduce system losses by creating a water payment accountability system. Over the past 20 years, using PPPs to leverage the private sector in partnership with government has been increasingly recognized as a viable way to promote the development of water supply systems in developing countries (Fuesta & Haffnerb, 2007). However, a recent systematic review of PPPs in developing countries noted a distinct evidence gap on the impact of PPPs; the limited existing evidence consisted of nine studies across the healthcare, infrastructure, water supply, and agriculture sectors, of which seven found positive effects (Ministry of Foreign Affairs of the Netherlands, 2013). The limited evidence on water supply PPPs is fairly encouraging: the implementation of a water supply PPP in Cartagena, Colombia in 1998 helped turn around a system that had flat water access rates of

68 percent and sanitation coverage that was rapidly declining, reaching 56 percent in 1994. By 2004, water access rates had increased to 95 percent, while sanitation rates had increased to 74 (Vives et al., 2006).

As part of the PPP, MECB also seeks to improve the quantity and quality of the water provided to residents of Jack Compound. MECB proposes to accomplish this by augmenting existing water sources with additional boreholes in better locations, constructing an elevated water tank, and installing automatic dispensers at water kiosks. Similar efforts in sub-Saharan Africa have led to increased access to clean water. Comparable water and sanitation interventions in Senegal were able to increase access to clean water for 3,450 residents with the addition of 21 boreholes (USAID, 2012).

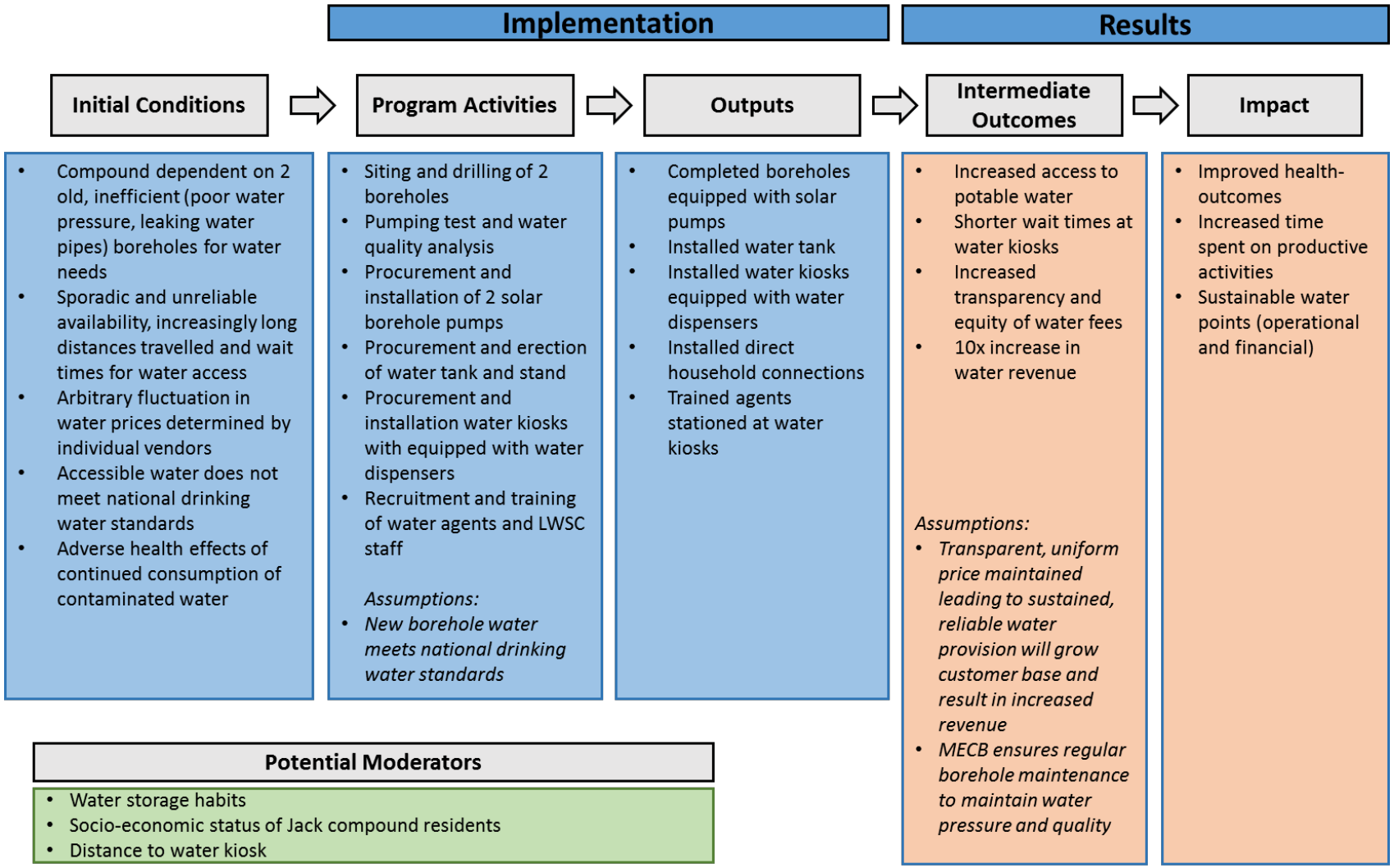
MECB's intervention to increase access to clean water has the potential to improve the health of the Jack Compound community. This clean water could reduce the prevalence of diarrhea: a systemic review of water and sanitation interventions in developing countries found that water supply interventions reduced diarrhea but this effect was mainly seen with the provision of household connections and use of water without household storage (Fewtrell & Colford, 2004). As MECB's innovation will include direct connections and water kiosks, it is expected that the intervention will reduce the incidence of diarrhea, increasing health in the community. However, a separate systematic review of the evidence on WASH interventions targeting childhood diarrhea in developing countries highlighted the important role behavioral factors play in determining the uptake and adoption of WASH interventions (Waddington et al., 2009). Overall, the outcomes and sustainability of a product is dependent on its proper presentation to ensure sufficient utilization by the target population (Luoto et al, 2014). On at least one measure, there is encouraging evidence suggesting that the intervention will increase health in the community: households in rural communities in Ghana provided with similar water kiosks had lower average levels of E. coli in their stored household drinking water (Opryszko et al., 2013).

