A framework for corporate engagement in water, sanitation, and hygiene initiatives

by

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Abstract

My research involved working with a non-profit organization, for-profit company, and a community in Eastern Tanzania. Students' International Health Association (SIHA) is a non-profit working in health promotion in rural Eastern Tanzania. IDEXX Laboratories, Inc., a multinational corporation that makes user-friendly water quality testing kits, is seeking insight on how to engage in Corporate Social Responsibility (CSR) to improve public health. The objective was to inform how a for-profit can engage in CSR with the aim of improving public health, using field research of SIHA's involvement in Water, Sanitation, and Hygiene (WASH).

The first objective of my research was to review current international activities associated with provision of safe water, researching the recommendations for WASH-related activities in developing countries. A literature review was used to collect and synthesize the current research. The second objective was to use field research over two field seasons to identify the context-specific public health challenges associated with water and sanitation in a severely water-challenged community in Tanzania. The first field season entailed preliminary observations and learning about the broad challenges related to WASH; in the second field season, I conducted a qualitative description using individual interviews. The third objective was to understand and evaluate IDEXX's current CSR initiatives. I investigated IDEXX using the corporation website, other media sources, and an in-person visit to the headquarters.

From the literature, eight key considerations for a WASH initiative were identified. The considerations can be roughly divided into three categories: tangible needs, community participation, and education provision. From the first field season, I learned that the main challenges in the community were poor access to WASH facilities and acceptable treatment

options. The results from the second field season demonstrated that the community has ideas for solutions, but lacks the necessary leadership to promote change. And from the investigation of IDEXX, it was clear that IDEXX is open to new ideas within CSR and is committed to investigating in CSR.

The results were used to develop a framework for the private sector pursing CSR and for the public sector seeking informed methods for connecting with the private sector. I titled this framework the Threefold Framework for Corporate Engagement. Within this framework there are three **principles** (sustainability, ethical responsibility, and meaningful public health outcomes), three **phases** needed for execution (preparation, introduction, and implementation), and three **components** (stakeholders, values, and outcomes) for ensuring that these CSR principles are met. Partnerships with the private sector can contribute meaningfully to public health and should focus on serving the priorities of the communities they are intended to benefit.

The Threefold Framework could be applied to other partnership based initiatives beyond corporate engagement. The fundamental components, phases, and principles are not specific to corporate partnerships and can be applied to any multi-organization partnership.

Preface

This thesis is an original work by Jacqueline Noga. The research project for this thesis received research ethics approval from the University of Alberta Research Ethics Board, project name “Developing a framework for meaningful, ethical, and sustainable corporate engagement in water, sanitation, and hygiene initiatives”, ID Pro00063963, on April 26, 2016 (Figure 8). The Tanzanian Regional Commissioner for the Coastal Region also provided research clearance (Figure 9).

Dedication

To the people who live in Kikongo.

Acknowledgements

Most importantly, I want to acknowledge Dr. Norman Neumann, my supervisor, who put this project into my hands and let me run with it. His trust in my ability to do this was the most powerful support I had. And his support and guidance made this thesis what it is.

I also want to acknowledge my committee members. Dr. Duncan Saunders, who is not only a committee member but a mentor, and a constant source of wisdom and advice that challenged me to think critically. Dr. Dev Jennings, for bringing in a unique perspective and new ideas. And Dr. Tania Bubela, for helping me focus and keep direction.

Thank-you to Pastone Madeha, my research assistant, for his endless patience and fantastic sense of humour, to Melkiory Noya for making everything come together, and to Charles Simon for quietly inspiring me and reminding me of the value of listening.

I would like to recognize the Student's International Health Association[1], without which I would have never come to understand development work as I do now. The student-run organization is filled with passionate people, whose determination to ensure student success is endless. The volunteers with whom I worked closely both questioned me and encouraged me, helping me shape my understanding of the world, of development, and of myself. Thank-you.

And finally, I want to acknowledge IDEXX Laboratories, Inc., and especially Chun-Ming Chen. Without Chen and IDEXX this project would never have started. Although the financial contribution was instrumental, the energy and passion that the employees have for their work was incredibly encouraging and inspiring. Thank-you to those who I had the opportunity to talk to and learn from.

[1] Please note that as of June 2016 SIHA became the Students Invested in Health Association

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Chapter 1: Introduction

Thesis overview

Globally, 780 million people lack access to clean water on a daily basis[2] (WHO & UNICEF, 2012), which is a global public health challenge. For decades there have been, and continue to be, myriad strategies to address the challenges to access to safe water for drinking, sanitation, and hygiene. This field is often referred to as WASH (water, sanitation, and hygiene), and fits within the scope of global public health. There has been progress. Since 1990 more than two billion people have gained access to clean water (Progress on drinking water and sanitation, 2012). However, considering that water is a human right (UN, 2011) it is unacceptable that clean, accessible water is still not available to 780 million people (WHO & UNICEF, 2012); in fact, it can be considered a tragedy (Gleick, 1996).

Corporate involvement in global health, such as WASH, represents an opportunity to improve public health outcomes in low-income countries (LIC). However, this approach has received mixed reviews; while some organizations and groups are adamantly opposed to corporate contribution others are actively looking for corporate partnership. Some non-profit organizations have developed guidelines for partnering with the for-profit sector. For example, PATH is an international non-profit organization that aims to develop unique approaches to global health challenges using the corporate sector. PATH is a leader in this emerging sector of corporate engagement, and the organization provides information and publications on their projects and partnerships (PATH, 2016). Within the academic literature, however, the concept of corporate engagement in global health is relatively new, emerging over the past decade, and

[2] Access to an improved source, as defined by the United Nations (JMP, 2016)

articles on corporate engagement in WASH are scarce. This leaves a gap in the literature when it comes to WASH strategies that embrace partnering with the corporate sector to help solve the fundamental public health challenge of providing safe water to people.

My research addresses this gap in the literature. It aims to develop a framework to inform the creation of a sustainable (meaning economic, environmental, and political sustainability), ethical (relating to human rights), and meaningful (denoting a relevant positive public health impact) model for corporate engagement in public health-based water initiatives with the non-profit sector. It is based on field research in Tanzania, a country in East Africa, with the short-term goal of informing a company (IDEXX Laboratories, Inc.) about improving its Corporate Social Responsibility (CSR) activities, and, in the longer-term contributing to improving WASH, globally.

The first objective of my research was to review current international activities associated with provision of safe water, researching the recommendations for WASH-related activities in developing countries. A literature review was used to collect and synthesize the current research. The second objective was to use field research over two field seasons to identify the context-specific public health challenges associated with water and sanitation in a severely water-challenged community in Tanzania. The first field season entailed preliminary observations and learning about the broad challenges related to WASH; in the second field season, I conducted a qualitative description using individual interviews. The third objective was to understand and evaluate IDEXX's current CSR initiatives. I investigated IDEXX using the corporation website, other media sources, and an in-person visit to the headquarters.

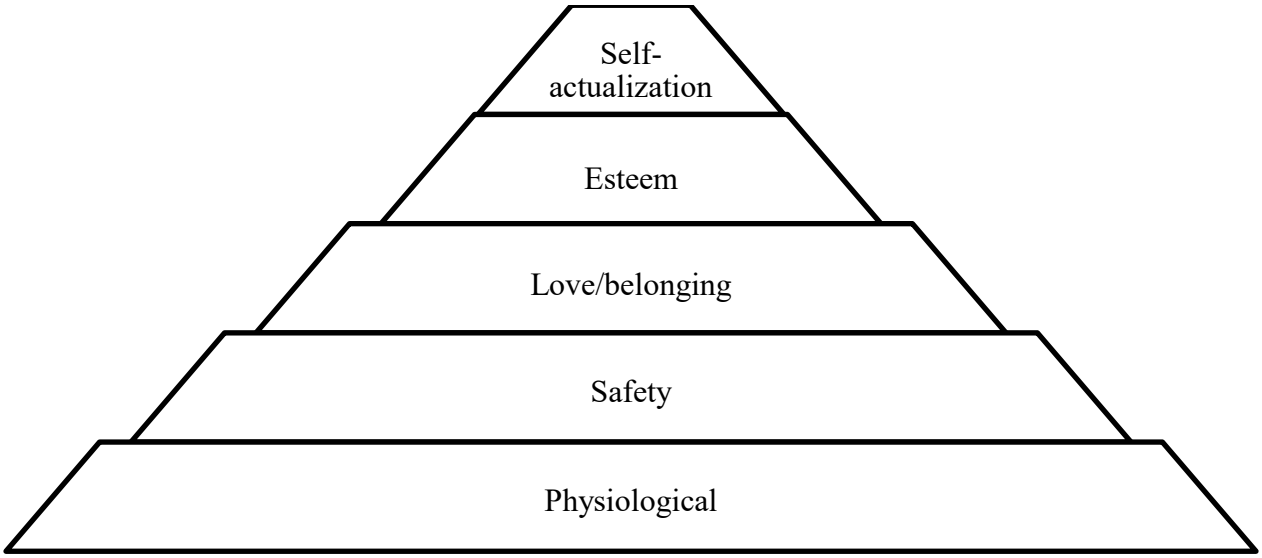
My research will provide a framework that can be used by corporate sector players interested in engaging in corporate social responsibility activities. It will further inform public sector actors who seek informed methods to connect with the corporate sector in a manner that results in productive partnerships to benefit those in need of improved WASH.

Introduction to Water, Sanitation, and Hygiene

WASH in Maslow's Hierarchy of Needs

Access to clean water, sanitation, and hygiene (WASH) meets basic human physiological needs, representing a foundational element of Maslow's Hierarchy of Needs (Maslow, 1943) (Figure 1). As an essential human requisite, access to clean water for drinking and hygienic purposes is an intrinsic component of overall human health and wellbeing (Bartram & Cairncross, 2010; Rijsberman, 2006), which, in turn, makes it critical for development. Moreover, water is needed for agriculture, and many water insecure areas are also food insecure, leading to amplified negative pressures on health (Madulu, 2003). Thus, without access to clean water a country will likely struggle to develop economically, socially, and politically (De Villiers, 2001; Grey & Sadoff, 2007; UN, 2011). The health issues associated with the consumption of unsafe water include water-borne diseases, as well as social health issues, such as individual income and poverty (Madulu, 2003), stigma and social exclusion (Noga & Wolbring, 2012; Sarkin & Cook, 2012; Thompson, Folifac, & Gaskin, 2011), and inadequate childhood education (Larson, Minten, & Razafindralambo, 2006).

Figure 1: Visual representation of Maslow's Hierarchy of Needs



The overall burden of disease caused by poor WASH

The burden of waterborne diseases caused by poor WASH has been estimated to be 1.5% of the overall global burden of disease (Prüss-Ustün *et al.*, 2014). This estimate attributes approximately 502,000 diarrhoea deaths to insufficient clean drinking water and 280,000 deaths to poor sanitation in 2012 (Prüss-Ustün, *et al.*, 2014). Another study attributes 1.5 million deaths per year to poor WASH and states that, by improving WASH, the total disease burden could be reduced by 10% (Prüss-Üstün, Bos, Gore, & Bartram, 2008). Transmission of these diseases can occur from direct consumption of water as well as indirect infection such as during bathing, inhalation of aerosolized particles, and consumption of contaminated food (Prüss, Kay, Fewtrell, & Bartram, 2002). Poor WASH is a major public health challenge.