In a community like Jack compound, increasing access to water and improving sanitation have the potential for far reaching social implications. In areas with reduced water access, water distribution is often unpredictable and unreliable, and water collection can be particularly cumbersome and time-consuming (Asaba et al. 2013; Crow and Sultana 2002; Crow and McPike 2009; Blackden and Wodon 2006). Women and children are often the primary collectors of water in developing countries (Crow and Sultana 2002; Pryer 2003; Asaba et al. 2013), and estimates show that in some contexts, a significant portion of women's time during the week is spent collecting water; in communities in Senegal and Mozambique, women spend 17.5 and 15.3 hours per week, respectively, collecting water (Crow and Sultana 2002). In light of this large time burden, increased access to improved water sources can offer significant time savings for households, with significant impacts on women's domestic work and productive opportunities (Arku 2010; Bennett 1995; Hutton and Haller 2004; Crow and McPike 2009). Therefore, improved access to water not only has the potential to bring significant time savings to households but also to have far-reaching impacts on the women and children who are often responsible for collecting the water. Improved access to water is associated with increased school enrollment for boys and girls (Walle and Koolwal 2011), gains in productive time due to improved health outcomes (Bartram et al. 2005; Hutton and Haller 2004), and additional time for women to pursue productive opportunities (Hutton and Haller 2004).

Theory of Change

AIR believes that policy-relevant research should be built on a theory of change that maps out the casual chain of activities, outputs, intermediate outputs, and impacts underlying the theory. Thus, we developed a theory of change to motivate our study design of the MECB project, which seeks to provide increased assess to clean water in Jack compound. Our theory of change encompasses the reason for the intervention, the program activities to address challenges, the tangible outputs, intermediate outcomes, and impacts. Figure 1 illustrates the theory of change that motivates our proposed design for the evaluation.

Figure 1 Theory of Change



The theory of change that AIR developed begins with initial conditions of Lusaka's population and current water systems. The next phase presents the program activities. The MECB intervention includes siting and drilling two boreholes, conducting pumping test and water quality analyses, procuring and installing two solar pumps, procuring and installing water dispensers and tokens, recruiting and training water agents and LWSC staff, and procuring laptops to monitor water point sales.

The stated program activities are expected to result in several outputs. These outputs include two completed boreholes with solar pumps, an installed water tank, installed water kiosks equipped with pre-paid communal dispensers, direct household connections, and trained agents located at water kiosks.

We anticipate that one assumption that may prevent a direct link between outputs and intermediate outcomes; that the provision of water and price uniformity are assumed to result in increased revenue for MECB. When this assumption holds true, the outputs will lead to intermediate outcomes: increased access to potable water, shorter wait times at water kiosks, increased transparency and equity of water fees, and a 10x increase in water revenue.
We expect that MECB's intervention will yield three main impacts on Jack compound residents. Under the condition that there is increased access to potable water, the project will lead to improved health-outcomes. Under the condition that there will be shorter wait times at water kiosks, there will be increased time spent on productive activities. Finally, under the conditions that there are increased transparency and equity of water fees and a 10x increase in water revenue, there will be sustainable water points, from both an operational and financial standpoint.

The impact of the project may be stronger or weaker depending on conditions associated with Jack compound. The factors that can exercise this influence are known as *moderators*. In the case of MECB's intervention, the moderators include the water storage habits of Jack compound residents, the variability in socio-economic status among residents, and the distance to water kiosks within Jack compound.

Implementation Timeline

MECB is currently procuring pipes and other equipment necessary for drilling the boreholes in the new location and is expected to start drilling in the next few months. MECB has contracted an external firm to construct the piping system to carry the water into Jack including trenching, pipeline construction, rehabilitation of the existing network, installation of tanks, and installation of 30 kiosks. The construction process is expected to take approximately eight months and is expected to be completed in September 2018, at which point the first users can draw water from the new MECB boreholes.

Research Questions

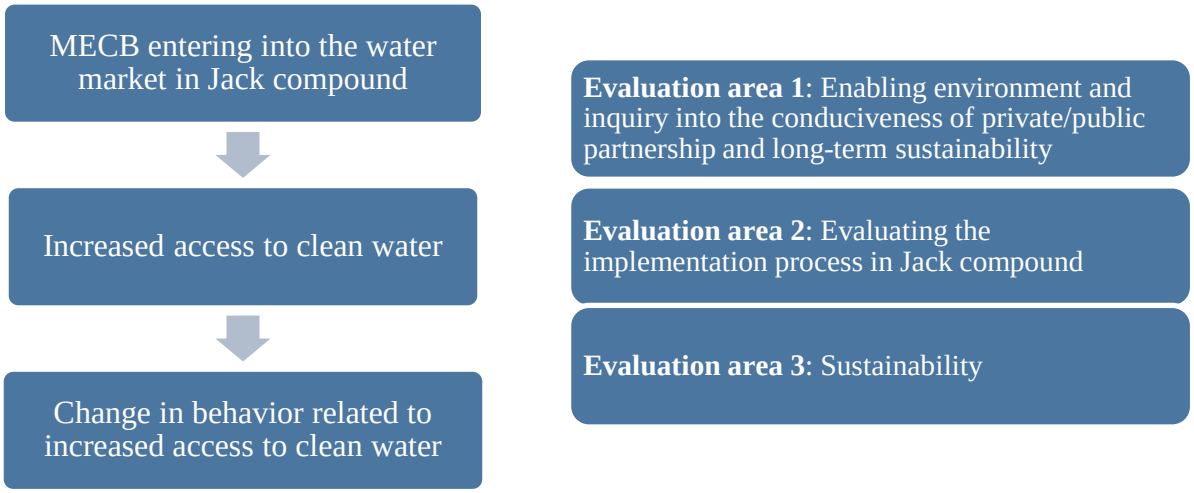
We consider three areas of evaluation, illustrated in Figure 2, which were discussed with MCA-Zambia and were checked for relevance with MCC and MECB. The first research area focuses on the enabling environment MECB faces during its effort to set up the first private–public partnership for water and sanitation in Zambia. We will treat MECB as a case study and examine

the company's experience setting up this initiative in Jack compound. Specifically, we will focus on MECB's process of establishing partnerships with relevant governmental actors (e.g., LWSC, NWASCO, ZEMA) and non-governmental actors (e.g., local residents, private investors, community development organizations, NGOs, etc.), the contextual factors that may enable or hinder successful project implementation, and the local dynamics that shape the project's potential for long-term sustainability. Research questions related to the enabling environment will be answered through an actor mapping exercise as well as key informant interviews with relevant stakeholders.

The second research area assesses the implementation process and the initial conditions related to water in Jack compound. Specifically, AIR will examine perceptions of water quality, water access, and water usage patterns. Research questions in this area will be answered through a rigorous process evaluation.

As part of the third research area—"sustainability"—AIR will examine the broader sustainability of the MECB-LWSC partnership.

Figure 2 Summary of Evaluation Areas



Area 1: Enabling Environment

- Who are the relevant actors and/or organizations that shape access to water in Jack compound? How do these actors and/or organizations impact how residents' access water?
- How did MECB establish its partnership with LWSC? How, if at all, did MECB work with other key actors relevant to water access in Jack to establish the project? What challenges, if any, did MECB face in securing this/these partnership(s) and how were they resolved?
- What lessons can be gleaned from this process of establishing partnerships that can be applied to inform future private–public partnerships?

Area 2: Implementation Process

Access to water and usage behaviors

- How do perceptions of access to water amongst select residents change as a result of MECB's intervention (this includes time spent fetching water and average quantity fetched)? Do residents perceive a change in access for the most vulnerable (e.g., those who are physically disabled or those in low socio-economic status households)? If yes, what are the perceived changes?
- How do perceptions of water accessibility, affordability, reliability, and quality change for select residents of Jack compound as a result of MECB's intervention?
- From where do select Jack residents get their water at baseline? From where do select Jack residents get their water at endline?
- For households with private taps, how is water distributed/sold among family, friends, neighbors, and other residents?
- What are the water usage patterns and/or behaviors of select Jack residents at baseline? What are the water usage patterns and/or behaviors of select Jack residents at endline?

Token system

- How is the token system used by residents? How do usage patterns differ, if at all, from MECB's envisioned plan for the use of the token system?
- Who are the main users of the token system? What are the reasons that motivate residents to use the token system?
- Are there perceptions of unmet demand amongst select residents? In other words, do respondents believe that there are households who are interested but unable to use the token system? If yes, what are the main barriers to participation?
- How is the token dispenser maintained? Is the current operation of the dispenser sufficiently reliable for daily use? Why or why not?

Implementation challenges

- How, if at all, did the implementation process differ from the original plan proposed by MECB (in the IGP grant contract)?
- What were the main challenges in implementing the intervention as planned?
- Are there any unintended consequences of the pumps/taps within Jack compound?

Water quality

- What are the perceptions of water quality at baseline? What are the perceptions of water quality at endline?
- What are the costs associated with transporting the water from the MECB kiosk to homes for select residents?

- How do select households transport, handle, and store water at baseline. How do select households transport, handle, and store water at endline? Does the transportation, handling, and storage of water change as a result of intervention?

Area 3: Sustainability

- How does MECB plan to shift maintenance responsibilities to residents of Jack compound? Is this plan feasible? Why or why not?
- Does MECB think that the revenue sharing agreement with LWSC is economically viable? Why or why not? How do MECB and LWSC view the sustainability of the private commercial provision of water?

IV. Evaluation Design

The AIR team proposes a qualitative research design to assess the implementation of the MECB project. AIR's qualitative design relies on actor mapping, key informant interviews, and focus groups with community members and project stakeholders with the aim of understanding how the MECB project was implemented and the overall perceptions of program impacts. The qualitative design gives researchers the flexibility to explore unforeseen areas of interest such as how and why a given link in a program's theory of change may not be working optimally.

Qualitative Research Design

AIR proposes collecting qualitative data to better understand the three evaluation areas of interest: the enabling environment, the process of implementation, and sustainability. Specifically, qualitative data will be collected through three methods—actor mapping, key informant interviews (KIIs), and focus group discussions (FGDs)—and will focus primarily on understanding local perceptions and practices related to water collection as well as the broader implementation processes and challenges shaping MECB's programming. Actor mapping will be conducted prior to the baseline data collection stage and will serve to identify the most relevant stakeholders, their role in water provision in Jack compound, their connections and relationships, as well as their broader influence in shaping water provision processes locally. This will inform subsequent research stages and the selection of key informants, in particular.

Qualitative data collection will focus on several key research themes, including the process of establishing the MECB/LWSC partnership, MECB implementation processes, interactions between the MECB water program and existing water institutions (i.e. community water trusts, municipal water systems, etc.), residents' current water collection practices, perceptions of water quality, and beliefs about water pricing. Qualitative methods are particularly well-suited for understanding the broader context shaping particular programs, as well as the beliefs, perceptions, and concerns of individuals and communities.