WASH, public health, and the determinants of health

A major component of public health is to address the determinants of health: the social, cultural, physical, and economic conditions that affect human health (Lee, 2005). They include, but are not limited to: education, income and social status, physical environment, social support networks, genetics, access to health services, gender, and early childhood development (Marmot, 2005). These health determinants cover the social, emotional, physical, and medical aspects of a person's life that can impact health. The extent to which each of these aspects is developed/fulfilled in an individual's life will contribute to that individual's overall health (Lee, 2005; Marmot, 2005).

Considering Maslow's Hierarchy of Needs in regards to the determinants of health, the social and economic determinants of health are impacted by the physical environment (Maslow, 1943). At the population level, this means that in countries where the majority of the population lives at the bottom of the economic pyramid and therefore in poor living conditions, economic growth can be stagnant (Prahalad, 2014). By targeting this population, a new market is made available, thus enhancing the opportunity for development. But first, the basic needs of this population must be met (Prahalad, 2014). Without water, which meets physiological needs, a person will not attain other needs, nor be able to access health care or social services. Lack of access to WASH further leads to direct health impacts measured by a loss in Disability Adjusted Life Years (DALYs) due to diarrheal diseases contracted through drinking water, particularly in Africa, Southeast Asia, and the Eastern Mediterranean (Prüss, *et al.*, 2002). Having access to WASH is therefore both a determinant of health and a base from which to improve social determinants of health (Parkes & Horwitz, 2009). For example, without WASH, education, stable employment, and attendant income can be difficult to attain (Burke & Beegle, 2004;

Lawrence, Meigh, & Sullivan, 2002; Sullivan, 2002), early childhood development is stunted (Nokes *et al*., 1999), and gender disparity and social stigma may be intensified (Larson, *et al*., 2006; Sachs, 2006). Conversely, when other determinants of health are met, an individual's ability to access water will improve.

Studies demonstrate the link between proximal access to clean water and income. Where access is limited, retrieving water from the nearest source, which can be many kilometers away, takes time from paid employment and other tasks. Water poverty may therefore be result of either a lack of access to water or being unable to afford water (Lawrence, *et al*., 2002; Sullivan, 2002). For example, household income in Tanzania was key to determining whether that household had access to clean, improved water (Madulu, 2003).

Improving access to safe water is seen as a good investment (Haller, Hutton, & Bartram, 2007), because it leads not only to improved health and employment opportunities, but to improvements in the economy through increased production (Tropp, 2013) and through tourism (Manyara & Jones, 2007). While low income areas are often underserved (Madulu, 2003), an investment of US $1.00 in securing safe drinking water results in an estimated return of US $4.00 (WHO, 2012). This economic gain comes from changes such as regained time that was previously spent collecting water (Haller, *et al*., 2007) and improved environmental sanitation leading to increased tourism (Manyara & Jones, 2007). At the population level, this improvement will mean economic development, for both the population being targeted and those organizations engaged in the market of improving access to safe water (Prahalad, 2014). For example, a NGO in the Philippines called A Single Drop for Safe Water, Philippines promotes social entrepreneurship in developing solutions to WASH (Tantingco, 2011). As a result, local

entrepreneurs improve their financial situation and simultaneously the opportunity for improved WASH in their community (Tantingco, 2011).

As income rises, water consumption increases thereby increasing the demand for availability of water (Sullivan, 2002). Income and optimal environments go hand in hand (Evans & Kantrowitz, 2002). For example, in Madagascar, the difference in water consumption between those who had private connections to a water source and those who collected water was 14,600 litres per month and 2,300 litres per month, respectively (Larson, *et al.*, 2006). Moreover, Larson *et al*. (2006) econometrics (economics-based statistics) study found that by increasing income and education, households were significantly less likely to have to collect water. This suggests that improved income leads to improved water security.

The impact of low income on water poverty is not specific to the developing world. For example, families with low income in the United States (U.S.) were more likely to swim at polluted beaches (Cabelli, 1983). In North Carolina migrant-worker camps, upwards of 44% of water samples were bacterially-contaminated, compared to other businesses and residences in the region that had water free of bacterial contamination (Ciesielski, Handzel, & Sobsey, 1991). Further, families with low income in the U.S. had more coliform bacteria in their drinking water compared to households with higher incomes (Francis, 1984). Evans and Kantrowitz (2002) explained that the poor health status of those in lower income brackets is driven partially by the suboptimal environments in which the people live. This further demonstrates the negative relationship between poverty and water security as a global environmental health issue.

While this discussion has focused on access to water, in regards to education as a determinant of health, WASH impacts educational attainment. When a household does not have

a private connection to a source of water, fewer individuals in the household will attend school and achieve even a primary school level of education (Larson, *et al.*, 2006). Children may be absent from school because they are required at home for household chores, which may include fetching water (Burke & Beegle, 2004). Providing clean water at school is an effective way to improve school attendance, as it addresses the issue of unsafe water as well as providing a close source for the families (Jasper, Le, & Bartram, 2012).

Without proper sanitation, parasitic worms which can be found in contaminated water cause slowed cognitive function and troubles with learning (Luong, 2003). For example, schistosomiasis, a water-transmitted disease caused by parasitic worms, which infects 207 million people globally (Steinmann, Keiser, Bos, Tanner, & Utzinger, 2006), has the highest prevalence in school-aged children (Woolhouse, 1998). Schistosomiasis negatively impacts cognitive function in children, including language, reading skills, and comprehension. When treated properly, cognitive function and performance in school have been shown to improve (Nokes, *et al*., 1999). Other parasitic diseases, such as cryptosporidiosis (Desai, Sarkar, & Kang, 2012) and giardiasis infections (Halliez & Buret, 2013), are also damaging to public health with similar long term consequences.

Social stigma, as a determinant of health in the WASH context, is defined as discrimination against a certain group that results in reduced access to water. This discrimination could be against an entire village, against the women in the village, or it could be against smaller groups such as people with disabilities or indigenous populations. For example, a case study in Cameroon found that girls, who are delegated the chore of fetching water, are often at risk of physical and verbal sexual abuse while completing the task (Thompson, *et al.*, 2011). People with disabilities are often left out of the planning process, and therefore left without access to

clean water even when an "improved" source has been implemented (Noga & Wolbring, 2012). In Tanzania, a study explored the stigmatization of people living with HIV or AIDS in relation to water use, finding that the often stigmatized population was not overtly impacted in regards to water use, however that did not mean the population was free from social discrimination and therefore indirectly impacted (Nkongo & Chonya, 2009). The indigenous populations of Botswana were ordered not to drill their own borehole on their land by the High Court of Botswana even though there were boreholes being drilled for diamonds on the same land (Sarkin & Cook, 2012). People who are already stigmatized are at an even greater risk of the negative impacts of poor WASH, as evidenced by the preceding examples.

Gender is another determinant of health that can have consequences for access to clean water. Women's empowerment and WASH go hand in hand. Most low and middle income countries (LMICs) have poor access to water (Progress on drinking water and sanitation, 2012), and it is often the role of women and girls to procure water. The reality that most of the developing world lives without a nearby source of water means that women and girls spend a significant amount of time gathering water each day (Progress on drinking water and sanitation, 2012). Therefore, these girls are unable to attend school and get an education, and ultimately lack employability (Larson, *et al.*, 2006; Sachs, 2006). This in turn leads to slower development of the country, because about half of the possible workforce is spending their time getting water (Koolwal & Van de Walle, 2013). By marginalizing the female population, development is being hindered, which also hinders developing improved water systems. As two of the most critical aspects for development that are intrinsically related, gender equity and WASH should be considered together.

These examples demonstrate how access to water as a determinant of health can be interdependent with other determinants of health. This interdependent relationship is not unique to water and the other determinants of health, but can be seen amongst many different determinants of health (Lahelma, Martikainen, Laaksonen, & Aittomäki, 2004). There is a negative relationship between inadequate clean drinking water and poverty, attendance to primary school, and stigmatization of already marginalized groups.

Challenges for WASH in developing countries

Amongst and even within LMICs there is a vast difference in opportunities to improve WASH. First, many countries in Africa, South America, and Asia face drought on an annual basis (Dai, 2011). During this time access to water for drinking can almost disappear, let alone water for hygiene or sanitation, which in turn leads to increased diarrheal disease (Fewtrell *et al.*, 2005). Second, poor investment and management by the local government and other water agencies contribute to slower development (Hunter, MacDonald, & Carter, 2010). Third, economic, social, and political barriers are detrimental to achieving adequate access to WASH (Hunter, *et al.*, 2010). And finally, water governance in LMICs is different than governance in high income countries (HICs). The idea that governance entails a partnership between government and civil society is not realistic in many LMICs, as there is corruption and often the citizen voice is not taken into account or even heard (Castro, 2007). This means that water governance is government-controlled (Jones, 2011). In summary, because LMICs are less economically and often politically developed than HICs, they face more barriers to improving access to WASH.

Water governance and corporate involvement in WASH

Given that water is considered a basic human right (UN, 2010a), the responsibility of ensuring the quantity, quality, and public health safety of water is on governments (i.e., municipal, provincial, state, or federal) or representative heads of state. It is unclear though, how clean water should be provided when a government is not fulfilling the need (Gleick, 1996).The duty often falls to international non-governmental organizations (Gleick, 1996), with an emerging trend of corporations getting involved in the provision of clean water (Porter & Kramer, 2011). Corporate investment in healthy outcomes for society offers opportunities to address various health disparities in society, including the provision of basic environmental necessities such as clean water.

There are many different labels given to this kind of corporate activity related to community development, such as Creating Shared Value (CSV) (Porter & Kramer, 2011), corporate philanthropy (Carroll, 1999), and corporate citizenship (Matten & Crane, 2005). However, according to Carroll (1999) the original concept started in 1953 with Howard Bowen's *Social Responsibilities of the Businessman* (Bowen, 2013). I define corporate social responsibility (CSR) as a specific and directed action taken by a corporation to improve the wellbeing of the community that the corporation works in. CSR can be local or global, it is voluntary, and it can focus on social, environmental, and/or economic pillars (Carroll, 1999). It is often perceived that CSR is a strategic method for improving profit (Campbell, 2007), however this does not have to be the case. Customers are beginning to expect companies to be ethical, and not only 'just a little bit', but in impactful ways (Barry, 2003). CSR can be a tool used to frame the actions a company will take that will produce these kinds of mutually beneficial results. The purpose of CSR is to improve the world in which business operates (Porter & Kramer, 2007).