Actor Mapping

During the baseline data collection stage, we will conduct actor mapping with eight key stakeholders to better understand the relevant actors in the local water sector, their relationships to one another (if any), their interests, and their broader influence in shaping water disbursement

processes within Jack compound. Actor maps are "visual depiction[s] of key organizations and/or individuals that make up and/or influence a system, as well as their relationships to a given issue and to one another" (Gopal and Clarke, n.d). This interactive exercise begins with respondents populating a blank document with relevant actors and organizations related to a pre-defined topic. Once this is completed, respondents are asked a series of follow-up questions related to the relative influence of these actors, and the connections between them, in order to gain deeper insights into exactly how these actors influence the broader policy or program under investigation (Gopal and Clarke, 2015). For this reason, actor mapping is uniquely well-suited to facilitate understanding implementation processes as it serves to: 1) identify meaningful patterns that influence policy processes and outcomes; 2) identify additional relevant actors whose influence or role may not have been known or well-understood prior to fieldwork; and 3) highlight areas of strength between various actors and/or organization that should be built upon in future programming stages. Actor mapping exercises can be conducted in groups or with one respondent. For the purposes of this study, we will conduct actor maps with individuals so that respondents are freely able to speak openly about various actors, their influence, relationships between actors, and their role in shaping water processes.

To gain the broadest perspective on the critical actors and organizations shaping water provision in the Jack compound, it is necessary to thoughtfully select participants with a range of experiences and occupying different roles within the water provision system. Given that each participant will have a unique experience and perspective as to the most important actors within a system, sampling from a diverse group of people—and triangulating the findings between respondents' maps—is essential for the validity of the broader exercise. For this reason, we plan to conduct actor mapping with two participant research groups: "water service providers" and "water service users". "Water service providers" include MECB, LWSC, local water trusts, and water agents, and we intend to conduct actor mapping exercises with one person from these four groups. "Water service users" encompasses local community members whose lives are impacted by changes to local water service provision practices. We hypothesize that those with a household tap may have different experiences with the various water provision actors than those who obtain water primarily through a shared tap, so we intend to sample two individuals who obtain water primarily through a household water connections and two individuals who obtain water primarily from shared water sources. Respondents will be selected from different locations within the Jack compound. This "user" perspective will provide a lens through which we will facilitate our understanding of the influence of specific water providers on current water collection practices.

Key Informant Interviews (KIIs)

AIR proposes to conduct semi-structured key informant interviews (KIIs) with stakeholders central to the implementation of MECB's water program, individuals occupying key positions in agencies responsible for water provision, and local community leaders. A key informant is a person who possesses expert knowledge about the program or a topic related to the program. Interviews with key informants in this study, therefore, are particularly well-suited for capturing in-depth, first-hand knowledge about current water provision practices, structures, challenges, and successes. The individual nature of these interviews (as opposed to focus group discussions) also allows respondents to speak candidly about various topics that they may be less willing to discuss in a group setting (e.g. implementation challenges, community concerns, etc.) For this

research, we propose using a semi-structured interview protocol that focuses closely on topics relevant to each category of key informant. We will rely on the results from the actor mapping and input from our local partners to identify individuals occupying key positions relevant to the overall research questions and study aims. As detailed in Table 1, we aim to conduct at least two key informant interview with each of the seven participant groups described below but will refine this number based on information gleaned from the actor mapping exercise about the role and influence of various actors.

Table 1 Key Informant Interviews by Evaluation Area

Evaluation Area	Respondent						
	MCA-Z	MECB	LWSC	NWASCO	Water Agents	Community Leaders	Private Tap Owners
Enabling environment	X	X	X	X		X	X
Implementation process	X	X	X	X	X	X	
Sustainability		X	X		X		

KIIs with MCA-Z staff (two interviews in total) will be used to understand implementation challenges and successes (and their cause), the process of engaging local stakeholders, institutional and political structures and support, and program sustainability. Given the central role of MCA-Z in the planning and implementation stages of this initiative, MCA-Z staff are well-positioned to provide critical information regarding all four of the evaluation areas.

KIIs with MECB program staff (two interviews in total) will provide information regarding the broader planning process and setup of the program. Specifically, we seek to understand the main challenges MECB staff encountered, how they strategized to overcome emerging challenges, their process of engaging local stakeholders (including efforts to inform communities about water privatization), the influence of various market forces (including willingness to pay and determinants of choice of water source), the sustainability of the revenue-sharing agreement with LWSC, and positive and/or negative consequences of improved access to water. During these interviews, we will also inquire about recommendations for future programming related to public-private partnerships for water and sanitation provision, which will serve as a case study for other organizations interested in establishing similar programs.

KIIs with members of LWSC (two interviews in total) will enable us to explore the current institutional context shaping water provision in the area and LWSC's evolving relationship with MECB. More specifically, we are concerned with understand LWSC's thoughts regarding its collaboration with MECB, the initial discussions and negotiations between LWSC and MECB regarding the project, staff perspectives on the PPP model, LWSC's current role and mode of engaging with MECB during implementation, challenges and successes throughout implementation, and LWSC's thoughts on the most feasible plans for sustaining this initiative.

KIIs with NWASCO (two interviews in total) will provide information about the process of setting MECB water prices. These interviews will provide critical insight into how NWASCO will interacts with MECB and other key stakeholders involved in local water provision.

KIIs with water agents (two interviews in total) will provide information regarding the maintenance and management of water sources, the community's responsiveness to established prices, the token system process and any challenges with this process, and other factors shaping the effectiveness of water provision in the community.

KIIs with private water tap owners/suppliers (four interviews in total) will provide an overview of the enabling environment and how residents access water currently. Specifically, we will ask private tap owners to provide their perspective on past and current water access, costs, quality, their thoughts on the MECB initiative, and whether they think the MECB initiative will lead to changes in water access and water usage patterns in the community. We will also ask tap owners about factors at the community level that shape the program implementation and their thoughts on broader program sustainability.

KIIs with community leaders (two interviews in total) will provide an overview of how the community has been affected, if at all, by the MECB water initiative. Specifically, we will ask community leaders to provide their perspective on past and current water quality, their thoughts on the MECB initiative, and whether they think the MECB initiative has had tangible effects on local health and time savings within their community. We will also ask community leaders about factors at the community level that shape the program implementation and their thoughts on broader program sustainability.

Focus Group Discussions (FGDs)

Focus group discussions provide a context in which Jack compound residents can feel comfortable and empowered to discuss the evaluation topics with their peers and the carefully trained facilitator. We will create a social dynamic that encourages participants to reflect on their opinions and experiences, and express them verbally. The FGDs are designed to capture data on residents' experiences with access to and usage of water before and after provision by MECB. Residents will provide information related to the implementation process as well as the program's broader sustainability. The FGDs will enable us to look at similarities and differences among residents using different water sources (including kiosks or direct connections, connections provided through MECB, LWSC, or another water source such as a farm). For baseline, we will conduct a total of 12 FGDs with residents whose primary method of accessing water is either through a communal LWSC tap, a private tap, or another source. We will conduct separate FGDs with men and women and conduct more FGDs with women due to their socialized role as the main collectors of water. During endline, we will conduct 6 FGDs with Jack compound residents who access water primarily through the MECB kiosk and through a direct MECB connection. We will also conduct 12 FGDs with residents whose primary method of accessing water is either through a communal LWSC tap, a private tap, or other water sources. Overall, 30 FGDs will be conducted over the course of the evaluation. See Table 2 below for more details.

Table 2 Focus Group Discussions by Water Source

MECB		LWSC	Private Source	Other Water Source
Kiosk	**Direct connection**			
2 female FGD	2 female FGD	3 female FGD*	3 female FGD*	3 female FGD*
1 male FGD	1 male FGD	1 male FGD*	1 male FGD*	1 male FGD*

*Conducted at baseline and endline

Under the implementation process set of questions, we will ask Jack compound residents how their access to water has changed (if at all) as a result of the MECB intervention and how the pumps and taps have influenced the accessibility, affordability, and reliability of water. We will also ask residents who get their water through MECB questions about the token system and whether the installation of the pumps/taps has brought any positive or negative unintended consequences. We will discuss water quality at each source in addition to asking questions about transportation, handling, and storage of water.

Under the "sustainability" set of questions, we will ask residents about their willingness to pay for water from different sources. These questions will provide context to better understand the potential sustainability of the project.

Table 3 summarizes the methods we will use for answering the key questions.

Table 3 Summary of Methods Used to Answer Key Questions for Research Areas

Evaluation area	Qualitative Method			Informants
	FGD	KIIs	Mapping	
Enabling environment	X	X	X	MECB, MCA-Z, LWSC, NWASCO, private tap owners, LWSC communal tap managers, residents
Implementation process				
• Access to water	X	X	X	MECB, MCA-Z, LWSC, water agents, Jack compound residents, community leaders
• Token system	X	X		MECB, MCA-Z, water agents, Jack compound residents
• Implementation challenges	X	X		MECB, MCA-Z, LWSC, NWASCO, water agents, community leaders, Jack compound residents
• Water quality	X	X		MECB, MCA-Z, community leaders, Jack compound residents
Sustainability	X	X		MECB, MCA-Z, LWSC, water agents, community leaders, Jack compound residents

Acronyms: FGD = focus group discussion, KIIs = key informant interviews

Recruitment of Participants

Jack compound residents will be recruited from MECB logs, LWSC logs, as well as through snowball sampling following KIIs with community leaders. Using the above-mentioned logs, we will randomly select residents to participate. Although we expect that identifying a sufficient number of residents who use other water sources may be difficult, we will rely on purposive sampling to determine a comparable sample of respondents. We hypothesize that residents will change their water source between baseline and endline after MECB's pumps and taps are installed. For this reason, new respondents will be sampled at baseline and endline.

Data Collection Procedures

Two-person teams will undertake data collection. Wherever possible, one researcher will be responsible for interviewing or facilitating, while the second researcher will have primary responsibility for recording responses. The researchers will record all KIIs and FGDs digitally on portable digital recorders, using an external microphone whenever possible. The researchers will download recordings to laptops each day, rename the files according to an anonymized code system held in an encrypted Excel sheet, and copy the files to external media for backup. At the end of each day, the researchers will transcribe the handwritten recording sheets to Microsoft Word documents, translating the material as necessary. Researchers will use audio recordings to supplement and validate the written transcriptions and translations. They will assign all transcriptions new names according to the code system to ensure data and informant confidentiality.

Analysis

All data from KIIs and FGDs will be coded and analyzed using the NVivo qualitative software program. Our team will create a preliminary coding outline and structure on the basis of the research questions, interview protocols, and memos of ideas that emerged during data collection. This coding outline serves as the tool for organizing and subsequently analyzing the information gathered in the interviews and focus groups. The outline is a living document that may be modified as new themes and findings emerge during data analysis. A list of definitions for the codes accompanies the outline, so that coders categorize data using the same standards. After inputting the raw data into NVivo, coders select a sample of interviews to double-code, to ensure interrater reliability. The team subsequently codes the data into the structure. Using this coded data, the qualitative team uses grounded theory to identify themes, categories, and theories that emerge from the data and that confirm or refute the researchers' initial impressions. That is, rather than basing the analysis on a hypothesis, the researchers create concepts and categories based on the data, refining the concepts as they go along to eventually inform the overall findings. During this process of data reduction, researchers characterize the prevalence of responses, examine differences among groups, and identify key findings and themes related to the research questions.

Timing

- Baseline: February 2018. This is approximately 4 months before the kiosks open.
- Endline: February 2019. This timeline will enable us to compare baseline to endline in the same season in case water demand varies systematically across seasons.