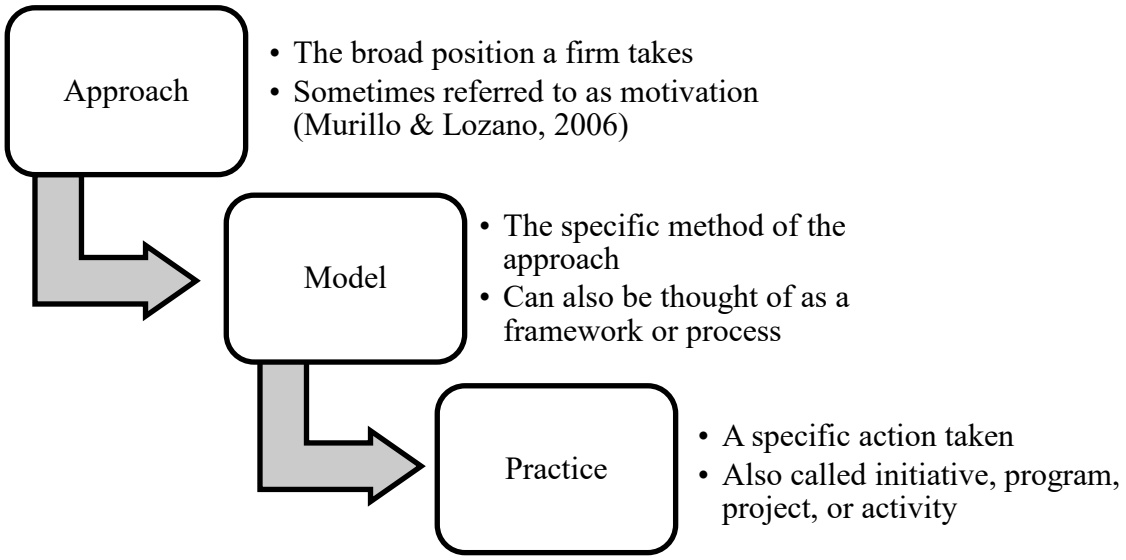
According to Newell (2005), CSR should not be providing something that the government normally provides, such as access to healthcare. There are certain public goods and services that the government should be managing, rather than having a company provide these rights in return for profit, for a good reputation, or for quieting the community to an indiscretion made by the company (Newell, 2005). If this is true, then when the government is failing to provide the good or service, and a company wants to take the responsibility, there are many considerations for how this can be done responsibly.

Background to Corporate Social Responsibility

Before discussing how CSR can impact WASH, I will present a brief background on CSR. CSR is an understanding that a business' actions can impact communities in various ways, and therefore the corporation has an obligation to those communities for making responsible decisions. Some formal definitions include one from the Government of Canada: "…the voluntary activities undertaken by a company to operate in an economic, social and environmentally sustainable manner" (Corporate Social Responsibility, 2015). A similar definition is provided by the European Commission, describing CSR as when businesses "…integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis" (Corporate Social Responsibility: a new definition, a new agenda for action, 2011). Most definitions discuss CSR as a voluntary action that is in the economic, environmental, and/or social realm. The consensus is that CSR is done by choice, for a variety of purposes.

The terminology used in the CSR literature can be confusing. There are several concepts with a variety of terms for each. For this discussion, I chose to use the following terminology for CSR (Figure 2). I will use these terms throughout the thesis.

Figure 2: Terminology for CSR



Approaches to CSR

There are three broad approaches when it comes doing CSR. The first, referred to as the *business case*, argues for the purpose of profit and other tangible economic-based results (Carroll & Shabana, 2010). The second approach, often described as *strategic CSR* (Campbell, 2007; Jones, Felps, & Bigley, 2007; McWilliams, Siegel, & Wright, 2006; Montiel, 2008), states that CSR should be for the purpose of shared benefit. Finally, the third, considered an *altruistic* approach, argues that CSR should be for those in need of aid and should not be for any kind of

benefit to the company. CSR is a well-known form of engagement in practices that, at least seemingly, go beyond typical corporate activities.

The *business case* for CSR is based on the idea that CSR can mitigate the costs of negative externalities (Heal, 2005). In this approach, CSR is done for the profit of the company, and thus, in turn, the shareholders will also benefit through having their interests gratified and having the company profit (Carroll & Shabana, 2010). The ethical argument behind the business case is expressed well by Jones *et al.* (2007) who claim that when something is done with the intent to benefit from the return there is "less moral weight" than if there is no foreseeable return. This implies that when a company is motivated by internal benefit the action being taken is more financially sound and, in that sense, more justifiable to shareholders. CSR can create returns for the company, which is the fundamental purpose of the business case for CSR.

More extreme than the business case is Friedman's idea that the sole purpose of business is to make a profit for its shareholders (Friedman, 1970). This argument is against CSR, regardless of the stated purpose or motivation for it. Thus, according to the argument, the social responsibility is profit making (Carroll, 1979). While this argument shines a negative light on CSR, it also sparked interest in understanding the purpose and goals of CSR, thereby creating a stronger argument for CSR.

Strategic CSR is based on the understanding that businesses operate in a social environment where actions taken by the firm have an impact on this environment, and therefore the best CSR initiative is one that results in shared benefit for both the firm and the society in which it operates (Campbell, 2007; Werther Jr & Chandler, 2010). The argument for a strategic CSR approach is that when a society is thriving the fundamental needs named by Maslow have

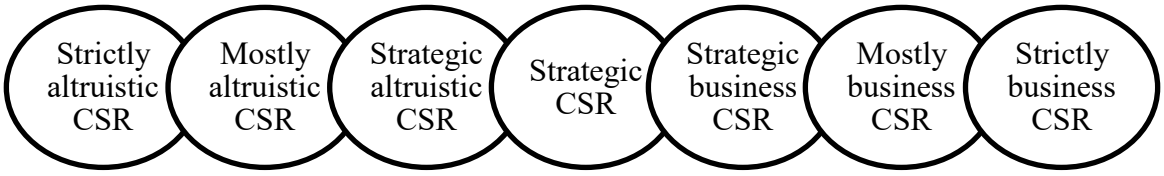
been met and the more complex needs that are further up Maslow's pyramid are recognized. The theory is that if a business ignores this demand and continues 'business-as-usual' instead of working towards meeting such needs it will be unsuccessful (McWilliams, *et al*., 2006; Porter & Kramer, 2007). Instead, business can recognize that potential growth, and work with the community to meet these needs, thus creating benefit for both the society and for the business: shared benefit. Strategic CSR is when the organization's core procedures incorporate CSR, making CSR a part of planning and daily practices (Werther Jr & Chandler, 2010). An example of a benefit that fits in this approach is the potential for increasing the applicant pool, as the business may seem more desirable as an employer because of their CSR initiative (Brammer, Millington, & Rayton, 2007). A healthy community is a benefit for a company operating within that community, which is the main argument for strategic CSR.

Altruistic CSR is based on the notion that CSR may not and does not have to benefit the organization's bottom line (Lindgreen & Swaen, 2010). The altruistic approach is not related to benefitting the firm, although it often does because this kind of act gets the most publicity (L'Etang, 1995). Moreover, oftentimes a corporation will receive reductions in taxes for charitable donations (Werther Jr & Chandler, 2010). This is doing something good only for the sake of doing something good- a key argument for altruistic CSR.

I submit that these different approaches to CSR do not exist in silos, but rather represent anchoring points in a spectrum of CSR approaches (Figure 3). We have developed this spectrum to represent the full range of CSR. For example, it can be difficult to determine where exactly strategic CSR ends and altruistic CSR begins. Rather than identifying CSR under one approach, the spectrum demonstrates the extent to which CSR combines approaches, such as strategy and altruism or strategy and business. The spectrum is bound by two extremes: i) the strictly business

CSR approach, and ii) the strictly altruistic approach. On the extreme business side, CSR is a vested corporate interest for which society benefits purely from the business transactions that occur in the corporation. The Friedman concept of business being responsible only for making a profit could be put on the extreme end of the strictly business CSR approach; however, it could also be argued that Friedman's logic is completely external to CSR and does not belong in the spectrum. On the opposite end of the spectrum is the extreme altruistic approach, where the sole goal of CSR is to improve the lives of the recipients without having any vested interests in any economic returns for the corporation. It is important to note that the polar ends of the spectrum are theoretical extremes, as most CSR approaches used by corporations today fit within the spectrum, depending on the perspective.

Figure 3: The CSR Spectrum



Being on the strictly business end of the spectrum means adhering to Friedman's view that the responsibility of a business is to make money (Friedman, 1970), but using a socially responsible angle for marketing purposes. A topical case that potentially fits close to the end of the spectrum is the recent Volkswagen© (Wolfsburg, Germany) scandal. Volkswagen claimed to be the first in the automobile sector to produce a low-emission, environmentally friendly car,

giving it a competitive edge over other manufacturers (Dans, 2015). The reality was that Volkswagen had adjusted the engine to emit fewer emissions during testing, but on the road the car did not perform to the same environmental standard, therefore the 'social responsibility' aspect was false (Dans, 2015). This is an example of strictly business CSR: Volkswagen found a way to appear socially responsible to improve sales.

On the opposite end there are examples of altruistic CSR that aim only to improve the world, with no stated or apparent interest in corporate benefit. Philanthropy is at the top of Carroll's four part CSR pyramid, suggesting that it is the highest level of CSR (Carroll, 1979). However, in the literature on CSR and therefore on the CSR spectrum, philanthropy (or altruistic CSR) is not considered higher or better than other forms of CSR. Rather, this spectrum demonstrates that altruistic CSR simply represents a different approach for which social benefit can be achieved. The rest of the spectrum aligns with actions, that to some extent, seek returns for the organization; it is only the strictly altruistic polar end of the spectrum that aligns with initiatives that are motivated only by *benevolence* and *anonymity*. An example that sits close to the far altruistic end of the spectrum is Bell Let's Talk, sponsored by Bell Canada, which is part of BCE Inc. (Montreal, Canada) (formerly Bell Canada Enterprises, Inc.) (BellCanada, 2016). The Bell Let's Talk initiative is focused on raising awareness about mental health, reducing stigma, promoting healthy workplaces, and funding research on treatments. The initiative is fully funded by Bell Canada, which to date has donated over $100 million (BellCanada, 2016). The main event that determines these funds is from the Bell Let's Talk Day, an annual event held in January, when for one day Bell Canada will donate five cents to mental health programs in Canada for every text message and phone call made on the Bell network, as well as any mention of Bell Let's Talk or use the Bell Let's Talk video on social media. The initiative has been

reported as successfully improving awareness of mental health in Canada (Quigley, 2016). There is no obvious benefit for Bell Canada, and the efforts of the initiative are focused on improving mental health in Canada. An altruistic approach to CSR is likely the most visible CSR, as it catches media attention, and therefore it can be argued that there is always some benefit to the organization or individual from altruism. Consequently, a strictly altruistic CSR approach must encompass anonymity, and again, is theoretical.

The spectrum demonstrates the melding of different approaches to CSR. As established, not only can combinations of approaches to CSR exist, but even within those combinations there can be variation. For example, if McDonald's (Oak Brook, Illinois), a fast food company, was to donate food to the Ronald McDonald House, it may be seen as truly altruistic because McDonald's is giving away their product for free, which means an immediate loss of revenue. However, McDonald's is also getting free advertising for their product, which in turn could increase revenue. This example demonstrates how the different approaches to CSR can co-exist in one initiative. The spectrum provides a means of defining the various ways that a company can act within the confines of CSR.