V. Ethical Considerations

Ethical Approval

AIR will obtain ethical approval from its own internal Institutional Review Board (IRB) as well as locally in Zambia. AIR will provide MCC with documentation of both ethical approvals prior to commencing data collection.

Consent

All participants will need to provide written informed consent before participating in any data collection exercise. Participants who are younger than 18 years of age will complete an informed assent and will then be required to seek parental consent, as well. The information sheet and informed consent documentation is attached at the end of this protocol. We will obtain informed verbal consent from each participant after reading the consent form aloud and ensuring that the participant has understood. The informed consent procedures were designed to comply with both the MCC's and AIR's consent requirements.

Potential Risks

We believe that this study carries no more than minimal risks. In the KIIs, we anticipate potential fear of revealing confidential information about the program.

Benefits

There are no direct, immediate benefits to the individuals who are interviewed. Program implementers' benefits will be knowing what components of the program were most successful and implemented well, and which ones were not. This is information that can be used to improve efficiency of delivery.

Assurances of Confidentiality

The study will protect confidentiality by a number of methods. First, all staff members will be trained and certified in ethical conduct of research. Second, we will not identify any individual by name in any report or publication about this study. We will not share specific information about an individual with anyone outside the research team. We have developed data-handling procedures to safeguard completed forms. Each participant will be assigned a unique identification code that we will use to link participant records across modules. After we transcribe the data, we will assign all transcriptions new names according to the code system to ensure data and informant confidentiality, and encrypt and password-protect the data files. The file connecting identification numbers and associated names will be accessible only to AIR key researchers and will be destroyed at the end of the study. All AIR computers are encrypted and password-protected.

VI. Communication and Dissemination Plan

Policy Impact

AIR is aware that high-quality research with concrete policy recommendations is a necessary but not sufficient condition for policy impact. To communicate our findings, we aim to take advantage of all channels available to us. Our policy influence strategy has three components: disseminating our results to policymakers and development professionals within Zambia, sharing our findings with the research community, and publicizing the lessons learned from our evaluation in the international policy community.

Communications Plan

AIR will take a multifaceted approach to disseminating the research findings by including blogs, social media activities, policy briefs, presentations at academic and policy conferences, presentations in Zambia, and academic papers to disseminate the research findings to policy makers and researchers. Importantly, AIR will ensure that the dissemination of the research findings through each of the various approaches will be customized to the audience; each of these methods will ensure wider reach of the policy findings and greater inclusion in the discussion around the policy implications. For example, we do not expect Ministry of Education officials to read long impact evaluation reports or peer-reviewed papers. Thus, we will emphasize the use of policy briefs and presentations in the dissemination of our research findings to these policy makers. Similarly, as is typical for research and academic communities, we will circulate a working paper and present our findings at research conferences.

VII. Work Plan

We present below the general Gantt Chart and, below, a more detailed breakdown of all tasks and human resources allocated to each task.

Table 4 Gantt Chart

Tasks	Project Year 1										Project Year 2												Project Year 3						
Subtasks	17-Mar	17-Apr	17-May	17-Jun	17-Jul	17-Aug	17-Sep	17-Oct	17-Nov	17-Dec	18-Jan	18-Feb	18-Mar	18-Apr	18-May	18-Jun	18-Jul	18-Aug	18-Sep	18-Oct	18-Nov	18-Dec	19-Jan	19-Feb	19-Mar	19-Apr	19-May	19-Jun	19-Jul
Inception																													
Study design																													
Mapping																													
Instruments																													
Baseline data collection																													
Enumerator training																													
Data collection																													
Data transcription																													
Analysis																													
First draft baseline report																													
Final baseline report																													
Presentation of results																													
Endline data collection																													
Enumerator training																													
Data collection																													
Data transcription																													
Analysis																													
Draft endline report																													
Final endline report																													

Tasks	Project Year 1										Project Year 2												Project Year 3						
Subtasks	17-Mar	17-Apr	17-May	17-Jun	17-Jul	17-Aug	17-Sep	17-Oct	17-Nov	17-Dec	18-Jan	18-Feb	18-Mar	18-Apr	18-May	18-Jun	18-Jul	18-Aug	18-Sep	18-Oct	18-Nov	18-Dec	19-Jan	19-Feb	19-Mar	19-Apr	19-May	19-Jun	19-Jul
Presentation of results																													
Final evaluation report																													

Table 5 Work plan by Task

Task	Time period (working days)	Team	Outputs
Remaining inception stage tasks			
Mapping exercise	September 2017	JM MMa, MMo	Mapping exercise completed
Finalize qualitative instruments	January 15-26, 2018	JM, VR	Qualitative protocols
IRB Social Sciences submission	January 29-February 9, 2018	VR, CH	IRB approval obtained
Approval from relevant Zambian Ministry	January 29-February 23, 2018	AB	Written approval obtained
Data collection			
Baseline			
Identification of FGD and KII participants	Week of February 12-16, 2018	MMa	Community leaders identified, FGD participants selected and appointments scheduled
Contacting Jack compound residents and making appointments	Week of February 19-23 2018	EZ	Residents contacted and appointments made
Qualitative data collector training (Wave I)	Week of February 12-16, 2018	JM leading, MMa, MMo	Data collectors trained
Data collection: FGDs and KIIs	Weeks of February 26-March 9, 2018	JM, MMa, MMo	FGDs and KIIs conducted
Transcription	Weeks of March 12 – March 23, 2018	MMa, MMo	Transcripts of FGDs and KIIs delivered on a rolling basis during this period
Data coding and analysis, qualitative	Weeks of March 26-April 20, 2018	JM, VR	Coded data in NVivo
Draft baseline report	May, 2018	AB, JM, VR, CH	Draft report delivered to MCC
Final baseline report	June, 2018	AB, JM, VR, CH	Report delivered to MCC
Presentation of findings	July, 2018	AB, JM	Presentation in Lusaka delivered to MCA-Zambia, MECB
Endline			