The CSR spectrum itself is a tool that can be used to consider how the different approaches to CSR exist and to determine what approach a corporation identifies with. This may vary within a corporation depending on the CSR initiative. In my perspective, the strategic approach is the most balanced, responsible approach for a corporation, such as IDEXX. Strategic CSR, and other approaches that include strategic CSR, address the reality that a corporation is responsible to its shareholders and therefore responsible for making a profit while at the same time ensuring that all parties involved in the CSR are benefitting. However, throughout the research in this thesis I consider all approaches within the CSR spectrum as possibilities for

IDEXX. This is because it is up to the corporation to determine where it works within the CSR spectrum. An assessment of IDEXX using the CSR spectrum is a part of the third objective of this research. Where on the spectrum a corporation identifies with will contribute to the approach to CSR from the corporate perspective, but this approach does not inform actions. The CSR spectrum helps to identify the motivation for CSR, but does not contribute to determining the process. The process can be determined by defining a particular model.

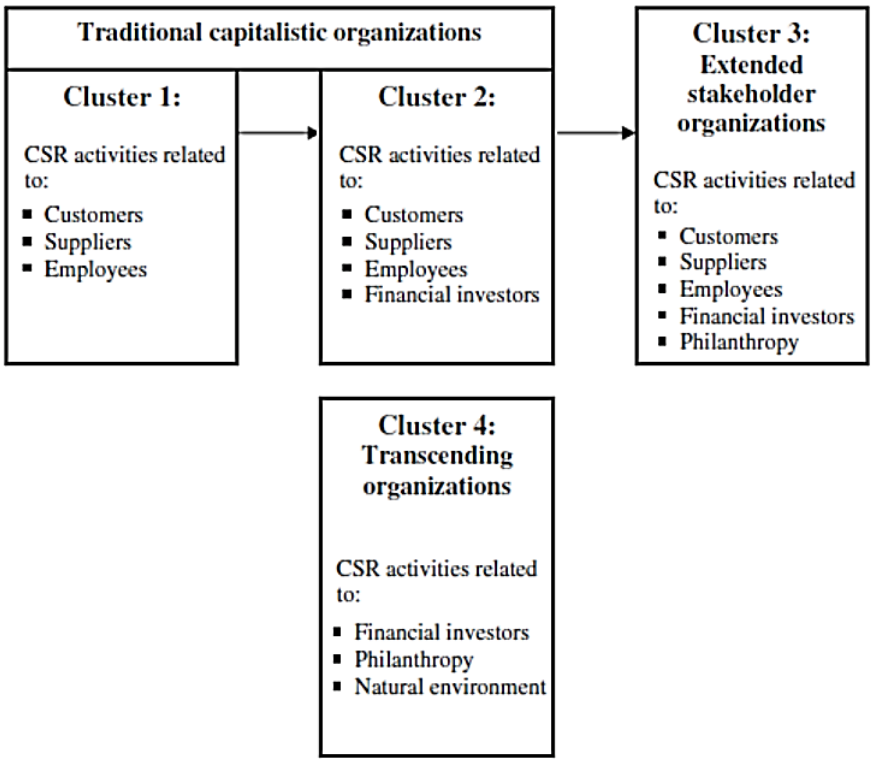
Models for CSR

In terms of doing CSR, there is a wealth of literature on the models for engaging in the CSR process. The specific method, herein referred to as a model, will determine the details of how CSR is pursued. Black and Härtel (2004) discuss five capabilities, or elements, of socially responsible companies, namely *stakeholder engagement, accountability, ethics, dialogue*, and *value-attuned public relations*. More specifically, *stakeholder engagement* includes stakeholder identity, meaning how the firm sees its interests connecting with stakeholder interests in the long run, and stakeholder management, meaning taking into account stakeholder interests in firm operations. The authors do not define stakeholder, so it is unclear whether stakeholders are referring to shareholders or to a broader group who have various stakes in the company. *Accountability* includes both the firm's reporting of performance for society in general as well as the employees' sense of the firm's accountability to its stakeholders. In this sense, there is explicit connection to accountability to the stakeholders but not necessarily to the wider community. *Ethics* also has a two-tiered measurement system, including both the firm's efforts to adhere to ethical behaviour and the employee's regard for others; both factors are meant to be within the workplace as well as externally. These ethical values are based on providing a caring atmosphere and a caring identity, which may be considered a firm-specific set of ethical values.

Dialogue refers to dialogue with stakeholders, which without a definition of stakeholder simply means a discussion with those who have a stake in the firm. This kind of conversation could include understanding values, thus engaging stakeholders at a non-hierarchical level, which could be incredibly impactful depending on who is included as a stakeholder. And lastly, *value-attuned public relations* refer to the extent to which the firm embraces public affairs, both in terms of supporting the work of public relations and allowing the information public relations provides to impact decisions. The purpose of public relations is to gather information about the stakeholders to understand and be able to address stakeholder interests. These capacities are all discussed as critical elements of CSR, and dialogue is considered especially important. By examining all five capabilities in a corporation, we can find the weaknesses in that firm's CSR (Black & Härtel, 2004). These criteria provide a model for CSR.

Lindgreen *et al.* (2009) discuss a model with four different 'clusters' within the CSR continuum that delineate different groups of stakeholders who can be focused on when engaging in CSR practices (Figure 4). Lindgreen *et al.* (2009) use Clarkson's (1995) definition of stakeholders as those with a vested stake or other interest in a company. The authors recommend that all four clusters should be taken into account when conducting CSR, however the third and fourth clusters offer an external perspective of the firm and thus may be more useful for older firms who are more well established. The conclusion is that there are many ways to be responsible (Lindgreen, *et al.*, 2009).

Figure 4: Lindgreen *et al.*'s Four Cluster Model for CSR[3]



Matten and Moon (2008) describe a binary model for CSR: implicit CSR, meaning the types of activities that are expected in every day practice, and explicit CSR, which involves going beyond expectations by addressing issues that are outside of 'business-as-usual'. The term implicit was selected by the authors because it refers to actions that are implied as everyday practice; thus, implicit CSR will likely not help a company differentiate itself in the market. Conversely, explicit CSR practices are often strategic, aiming to improve public image. They are motivated by public interest, competition within the market, and pressure from government and non-governmental groups. In terms of regulation, implicit CSR is often regulated whereas,

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explicit CSR is neither expected nor is it regulated (Matten & Moon, 2008). Both aspects of the model can contribute to business success.

Although there are many ways to do CSR, boundaries are delineated. CSR should be congruent with the business' objectives: high congruence with the cause is better when it comes to promotional practices related to purchase of the company's product (Menon & Kahn, 2003; Newell, 2005). Moreover, the business should use only a brief explanation of the company's relationship to the cause, as more elaboration often leads to greater suspicion (Menon & Kahn, 2003). Mohr *et al.* (2001) recommend choosing a cause that is affordable, as providing only a small contribution of the proceeds to the cause a company may appear cheap and exploitative of the cause for profit. Strong community involvement in any CSR practice will be the best way for there to be mutual benefit to all stakeholders (Newell, 2005). These boundaries help define how to do CSR responsibly.

Regulating CSR

Currently, legally regulated guidelines for what CSR should entail and how it should be reported are not common, but rather it is up to the individual corporations to regulate their own practices; this can create tension when pursuing CSR practices. The CSR literature uses the term 'regulation' to describe an institutionalized directive for how CSR is conducted; not referring to the specific activities, which are often regulated by government legislation (for example, environmental legislation in the discussed Volkswagen case), but referring to what CSR can be, the impact it has, and how it should be reported. Regulating CSR has been greatly debated, particularly within the global health community. When discussing 'regulation' many authors refer to 'soft-regulation' or 'self-regulation' (Campbell, 2006; Joseph, 2001), meaning that

corporations are setting standards of practice individually. There are certification organizations that offer systematic assessment of organizations, such as ISO 14001 Environmental Management System Certification that has a standardized method for certifying organizations as having best practices in environmental management. These organizations offer an objective assessment; however, they require proactive engagement by the organization seeking certification. This leaves room for ethically questionable practices by those organizations that do not seek objective assessment but still claim to be socially responsible, explaining the apprehension towards CSR from the global health community, amongst others. The theory is that a company would not want to do something that results in negative backlash from the public because a company is dependent on customers and stakeholders (Werther Jr & Chandler, 2010).

Regulating CSR is a common topic in the literature, particularly discussions about the different methods of regulation that could work. CSR is currently limited by discrepancies in international law and ethics which make finding a common set of regulations for CSR difficult (Joseph, 2002). Campbell (2006) offers the idea of having business make their own regulations; he expands on this by suggesting that corporations interact/collaborate with government to create regulations. Government regulation seems like a reasonable option, however because trans-national corporations operate from different countries, and there is not a trans-national government to regulate CSR, multi- and trans- national corporations are free to regulate themselves (Maynard, 2001). Joseph (2001) promotes the use of soft regulation in which business can voluntarily engage in international CSR initiatives. He argues that self-regulation has potential to be the best way to regulate CSR as long as the commitment behind it is real and the fundamental concept of CSR becomes the "driving force" for action (Joseph, 2001). In terms of accountability, Bendell (2005) suggests making CSR a partnership based activity, as it holds

the business accountable to its partners. The consensus in the literature is that giving business more freedom to regulate is best.

There are, however, other possibilities for regulation. Community-driven regulation is not a formal regulation method, but is instead what happens when a community is not content with what the business is doing, and raises concerns that change the action (Newell, 2005). In essence, community-driven regulation is when a community creates the pressure for firms to act responsibly (Newell, 2005). Media-driven regulation is another form of societal pressure on corporations; publicity is considered one of the best regulation mediums (Campbell, 2006; Maynard, 2001). There is also regulation driven by competitors, which can be effective in theory, but in practice it is uncommon, as usually all corporations benefit from perceivably immoral actions of a competitor (Maynard, 2001). Finally, there are online "watchdogs" that monitor companies using an "objective" set of regulations; these groups consider themselves as objective in that they usually do not have a stake in any corporation. There are different groups that monitor the corporate sector for claims of CSR, and evaluates the initiatives, such as CSR Watch (CSR Watch, 2015) and the Covalence Ethical Quote (http://www.covalence.ch/), which use their own set of rankings and reports on large companies. Because these groups provide a hypothetically objective assessment, they offer an unbiased valuation that anyone can use to decide whether they are interested in being a stakeholder, or even just a customer, for that company. These options go beyond the typical regulation players to include groups such as key stakeholders and objective third parties. Unfortunately, since there is not an accepted universal guideline, these groups still regulate according to their own biases, making regulation of CSR inconsistent.

This lack of formalized legally-binding regulations makes CSR a contentious topic: without regulations, it is difficult to hold corporations accountable for unethical actions. Concern for this is the reason for resistance to CSR (Werther Jr & Chandler, 2010). However, the field is producing a growing number of articles that see CSR in particular, and corporate sector involvement in general, as beneficial (Aguinis & Glavas, 2012; Carroll, 1999; Frame, 2005; Joseph, 2002). Moreover, there are increasing cases of CSR (Wagner, Lutz, & Weitz, 2009). As there is a growing need for formalized regulation, it may be something that comes into the agenda of academia and even international regulatory bodies such as the United Nations.