Task	Time period (working days)	Team	Outputs
Qualitative data collector training (Wave III)	January, 2019	VR leading, MMa, MMo	Data collectors trained
Data collection: FGDs and KIIs	February, 2019	VR, MMa, MMo	FGDs and KIIs conducted
Transcription	February, 2019	MMa, MMo	Transcripts of FGDs and KIIs delivered on a rolling basis during this period
Data coding and analysis, qualitative	March, 2019	JM, VR	Coded data in NVivo
Draft endline evaluation report	April, 2019	AB, JM, VR, CH	Draft report delivered to MCC
Final endline report	May, 2019	AB, JM, VR, CH	Final report delivered to MCC
Presentation of results	June, 2019	AB, JM	Presentation in Lusaka delivered to MCA-Zambia, MECB
Final Evaluation Report	July, 2019	AB, JM	Final report delivered to MCC

VIII. References

Arku, F. (2010) Time Savings from Easy Access to Clean Water: Implications for Rural Men's and Women's Well-being. *Progress in Development Studies.* 10(3):233-246.

Asaba, R., Faga, G., Kabonesa, C., and Mugumya, F. (2013) Beyond Distance and Time: Gender and the Burden of Water Collection in Rural Uganda. *The Journal of Gender and Water.* 2(1):31-38.

Bamberger, Michael. (2012). *Introduction to Mixed Methods in Impact Evaluation*. Washington, D.C.: ALNAP.

Bartram, J., Lewis, K., Lenton, R., and Wright, A. (2005) "Focusing on Improved Water and Sanitation for Health." *The Lancet* 365:810-812.

Bayliss, K. (2003) Utility privatisation in Sub-Saharan Africa: a case study of water. *Journal of Modern African Studies.* 41. 507-531.

Bayliss, K. (2013) A Cup Half Full: The World Bank's Assessment of Water Privatisation.' In: Bayliss, K. and Fine, B. and Van Waeyenberge, E., (eds.), The Political Economy of Development: The World Bank, Neoliberalism and Development Research. London: Pluto Press.

Bennett, V. (1995) Gender, Class, and Water: Women and the Politics of Water Service in Monterrey, Mexico. *Latin American Perspectives* 22(2):76-99.

Berk, R. A., & Rossi, P. H. (1999). *Thinking about program evaluation 2*. Sage Publications.

Berry, J., Fischer, G., & Guiteras, R. P. (2015). Eliciting and utilizing willingness to pay: evidence from field trials in Northern Ghana. CEPR Discussion Paper No. DP10703.

Bethony, J., Brooker, S., Albonico, M., Geiger, S. M., Loukas, A., Diemert, D., & Hotez, P. J. (2006). Soil-transmitted helminth infections: ascariasis, trichuriasis, and hookworm. The Lancet, 367(9521), 1521-1532.

Biran, A., Rabie, T., Schmidt, W., Juvekar, S., Hirve, S., and Curtis, V. (2008). Comparing the performance of indicators of hand-washing practices in rural Indian households. *Tropical Medicine & International Health. (13)*: 278–285. doi:10.1111/j.1365-3156.2007.02001.x.

Blackden, C. M., & Wodon, Q. (Eds.). (2006). *Gender, time use, and poverty in sub-Saharan Africa* (Vol. 73). World Bank Publications.

Budds, J., & McGranahan, G. (2003). Are the debates on water privatization missing the point? Experiences from Africa, Asia and Latin America. *Environment and Urbanization*, *15*(2), 87-114.

Crow, B., & Sultana, F. (2002). Gender, class, and access to water: Three cases in a poor and crowded delta. *Society &Natural Resources*, *15*(8), 709-724.

Crow, B., & McPike, J. (2009). How the drudgery of getting water shapes women's lives in low-income urban communities. *Gender, Technology and Development*, *13*(1), 43-68.

Curtis, V., Cousens, S., Mertens, T., Traore, E., Kanki, B., & Diallo, I. (1993). Structured observations of hygiene behaviours in Burkina Faso: validity, variability, and utility. *Bulletin of the World Health Organization*, *71*(1), 23.

Fewtrell, L., & Colford, J. M. (2004). Water, sanitation and hygiene: interventions and diarrhoea. *A systematic review and meta-analysis. The International Bank for Reconstruction and Development/The World Bank. Washington, DC*, *20133*.

Fuest, V., & Haffner, S. A. (2007). PPP–policies, practices and problems in Ghana's urban water supply. *Water Policy*, *9*(2), 169-192.

Gopal, Srik and Tiffany Clark. (2015). *System Mapping: A Guide to Developing Actor Maps*. Washington, D.C.: FSG.

Gopal, Srik and Tiffany Clark. (n.d.). *Guide to Actor Mapping.* Washington, D.C.: FSG.

Hirn, M. (2013). Private Sector Participation in the Ugandan Water Sector: A Review of 10 Years of Private.

Hiroshi, N., Yasahuru, S., Eriko K., Keitaro, A., and Hirofumi, T. (2014). Basic research for impact evaluation trial on grant aid: A case from rural groundwater development project in Zambia. *Rep. no. GL JR 14-014*. Tokyo, Japan: JICA.

Hutton, G., Haller, L., Water, S., & World Health Organization. (2004). Evaluation of the costs and benefits of water and sanitation improvements at the global level.

Liu, L., Oza, S., Hogan, D., Perin, J., Rudan, I., Lawn, J. E., ... & Black, R. E. (2015). Supplementary Data for Global, regional, and national causes of child mortality in 2000–13, with projections to inform post-2015 priorities: an updated systematic analysis. *The Lancet*, *385*(9966), 430-440.

Luby, S. P., Halder, A. K., Huda, T., Unicomb, L., & Johnston, R. B. (2011). The effect of handwashing at recommended times with water alone and with soap on child diarrhea in rural Bangladesh: an observational study. *PLoS Med*, *8*(6), e1001052.

Luoto, J., Levine, D., Albert, J., & Luby, S. (2014). Nudging to use: Achieving safe water behaviors in Kenya and Bangladesh. *Journal of Development Economics*, *110*, 13-21.

Manun'Ebo, M., Cousens, S., Haggerty, P., Kalengaie, M., Ashworth, A., & Kirkwood, B. (1997). Measuring hygiene practices: a comparison of questionnaires with direct observations in rural Zaire. *Tropical medicine & international health*, *2*(11), 1015-1021.

Opryszko, M. C., Guo, Y., MacDonald, L., MacDonald, L., Kiihl, S., & Schwab, K. J. (2013). Impact of water-vending kiosks and hygiene education on household drinking water quality in rural Ghana. *The American journal of tropical medicine and hygiene, 88*(4), 651-660.

Pryer, J. A. (2017). *Poverty and vulnerability in Dhaka slums: the urban livelihoods study*. Routledge.

Quick, R. E., Kimura, A., Thevos, A., Tembo, M., Shamputa, I., Hutwagner, L., & Mintz, E. (2002). Diarrhea prevention through household-level water disinfection and safe storage in Zambia. *American Journal of Tropical Medicine and Hygiene. 66*(5), 584–589.

Scheaffer, R. L., Mendenhall, W., & Ott, L. (1995). Elementary survey sampling. Duxbury Press.

Somers, M. A., Zhu, P., Jacob, R., & Bloom, H. (2013). The Validity and Precision of the Comparative Interrupted Time Series Design and the Difference-in-Difference Design in Educational Evaluation. *MDRC*.

Stanton, B. F. and Clemens, J. D. (1987). An educational intervention for altering water-sanitation behaviors to reduce childhood diarrhea in urban Bangladesh. II. A randomized trial to assess the impact of the intervention on hygiene behaviors and rates of diarrhea. *American Journal of Epidemiology*. *125,* 292–301.

USAID. Real Impact: Senegal the Water and Development Alliance. N.p. Print.

Vives, A., Paris, A.M., Benavides, J., Raymond, P.D., Quiroga, D. & Marcus, J. (2006), *Financial Structuring of Infrastructure Projects in Public-Private Partnerships: An Application to Water Projects* (Inter-American Development Bank).

Waddington H, Snilstveit B, White H & Fewtrell L (2009). *Water, Sanitation and Hygiene Interventions to Combat Childhood Diarrhoea in Developing Countries*. International Initiative for Impact Evaluation, New Delhi, India.

WaterAid. (2005) National Water Sector Assessment Tanzania, London.

World Health Organization. (2015). *Progress on sanitation and drinking water: 2015 update and MDG assessment*. World Health Organization.

Annex A: Informed Consent Documentation

UNZAREC FORM 1b

THE UNIVERSITY OF ZAMBIA

DIRECTORATE OF RESEARCH ND GRADUATE STUDIES

HUMANITIES AND SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE

Telephone: +260-211-290258/293937
Fax: +260-211-290258/293937
E-mail drgs@unza.zm

P. O. Box 32379
Lusaka, Zambia

HUMANITIES AND SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE

CONSENT FORM

(Translated into vernacular if necessary)

TITLE OF RESEARCH:

REFERENCE TO PARTICIPANT INFORMATION SHEET:

1. Make sure that you read the Information Sheet carefully, or that it has been explained to you to your satisfaction.

2. Your permission is required if tape or audio recording is being used.

3. Your participation in this research is entirely voluntary, i.e. you do not have to participate if you do not wish to.

4. Refusal to take part will involve no penalty or loss of services to which you are otherwise entitled.

5. If you decide to take part, you are still free to withdraw at any time without penalty or loss of services and without giving a reason for your withdrawal.

6. You may choose not to answer particular questions that are asked in the study. If there is anything that you would prefer not to discuss, please feel free to say so.

7. The information collected in this interview will be kept strictly confidential.

8. If you choose to participate in this research study, your signed consent is required below before I proceed with the interview with you.

VOLUNTARY CONSENT

I have read (or have had explained to me) the information about this research as contained in the Participant Information Sheet. I have had the opportunity to ask questions about it and any questions I have asked have been answered to my satisfaction.

I now consent voluntarily to be a participant in this project and understand that I have the right to end the interview at any time, and to choose not to answer particular questions that are asked in the study.

My signature below says that I am willing to participate in this research:

Participant's name (Printed):
…….....…….....

Participant's signature: …… Consent Date: …….....

Researcher Conducting Informed Consent (Printed)
…….

Signature of Researcher: ……..…….. Date: …….

Signature of parent/guardian: ……. Date: ……

ABOUT AMERICAN INSTITUTES FOR RESEARCH

Established in 1946, with headquarters in Washington, D.C., American Institutes for Research (AIR) is an independent, nonpartisan, not-for-profit organization that conducts behavioral and social science research and delivers technical assistance both domestically and internationally. As one of the largest behavioral and social science research organizations in the world, AIR is committed to empowering communities and institutions with innovative solutions to the most critical challenges in education, health, workforce, and international development.

AIR®

AMERICAN INSTITUTES FOR RESEARCH®

1000 Thomas Jefferson Street NW
Washington, DC 20007-3835
202.403.5000

www.air.org

Making Research Relevant

LOCATIONS

Domestic

Washington, D.C.
Atlanta, GA
Austin, TX
Baltimore, MD
Cayce, SC
Chapel Hill, NC
Chicago, IL
Columbus, OH
Frederick, MD
Honolulu, HI
Indianapolis, IN
Metairie, LA
Naperville, IL
New York, NY
Rockville, MD
Sacramento, CA
San Mateo, CA
Waltham, MA

International

Egypt
Honduras
Ivory Coast
Kyrgyzstan
Liberia
Tajikistan
Zambia