CSR in practice

To date there are a variety CSR initiatives spanning a multitude of corporate sectors, from the tech industry to the food industry. CSR can be done internally or externally. CSR initiatives that are meant to benefit people working in the firm are considered internal CSR. Internal CSR can include providing special benefits to the employees, such as providing travel insurance, in-office physicians, and full reimbursements for legal advice, like Google Incorporated (Mountain View, California) (Google Careers: Benefits, 2016). It could also be improving employee morale by providing paid work hours for volunteering in the community, like Xerox Corporation (Norwalk, Connecticut) (2014 Report of Global Citizenship, 2014). This type of internal CSR is usually directly related to human resources retention, and employee morale and productivity, so most activities are related to keeping employees healthy and happy (Werther Jr & Chandler, 2010). Going outside of the firm, the motivation for CSR broadens and can be focused not only on human resources retention/employee morale, but also on marketing/partnership building and customer retention, representing external CSR activities.

Examples of this type of external activity includes providing donations to charities. For example, Avon Products Incorporated (New York City, New York) hosts the Avon Breast-Cancer walk, a charitable event that raises money for breast cancer research, and all the funding to host the event comes from Avon Products Inc. (Edwards & Kreshel, 2008). This is an example of monetary donation-based CSR. Another example of monetary donation based CSR is McDonald's (Oak Brook, Illinois) sponsorship of the Ronald McDonald House. The Ronald McDonald House provides a temporary home for families with children who are in the hospital with various illnesses. Ronald McDonald House is the fast food restaurant's number one recipient of donations (Carroll & Shabana, 2010), thus, the House took the name of the corporation. There is also resource/expertise based CSR, such as The Home Depot Incorporated (Cobb County, Georgia) providing building materials and employee labour to Habitat for Humanity, an international non-governmental organization that organizes volunteers to build homes for families in need (Lichtenstein, Drumwright, & Braig, 2004). This initiative is completely in line with Home Depot's mission and expertise. These are all examples of the externally-practiced mostly altruistic approaches to CSR, as their purpose is to improve the wellbeing of the community where the corporations operate.

There are also examples of external CSR that are not based on donations but on raising awareness. One example is the Linda Lundstrom (a fashion designer) traditional Inuit parka (The Sewing Circle Project, 2016). Inspired by her own childhood, Linda Lundstrom partnered with John Kim Bell (an Aboriginal conductor and composer) to create a yearly competition for First Nations people to design a piece of First Nation's artwork; the winner's motif is on a line of Linda Lundstrom parkas (Westley, Zimmerman, & Patton, 2009). The coats come with a card explaining the motif and giving credit to the artist, and part of the profits go to the artist

(Westley, *et al.*, 2009). The purpose is to increase awareness of the talent and culture of First Nation's, as well as promote traditional practices. Another example of external CSR focused on raising awareness is the Product Red campaign. Product Red is a licensed retail brand, and the products are meant to promote awareness and raise funds for 'AIDS in Africa', and was taken on by companies such as the Gap (Amazeen, 2011). This campaign raised over US$2.5 billion for the cause; much of the success is credited to the incorporation into a business-as-usual philosophy (Amazeen, 2011). CSR that is external to the company can be about promoting community engagement in, and awareness of, causes in need of social attention.

Conclusion: CSR is a diverse topic

There are many different CSR methods that can be pursued and there are many different ways to act responsibly (Lindgreen, *et al.*, 2009). There is not one way to do CSR, and furthermore, there are no universally accepted set of regulations that could be used to legislate CSR practice. As mentioned, the specific approach to CSR will determine the motivation, and which approach to take is determined by the corporation and the initiative. Models for conducting CSR initiatives have been proposed, however they are still lacking several key components, including defining who a firm's stakeholders are or could be and how to engage with these stakeholders. My research aims to develop a framework that fills these gaps. This framework is meant to be a guide for corporations interested in pursuing CSR, but is not meant to prescribe to a specific approach. In regards to health-related CSR, a public health lens can contribute to determining these norms and values.

The convergence of public health, water governance, and CSR

The spectrum of CSR can be used to compare CSR to public health. Public health helps identify the population-health problems and brings methods for solutions. Corporations also have something to offer. CSR activities focused on providing the basic environmental health requisites of safe, sufficient, and sustainable water, air, food, and habitat (i.e., environments) will likely yield the greatest immediate public health benefits for a community since they meet the basic physiological needs of the members. Even a partially altruistic CSR approach aligns with the core principles and activities of public health, in that the goal is to improve the health and equity of people, including those aspects related to social interactions, environment, economy, and government. This public health goal does not encompass any intentional direct benefit for those conducting public health initiatives. Conceptually, altruistic CSR focuses on identifying a community need first, which is often made tangible or recognizable through a public health lens. An understanding of how the determinants of health affect the wellbeing of a community can ultimately focus the investments of CSR that yield the greatest improvement in the overall health outcomes/benefits for the community. The corollary to this statement is that public health research and evaluation can also provide the metrics of CSR success (i.e., measurable improvements in health and equity) by gauging improvements in health outcomes. Thus, a framework for CSR activity can include partnerships between the corporation pursuing CSR and organizations from the not-for profit sector (public health, NGOs) interested in improving health outcomes in communities.

In terms of water quality, and all the medical health and social health benefits that come with ensuring that safe water is being consumed, corporate investment can make a positive difference, particularly in LMICs. Public health outcomes can be used as proxy measures to

assess the impact that corporate investment is making. If the burden of waterborne diseases decreases, there is some evidence of an effective initiative. However, in some cases a reduction in waterborne disease may not be a measurable or achievable objective, even in situations where tangible public health infrastructure improvements (i.e., drilled wells) are made in the community. This is particularly relevant in communities facing a multitude of exposure pathways associated with waterborne enteric pathogens (i.e., recreational water exposures, food, hygienic/sanitary-related exposures). In terms of overall community health in LMICs, public health measures, both direct or indirect, can all be proxy measures of success and indicative of broader positive impacts on the community, including direct measures such as DALYs and Quality Adjusted Life Years (QALYs), and indirect measures such as average household income or productivity, general reporting of social health, school attendance, reduced gender disparities, and other determinants of health. A CSR initiative focused on WASH would therefore benefit from coupling with public health.

A positive example of CSR promoting public health is that of Merck & Co., Incorporated (Kenilworth, New Jersey), a pharmaceutical corporation that has a CSR branch called Merck for Mothers (Merck for Mothers, 2016). This organization works with PATH (formerly Program for Appropriate Technology in Health), a well recognized and established global health organization (PATH, 2016) as well as other local partners in five countries to ensure that women have access to care throughout their pregnancy; it also has a corporate donation scheme that provides grants to local non-profits working towards the same cause (Merck for Mothers, 2016). According to the Merck for Mothers website, 2553 health facilities have been strengthened and 5,081,508 women have been granted access to reliable care (Merck for Mothers, 2016). One academic study found that the project has had a positive impact on the health systems in Zambia and

Uganda, although questions have been raised about the sustainability of the project (Kruk *et al.*, 2014). There is also evidence that suggests Merck for Mothers has been a positive influence on maternal health, measured by reduced maternal mortality (D'Alton, Main, Menard, & Levy, 2014; Herrick, Harner-Jay, Levisay, Coffey, & LaBarre, 2014). Merck for Mothers demonstrates the potential for beneficial corporate engagement in promoting public health objectives.

International CSR, human rights, and corporate ethics

International CSR faces an additional interesting challenge: ethics. Ethics are not universal and a failure to work with ethical principles are often the reason that international work can fail (Rahaman & Varis, 2005). Ethics can be defined as the standards and moralities that define how a particular group, ethnicity, or individual acts; a person's ethics are in a sense the code that dictates right and wrong, and how to act and react in morally questionable situations (Rahaman & Varis, 2005). It has been argued that there are some universally accepted ethical principles that can be applied to water: dignity (the right to water to live), participation (everyone has the right to be involved in water management), as well as solidarity, equity, 'the common good', and stewardship, which stem from the reality that water is a mutually used resource that requires cooperation, trust, and sharing (Rahaman & Varis, 2005). Rahaman and Varis (2005) argue that people should do for others what they would like to have done for them. Thinking on an individual level, it is not only unethical but illegal to deny a person the right to water, and yet in many countries a government will fail to meet their corresponding duty to enable access to water. The reality is that water is a human right and as such water should not be the reason for inequities amongst and within nations (Rahaman & Varis, 2005).

Corporate ethics tend to vary amongst different countries. The normative principle that the corporate sector generally adheres to is to make a positive social and environmental impact while maintaining standard business practice (Heal, 2005). Relating this to CSR, the ethical principles seem to be rooted in adding social value (Heal, 2005). This is especially the case in social entrepreneurship, in which the primary focus of the corporation is social benefit (Mair & Marti, 2006; Martí & Mair, 2009). Context greatly impacts aspects such as power and resource availability (Martí & Mair, 2009). The struggle for the Western corporate world is how exactly to engage in international CSR and in an ethical way - a concept not clearly defined (Martí & Mair, 2009). Ideally, the actions taken should align with the politics, norms, and values of the country in which the corporation is working, however this may require deviation from standard corporate practice. Until there are international guidelines for CSR, a company must independently determine the ethical principles and methods for engagement. This is particularly relevant for corporations interested in promoting public health outcomes through CSR activities focused on providing basic necessities for communities. Transparency in actions is critical for CSR; for example, in 1962 Nestlé S.A. (Vevey, Switzerland) wanted to expand production of milk in India, however the farmers were struggling to keep their milk safe (Porter & Kramer, 2006). To improve their own business, Nestlé worked with the farmers to improve techniques and sanitation in milk production, benefitting both the farmers and Nestlé (Porter & Kramer, 2006). By having a common goal, and targeting the specific challenge, there is now more milk available in India.

Firestone Tire and Rubber Company (Nashville, Tennessee), and its presence in Liberia is a perfect example of differences in ethical norms and necessities, and how it resulted in negative outcomes for the company. In the 1990's Firestone had a rubber extraction plant in

Liberia, at the same time Liberia was in a civil war led by the military dictator Charles Taylor. Firestone was reported by Human Rights Watch as providing Charles Taylor, a known war criminal, with resources in exchange for continued permission to work in the country. Charles Taylor claims he had a working relationship with Firestone that encouraged him and provided resources for his attacks on the Liberian government. Firestone claims that they were benefitting the community by providing jobs and a creating a safe work environment for people on the verge of civil war (Miller & Jones, 2014). Regardless of intentions, the company violated the ethical standards to which it was held in the United States to adhere to the perceived norm of Liberia, where it was working. Firestone's actions negatively impacted the company's reputation (Miller & Jones, 2014).

Navigating corporate ethics while striving for public health outcomes is challenging, and requires careful consideration prior to action. Although an in-depth analysis on the intersection of corporate ethics and public health ethics is not within the scope of this research, ethical principles should be incorporated into the planning phase of any CSR initiative that is targeting public health.

The project: Developing a framework for sustainable, ethical, meaningful CSR

Background to the project

My research will be used to develop a structured framework that can guide a corporation when pursuing CSR initiatives related to practices focused on improving water quality and health outcomes through CSR partnerships with the not-for-profit sector. The project is a result of the desire of a corporation, IDEXX Laboratories, Inc., to partner with the University of Alberta to

develop a framework for a CSR program grounded in public health outcomes related to safe water.

This project originated from an earlier collaborative partnership started in 2010 with a student doing her practicum for her Master of Public Health with IDEXX and Samaritan's Purse, a humanitarian aid organization. The student used water quality testing kits that were donated by IDEXX to run a water-testing/education program in Indonesia with local health officials. IDEXX decided to pursue the idea further, with the aim of working with the University of Alberta in developing a long-term focus on CSR centered on environmental public health issues (e.g., water safety). IDEXX has partnered with the School of Public Health specifically, with the goal of developing projects that will utilize the skills and resources that the company has to offer. Although the one-time donations are using IDEXX's outputs, the company is looking to be involved in the outcomes as well, namely improved health of the recipients of the donations.

Introduction to the corporate partner, IDEXX

IDEXX Laboratories, Inc. develops, manufactures, and distributes various products and services for water, food, and veterinary diagnostics (livestock, poultry, and dairy markets) markets worldwide. The company operates in three sectors: Companion Animal Group, Water, and Livestock and Poultry Diagnostics. Within the water business, the company offers products to test water for microbiological contaminants, including coliforms, *E. coli*, Enterococci, *Pseudomonas aeruginosa*, and *Cryptosporidium/Giardia*. These tests are used in government laboratories, water utilities, and private certified laboratories across the world as a measure of the public health safety of water. IDEXX markets and sells the tests through marketing, sales, and

technical service groups, as well as independent distributors and other resellers. The company was founded in 1983 and is headquartered in Westbrook, Maine, U.S.A.

As a relatively young business, IDEXX has had a notable revenue growth rate and has expanded to twenty different countries, including Australia, Sweden, and South Africa. IDEXX has revenue of $1.4 billion with 5-7% annual growth over the last ten years. In the second quarter of 2015 the reported revenue was $413 million, an increase of 6% compared to the prior year period. Last year the full-year normalized organic revenue growth was 10%. The Water Business contributed greatly to this revenue, even though it is the smallest of the three segments. In 2014 the Water Business alone had revenue of $94.7 million and a gross profit of $62.9 million. Part of this overall income is returned to the global community in which IDEXX works, going to over seventy animal-related non-profit organizations, disaster relief organizations, and education programs for training in animal health, biomedical and technological research, work force development, innovation, and entrepreneurship. IDEXX has become a billion-dollar multinational corporation, and aims to use that power and expertise to build healthier communities.

Currently, IDEXX is involved in various CSR initiatives. Both internal and external CSR have the same goals for IDEXX. The core values of the company that drive these initiatives include sustainability, innovation, quality, partnerships, collaboration, and accountability (https://ca.idexx.com/en/corporate/about-idexx/our-purpose.html). For example, the GiVE (Global IDEXX Volunteer Efforts) program provides two works days per year for employees to go into the community and volunteer with different projects. This program is meant to increase employee morale, and give the employees a sense of humanity and self-fulfillment. It is also intended to make a positive impact in the recipient communities. Another example of internal

CSR is the employee Fitness Center. Providing a fitness center at work is likely to attract desirable employees to IDEXX and keep employee morale high, which will help with employee retention. In terms of external CSR, IDEXX donated water quality testing kits to the City of Calgary after the 2013 flood and provided diagnostic testing kits for pet health in Japan after the 2011 tsunami. One particularly relevant external initiative is with Dr. Bob Metcalf, an emeritus professor of Biological Sciences at California State University, Sacramento (IDEXX, 2016), who used Colilert® tests donated by IDEXX to test the effectiveness of his solar cooker on pasteurising water. These initiatives have the potential to improve and maintain employee morale as well as enhance community stewardship and they set IDEXX apart from its competitors. Unfortunately, these are often one-time investments that do not have any kind of sustainable aspect to them. IDEXX aspires to develop a sustainable external CSR program that is grounded in public health outcomes for communities.

Introduction to the non-profit partner, University of Alberta's Students' International Health Association (SIHA)

For purposes of the current project, collaborations were also established with a non-profit organization – the University of Alberta Students' International Health Association (SIHA) – as a conduit for exploring project-relevant situations for CSR partnerships centered on water quality and public health outcomes in a developing country (Tanzania, Africa). I chose to work with SIHA because the organization supported student research and was working on water projects, and was open to having a graduate student conduct research with them. Connecting with SIHA allowed for trustworthy engagement with the local people, as I was working as part of a group that the Tanzanian community members are comfortable with. Moreover, SIHA helped with the logistics (such as arranging a translator, accommodations, and transportation) and funding for

travel, as well as background knowledge about the communities. Working with specific communities in Eastern Tanzania provided a geographical focus, allowing for a more concentration for the project when exploring issues in communities faced with severe water challenges (quality, quantity, and safety).

SIHA works in two rural villages in Eastern Tanzania. Since 2010, SIHA has been engaged in health promotion and community development projects with community members in Kikongo and Mwanabwito, in the Kibaha district, about seventy kilometers west of Dar es Salaam. The projects that SIHA is currently involved in include maternal health education, water provision and treatment, bednet distribution, and capacity building with local NGOs. SIHA has been involved in the development of WASH programs over the last several years, however significant challenges persist. Working with SIHA provided the opportunities to explore first-hand the public health targets/barriers related to implementation of WASH programs in water-challenged communities in a developing country-context. This in turn provided an ideal basis for the grounding of a CSR framework aimed at improving public health outcomes for a community.

Goal of the project

The primary goal of my research was to develop a framework that informs the creation of a long-term, sustainable, ethical, meaningful CSR program for IDEXX and that fits the company's values in terms of what the company can offer and what shareholders expect. As an example, although IDEXX's Water Business' primary corporate focus is the manufacturing of water quality testing kits for public health screening of water safety, simply providing the testing kits may not be sufficient for a purely altruistic, public health-based CSR initiative by the company, since provision of the kits may do little towards improving overall health outcomes or

benefits to a community. In contrast, providing the kits may be considered sufficient for either a business-case or strategic CSR focus. The purpose of the framework is to be a starting point for long-term CSR initiatives that is informed by research.

The following three objectives were used to gather the information needed for developing this framework.

The **first objective** of my research thesis was to review current international activities associated with provision of safe water, in particular, the recommendations (including considerations, suggestions for implementation, and approaches), guidelines, and evaluations laid out for WASH-related activities in developing countries to help formulate an altruistic, public health based CSR focus around water safety. Specific topics within my review include: what has already been tried, what works well, and what has failed. My review provides the background to understand in the most recent WASH initiatives and public health practices, which helps inform the subsequent objectives.

The second objective was to use field research to identify the context-specific public health challenges associated with water and sanitation in a severely water-challenged community in Tanzania. Although various WASH-related guidelines and evaluations exist in the literature (i.e., Objective 1), these principles tend to be broad in scope. By working with SIHA, and learning from the local population, the field research enabled the identification of the barriers to WASH in water quality-challenged communities. This field-based assessment helped to contextualize the WASH recommendations/guidelines outlined in Objective 1 to identify critical gaps/barriers in current WASH-related activities and opportunities for improvement of these activities in the communities. The specific aims under objective two were to:

Specific Aim 1: Understand the context of the physical environment and barriers/challenges regarding access to safe water, and risk exposure to contaminated water sources in these communities.

Specific Aim 2: Understand the local perspectives on water (including quality and access) and in particular what the cultural or societal barriers may be regarding water safety in terms of access to, and knowledge about, safe water.

Specific Aim 3: Evaluate the possibility for using water quality testing kits from the perspective of the regional and local governments.

The third objective was to understand and evaluate IDEXX's current position in the 'CSR spectrum'. The CSR spectrum previously outlined defines the boundaries in which CSR exists, thus allowing corporations such as IDEXX to evaluate their current position in the CSR spectrum. This helps a corporation develop plans for CSR related to where they want to be on the CSR spectrum, and furthermore, what their expectations/outcomes are in regards to CSR investment. Therefore, where IDEXX wants to work on the CSR spectrum is important. Being transparent about the purpose that is driving IDEXX to pursue CSR will help determine where IDEXX should be on the spectrum. Pushing the boundaries into altruistic external CSR will help align this project with the public health goals.

Specific Aim 1: Understand what kind of initiative would be beneficial to IDEXX

Specific Aim 2: Understand the purpose of the current CSR initiatives at IDEXX, and the goals for future CSR initiatives

Purpose of the framework

The purpose of my research was to develop a framework that will serve multiple purposes. For IDEXX, the purpose of my framework is to improve the company's CSR. The framework is a tool for the corporation to use to expand their CSR initiatives. Beyond the benefit to IDEXX, the framework can also guide other corporations interested in engaging in CSR as well as by the public sector seeking informed methods for connecting with the corporate sector. Use of the framework should result in productive partnerships that could provide public health benefits to communities in LMICs. The utility of the framework is enhanced by its grounding in both the literature and empirical field research on small-scale WASH initiatives. For water-challenged communities, the framework will help to inform the development and sustained activity of projects that are meant to improve the health of community members by reducing burden of disease and disparity in health-related outcomes associated with water.

Chapter 2: Methods

The three objectives were addressed using different methods. Objective one was to review current public health practice associated with provision of safe water, in particular, the recommendations (including considerations, suggestions for implementation, and approaches), guidelines, and evaluations laid out for WASH-related activities in developing countries. The method for completing objective one was a literature review, focusing on seminal papers and a wide range of examples. Objective two entailed exploring the WASH context and current WASH initiatives in severely water-challenged communities in rural Tanzania. Two methods were used for objective two that were completed in two separate field seasons: the first season was an exploratory investigation to understand the water activities/challenges and the second field season was a qualitative description to understand the specific barriers to accessing water. Objective three was to understand and evaluate IDEXX's current position in the 'CSR spectrum'. The method for completing objective three was investigative, using written information from IDEXX's website, external media sources and literature, and data collected from one-on-one discussions with IDEXX employees. The synthesized data was used to develop my framework.

Method for objective one: Review of literature on WASH initiatives

A literature review was conducted to gain a solid understanding of the current research on small-scale WASH initiatives. The goal was to understand what is currently being done to improve WASH in the global context, and to learn about successes and failures and what was identified as positive and negative aspects of the initiatives that contributed to the outcome. The research question for this literature review was: What contributed to implementing a successful WASH initiative in water-challenged communities, globally?

Levac *et al.* (2010) provide a succinct layout for a scoping review that builds on that of Arksey and O'Malley (2005). For this literature review the same process was used to maintain consistency in the search for literature. The following explains the process used to answer the research question.

Identifying relevant studies

There were two tactics used to answer the research question. The first was to identify the key review articles that looked at the state of WASH initiatives. The second was to search the literature looking for articles that included examples of WASH initiatives and recommendations for success. Key words included "Water, sanitation, and hygiene" AND: review; effectiveness; implementation; evaluation. I searched the University of Alberta online library's search engine to identify articles from a variety of academic journals and databases, and I used Google Scholar to identify seminal papers and gray literature (Haddaway, Collins, Coughlin, & Kirk, 2015; Perryman, 2013).

Iterative study selection

Inclusion criteria were kept broad, with the only restraints being that the articles had to be available in English and the full text was available via open source or through the University of Alberta online library. The search was kept to articles later than 2001, after the Millennium Development Goals (MDGs) were implemented and WASH became a higher priority, as well as to identify recent literature on the topic (Imel, 2011). The exception made to the date of publication criteria was for seminal papers.

My process for selecting articles entailed reading the titles and abstracts, seeking out the keywords. When reading the abstracts in primary research literature I looked for and selected articles with explicit mention of a specific WASH initiative in primary research papers. In the review literature, I selected articles that included a discussion about the challenges and factors related to WASH initiatives. I chose to include articles in my literature review based on the approach to the WASH initiative described in the abstract, looking for a variety of locations, strategies, and organizations, but keeping the target population to water-challenged communities. My iterative process meant that as more articles were selected and read, the prominent authors in the field were identified and their specific articles were retrieved. Moreover, seminal papers in the field were sought out, such as Esrey *et al.*'s (1991) *Effects of improved water supply and sanitation on ascariasis, diarrhoea, dracunculiasis, hookworm infection, schistosomiasis, and trachoma*. The overall selection criteria were based on finding the most prominent and/or wide ranging research in the field.

Data organization

The information gathered from the selected articles included author(s), year, journal or other type of publisher, and all recommendations (which I then organized into considerations, implementation process, and varied approaches) made in regards to WASH initiatives. I read the articles and synthesized the key points related to my research question: What contributed to implementing a successful WASH initiative in water-challenged communities, globally? My notes were used for content analysis, which focused on bigger themes put forth by the articles. I used these themes to describe the current state of the field.

Methods for objective two: Context analysis and qualitative inquiry of water challenges in Tanzania

Context

The research presented in this thesis was carried out in Kikongo, a rural village in the Eastern coastal region of Tanzania. I lived in a town called Mlandizi, which is seventy kilometers west of Dar es Salaam, the economic capital of Tanzania (Figure 11). From Mlandizi, Kikongo is seven kilometers south, down a graded dirt road. A detailed description of the village is provided in Chapter 4. I chose this location and village because of SIHA's ongoing connection with the community members described previously.

Context analysis

During the first phase of the research, from May 17 to August 5, 2015, an exploratory approach was taken to gain a broad view of a complex problem. I describe this approach as a context analysis, as it entailed exploring the current context -including the social, physical, and political environment- to learn about the community before selecting a more in depth research method. The methods for data collection included observations of the physical environment surrounding the water sources, informal surveys of community members' perceptions of and knowledge on water quality, and a literature review on education on water quality in developing countries. This included a structured evaluation of a WASH initiative in Kikongo: four Biosand Filters (BSFs) implemented by SIHA. A Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis of the BSFs was conducted, using perspectives from SIHA's past executives, the community members involved in the implementation of the BSFs, and observation of the current state of the BSFs. The various perspectives were collected through in-person meetings when possible, and over email if in-person was not an option. The responses were put directly

into the SWOT analysis. A SWOT method was used because of its simplicity (Abdi, Azadegan-Mehr, & Ghazinoory, 2011; Helms & Nixon, 2010). The goal of these activities was to begin to learn about the issues and barriers faced in the community when accessing and using safe water. A context analysis was critical to informing the next steps, as it helped determine the appropriate method for my research in Kikongo in the following field season, from May 20 to July 15, 2016.

Qualitative inquiry

Before discussing and applying the chosen method -namely qualitative description- a general overview will explain two key elements of qualitative research that hold true for all qualitative inquiry. First, qualitative data are not meant to be counted or measured: the data provide in-depth insight into the research question, allowing for the data to provide a rich description of the results (Mayan, 2009). This means that this research will not have numbers or percentages to indicate importance or impact, but instead will use words and themes. Second, the researcher is an instrument during the research process, including data collection and data analysis; this means that the influence of the researcher on the data must be recognized (Flick, 2014; Milne & Oberle, 2005), and any possible biases the researcher may have are internally acknowledged (Creswell & Miller, 2000).

For myself, I have been involved in research related to water management since 2011 and as such, I have inherently developed my own perspective and opinion on the topic of international WASH development strategies. Specifically, I am aware of the importance of government support, of citizen engagement, and of mutual understanding of how water is being managed, which helped form my questions. Moreover, in the second field season I had already visited IDEXX and had developed an opinion about the corporation's capacity to be involved in

international development. Although my perspective had the potential to influence the way I conducted my research, I also brought my knowledge on the importance of community-driven solutions, and my understanding that it is the opinions and perspectives of the community members that matter when it comes to improving WASH. I kept this point in mind throughout the second field, but also drew on my own education and knowledge when asking questions.

Qualitative description: Introduction

The most important element of qualitative description that is unique to this method is that qualitative description requires a lesser degree of interpretation compared to other methods of qualitative research. This necessitates that the researcher stays close to the data (Milne & Oberle, 2005; Sandelowski, 2000, 2010). This means that throughout data collection and analysis the data are used directly to inform findings with minimal extractions or alterations rather than interpreting the data and using the interpretation to discuss the findings. Data collection can be through interviews, focus groups, and other forms of qualitative data collection. In my research, when the research assistant provided an interpretation, I took notes of the conversation; these notes, which I refer to as the field notes, were the data. During data analysis the data are used to understand the phenomenon being studied as it is with minimal interpretation, rather than diving into depths of interpretation. The researcher maintains a smaller degree of interpretation, using theory to guide the process but not to interpret meanings (Sandelowski, 2010). In short, qualitative description is used to provide an explanation of a complex situation using the words of those involved (Milne & Oberle, 2005).

Qualitative description: Working with language differences

As qualitative description requires a low degree of interpretation and requires staying close to the data, it is important that the same language/tone is used throughout the research process (Sandelowski, 2000). Because this research includes two languages, a limitation is that there is inevitable interpretation between English and Kiswahili. To mitigate discrepancies on behalf of the researchers between different participants, the research assistant/interpreter must accurately convey the discussion in a consistent way. Using the same research assistant for translating, interpreting, and analyzing helped with consistent communication. Moreover, having discussions with the research assistant about how the data are being understood and working to co-create meaning based on what was said in the community. These techniques allowed myself, my research assistant, and the participants to work with the challenge of the language barrier, and helped me stay close to the data.

According to Wallin and Ahlstrom (2006), it is critical to explain the background of the interpreter, as that individual plays a key role in the interpretation and analysis of the data. Pastone Madeha was selected by SIHA's In-Country Representative to work as a research assistant; he has a Bachelor of Education in Community Development and Adult Education from the University of Dodoma, where he learned about community development and qualitative research. During this research Pastone acted as a translator for the written documents (such as the consent forms and knowledge translation materials), an interpreter during the interviews, and a research assistant throughout data analysis. Although he did not have any prior experience as a translator or interpreter, Pastone speaks English at the university-level. As an interpreter, Pastone had an appropriate level of involvement with the community: he is from Tanzania and therefore is both linguistically and culturally literate, but he grew up in Morogoro (approximately 130 km east of Kikongo) and did not have a prior relationship with any of the participants. Pastone, from

hereon referred to as ‘the research assistant’, was involved in every step of the research and is therefore also considered a ‘tool’ in the research.

Qualitative description: Sampling

The participants were fifteen adult community members in Kikongo. The inclusion criteria were kept broad because the goal of the research was to get a general description of the current water context. Included participants were those who live in Kikongo, spoke English or Kiswahili, and could express their experiences with gathering water. Participants were individuals who have firsthand experience and who could provide ‘rich’ information (Weiss, 1995).

A community gatekeeper selected participants. This gatekeeper was a member of the Kikongo Water Committee, a local water organization that has worked with SIHA since 2012. Members of the committee are considered the leaders in water management in the community. The individual from the Kikongo Water Committee who was involved in participant selection was provided with an explanation of the research, along with a copy of the letter of ethics approval from the Regional Coastal Government (Figure 9) and a copy of the consent form. As the community gatekeeper, he identified participants who he believed would be willing to participate and who would provide first hand experiences in gathering water. He also ensured that any interested person could participate. This process allowed for the researchers to adhere to cultural norms when asking for participation as well as having participants who provided rich information relevant to the research questions.

Qualitative description: Data collection

The data gathering method was semi-structured interviews, starting with the first interview on May 27, 2016 and the last interview on June 28, 2016. The data collected was field notes, which included observations from physical assessments, notes from the interviews, and impressions/thoughts about observations and interactions. After each interview my research assistant and I debriefed to ensure that all the information was captured and interpreted according to a mutual understanding, and notes from these discussions were included as data during data analysis.

A qualitative interview helps develop a description of a phenomenon or process. It also helps to combine multiple perspectives of a phenomenon/process, creating a fuller picture that no one could individually provide (Weiss, 1995). Semi-structured interviews are common for qualitative description as this interview style allows the researcher to learn about challenges faced in the community through the voice of the community (Milne & Oberle, 2005; Sandelowski, 2010). This kind of interview includes open-ended questions as well as prompts to carry out a conversation about a particular topic (DiCicco-Bloom & Crabtree, 2006). In qualitative description, probing for clarification is an important part of the research as without clarification the data would be left up to interpretation (Milne & Oberle, 2005).

Some of the questions were inspired by the research of Stevenson *et al.* (2012) on water insecurity in Ethiopia, which used an anthropological approach. Semi-structured interviews were designed to allow me to learn about barriers and challenges to accessing and using water through open-ended questions. The questions, in English, were (see References

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Appendix A, Interview Questions in English and Kiswahili):

1) How do you get water?
    i. What is your experience getting water throughout the year?
    ii. What are the factors in the community that make getting water difficult?
    iii. When accessing water, what are things you face?
2) What are the factors in the community that make using water difficult?
3) If there was something that could be done to improve the current situation, what would it be?
4) Leaving the domestic uses of water, what else do you want to tell me about how water plays a role in your life/in the community?

A qualitative interview should follow different phases that set up the interviewer to ease the participant into the conversation and build trust. Mayan (2009) discusses the work of Rubin and Rubin (2005) who suggest that an interview should be roughly broken into five phases: i) introduction, ii) easing into discussion, iii) more difficult questions, iv) ending on a positive note, and v) thanking the participant. DiCicco-Bloom and Crabtree (2006) lay out the phases more generally into three phases: exploratory, co-operative, and phasing out. For my qualitative description these phases described by Mayan (2009) and DiCicco-Bloom and Crabtree (2006) were combined: the exploration phase included introductions and easing into the interview with an easier question. Once some trust and rapport was developed, the next phase (the co-operative phase) was when the more difficult questions were posed. After completing the more difficult questions the final phase entailed easing out and ending on a positive note, as well as thanking

the participant. I followed this process during the qualitative description to build trust and protect the participants from any stress or discomfort.

The location and style of the semi-structured interviews were chosen with the participant's comfort in mind. Interviews were conducted outside, often in a shaded area close to the participant's home or place of work. The participant, research assistant, and I generally sat in a triangle, allowing all persons involved to make eye contact and speak to each other. In Kiswahili the research assistant introduced us and the research, and explained the consent form. The style of translation the research assistant used was not simultaneous but instead the research assistant allowed the participant to reply fully before interpreting the response for me. This style allows the participant to feel heard and the interpreter to listen to what is being said rather than focusing on interpreting the words (Wallin & Ahlström, 2006). Both my research assistant and I endeavoured to make the participant feel comfortable and valued throughout the interview.

It is important to note that there were pre-existing relationships between some of the participants and I. Several of the participants were members of the Kikongo Water Committee. In the first field season (summer of 2015) the Kikongo Water Committee and I worked in a professional relationship. In the past, the nature of the relationship has allowed for honesty.

My research assistant and I worked to ensure that participation was volunteer-based by affirming that participation was completely voluntary to each participant, and iterating that it is up to each person as an individual to choose to participate. Moreover, the consent form was approved by the Research Ethics Board 1 (Figure 8) and was translated, both linguistically and culturally, by the research assistant who also explained the consent form verbally and asked for consent. During the interview we strived for continuous consent by reading the tone of the

conversation, and being prepared to end the interview if there is any apprehension from the participant (DiCicco-Bloom & Crabtree, 2006).

Qualitative description: Data analysis

Data analysis starts at the same time as data collection: the researcher immediately interprets and makes sense of what is being said (Mayan, 2009). Throughout the interviews the field notes are read and re-read, looking for patterns and new questions arising from the information; qualitative data collection and analysis are an iterative process (Mayan, 2009). The process of qualitative analysis in this qualitative description entailed a content analysis of the field notes, coding, categorizing, and theming the data looking for patterns.

Mayan (2009) describes coding and categorizing as the key pieces to data analysis that lead to the theme that addresses the research question. I followed Mayan's (2009) guidelines for coding and categorizing. The field notes were typed out, and coding was done manually using Microsoft Word 2016. According to Mayan (2009), coding comes first; it is the process of familiarizing oneself with the data, looking for common language and similar topics. This entailed reading and re-reading the data, noting trends and marking the data with words, or 'codes'. Categorizing is the next step that entails assigning labels to these trends, grouping codes together (Mayan, 2009). After categories are created the researchers ensure that they are internally homogeneous, meaning that all the data within the category are fitting, as well as externally homogeneous, i.e. the categories are distinct. My research assistant also went through my notes, making his own categories, and we worked together to ensure we had a shared understanding of the interviews. Once the categories are judged to be homogeneous and the researchers feel comfortable with the findings, the final step is to look for the element(s) that ties

the categories together: the themes. Once the interviews were finished I finalized the themes that I found from the interviews. The themes should answer the research question, and from there conclusions can be drawn.

Traditionally, qualitative research interviews will continue until theoretical saturation has been achieved, meaning that the codes and categories are repeating and nothing new is coming up. However, in qualitative description saturation can be difficult to achieve, because the goal is to gain different perspectives that may be similar or different (Milne & Oberle, 2005). For this research, 'saturation' was based on the general topics that were discussed, so although different perspectives on a topic may continue to arise, once no new topics are coming up I considered saturation to be reached, as I felt confident in the description of people's experience accessing water that I had developed (Mayan, 2009).

Rigor

Verification in qualitative research means being certain of the findings. To achieve this I followed Mayan's (2009) description of the recommendations laid out by Morse *et al*. (2002). Prior to starting the research I created a methodological 'walk through', determining my method, research question, data collection strategy, population, and data analysis plan, and I adhered to this plan throughout the research process. I worked with a local leader to select participants to have participants who can provide a rich description of their experience accessing water. I engaged in researcher responsiveness by openly acknowledging my biases and the potential of those biases to influence the research, and staying close to the data, avoiding any extensive interpretation. And throughout the research process I worked iteratively, collecting and analysing the data simultaneously (Mayan, 2009).

To further enhance rigor, I actively worked to be aware of my own thought process and decision making by keeping a personal journal and research journal, an accepted method for improving rigor (Mayan, 2009; Morse, *et al*., 2002). The research journal included an audit trail that recorded decisions made and justification for those decisions. I used my personal journal to reflect on my potential biases and my personal thoughts on the research. I also kept an online blog in which I reported on my research progress and my personal learning.

A contested tactic for validation of qualitative analysis that I did not use is member checking, or informant validation. Some argue that member checking is a tool for maintaining rigor in qualitative description (Neergaard, Olesen, Andersen, & Sondergaard, 2009). This tool may be used, however it is should be treated with caution, because neither researcher nor participant have a final say on the results, but rather they are co-constructing knowledge (Mayan, 2009). Therefore, in my research, member checking was used to validate the understanding that the researchers and participant have with each other during the interviews, and again during analysis between my research assistant and I.

Inter-researcher trustworthiness and reliability was developed between my research assistant and I over the first week by discussing the research proposal, and working on developing a common understand of qualitative research using journal articles (Wallin & Ahlström, 2006; Williamson *et al.*, 2011) and a textbook on qualitative inquiry (Mayan, 2009). Throughout the research process we engaged in peer review, including a debrief after each interview and comparison of notes. This contributes to verification in qualitative research (Morse, *et al*., 2002). My research assistant did not go through the full process of coding, categorizing, and theming, however he did create his own list of concepts from the interviews and we compared my categories to his list (Mayan, 2009). I did not have a second researcher

code the data because qualitative inquiry is based on the co-creation of knowledge between the participants and I, and another coder would not contribute to that knowledge development. According to Mayan (2009) and Morse (1997), intercoder reliability does not contribute to rigor in qualitative research. All translated documents (research consent forms, research questions, and after the research, the knowledge translation report) were looked over by another translator to ensure validity.

Ethics

The context analysis was non-invasive and did not require formal ethics review, as was confirmed by the University of Alberta Research Ethics Office (Figure 10). Review by the Research Ethics Board 1 was required, and the research was approved, for the qualitative description analysis in the second field season (Figure 8). Research clearance was also provided by the Regional Tanzanian Government (Figure 9).

Methods for objective three: Mind mapping and investigating CSR at IDEXX

To understand and evaluate IDEXX's current position in the 'CSR spectrum', a comprehensive understanding of what IDEXX is currently doing for CSR was needed, as well as a tool for demonstrating the findings. Using lessons from the Special Topics in Social Enterprise course in the School of Business at the University of Alberta, a mind map was selected as the appropriate tool for demonstrating the information found about IDEXX's current CSR values and activities. This mind map incorporates the ideas learned during the course, and represents IDEXX's current internal CSR initiatives as well as their intentions for future CSR projects. Information about IDEXX was gathered through a variety of sources, including the IDEXX website and media sources that were publicly available, by searching IDEXX on the Google Inc.

search engine. The purpose of this mind map was to demonstrate how IDEXX's company values compare to their current actions and future plans. This helped determine current gaps in the CSR initiatives and inform future decision-making.

The mind map was made using Freemind, version 1.0.1, an electronic mind mapping program (http://freemind.sourceforge.net/, 2013). Freemind was selected because it is a free tool that is easy to use and allows for the map to be converted to text for readers who do not have the software. The benefit of the visual map is that it makes the comparisons between values, actions, and future directions easy to follow. Using an electronic map demonstrates IDEXX's CSR, both current and future.

To further understand what kind of initiative would be beneficial to IDEXX, employees were directly involved in the process. During a visit to the IDEXX Headquarters in Westbrook, Maine on November 2, 2015 a presentation was made on the opportunities that were identified in the first field season. After the presentation, a tour of IDEXX was provided to gain a better understanding of the company and how it operates. Moreover, individual meetings with six key employees led to discussions about the direction that IDEXX would like to see the project go. Outcomes of the meeting helped determine how the general staff and leaders in the Water Business see IDEXX's role in improving public health and the most appropriate style of CSR. Moreover, it clarified the purpose of the current CSR initiatives at IDEXX, and the goals for future CSR initiatives. The process of explaining the project and discussing the aspects with IDEXX leaders and staff provided the dialogue needed to understand where IDEXX sits on the CSR spectrum.

Data synthesis

I utilized the data collected for all three objectives to develop my framework, which is the outcome of this research. To do this, I considered the implications of each data set and how the implications interacted amongst each other. This required reflecting on different players involved, and what the commonalities in their goals were. The intersections became the components of the framework.

Chapter 3: Review of Current WASH Initiatives

Introduction to and definition of WASH initiatives

Waterborne disease is the cause of 1.5 million deaths per year (Prüss-Ustün, *et al.*, 2014) and many of the determinants of health are directly or indirectly impacted by access to quality water. Evidence demonstrates the utility of improved WASH, for example with reduction in diarrhoea (Cairncross, Cumming, Schechtman, Velleman, & Waddington, 2013; Waddington & Snilstveit, 2009). By definition, a 'WASH initiative' refers to the broad action taken to improve WASH. Studies on WASH describe a variety of initiatives that boast successful results. However, the academic literature is prone to publication bias, in that research with positive results are more likely to be published (Egger & Smith, 1998). In reality, many countries with poor access to water and sanitation are home to the remainders of failed WASH projects (Montgomery, Bartram, & Elimelech, 2009). Failed projects are those that did not have a positive impact for the health of communities and whose infrastructure deteriorated due to physical breakdown of the technology or a failure of management. The complexity of WASH inevitably leads to a need for complex solutions; as a multitude of factors involved that can impact WASH, including the geographical/cultural context, considerations for implementation, and the process of implementation and maintenance. The purpose of this literature review is to synthesize the current recommendations (including considerations, suggestions for implementation, and approaches) on how to make a WASH initiative successful.

Prior to discussing the recommendations for WASH from the literature, I will discuss two important factors: a) the context of WASH initiatives, meaning the physical, social, political, economic environments, and b) the evaluation of WASH initiatives, meaning assessing the

process and impact of the initiative. Next, I will discuss the considerations that have been found to contribute to the success of an initiative and recommended process for WASH program implementation. Finally, I will analyze the recommendations in the context of an example. An important caveat to this discussion is that any given WASH situation is entirely dependent on context, and so it is critical to start with a consideration of context.

The iterative process of collecting articles warranted screening articles during the search, resulting in a total of thirty-four articles being selected using the inclusion and exclusion criteria. From these articles, twenty-five were included in my review. The academic articles were from journals on health, environment, international development, and water. The five articles from gray literature were published by international NGOs or from the World Health Organization, including two from the *Bulletin of the World Health Organization*. The articles on primary research were quantitative studies, focusing on evaluating WASH initiatives using quantitative public health metrics such as prevalence of diarrheal disease or presence of *E. coli* in stored household water. The articles from gray literature focused on best practices and discussed strategies for a successful WASH initiative. The review articles were systematic reviews, except for Lantagne *et al*.'s (2006) review which was not a review of literature but of household water treatment options, and Waddington and Snilstveit's (2009) article which was a synthetic review.

Context of WASH initiatives

Context refers to the social, cultural, political, economic, and physical environments that embody a WASH initiative. Success partially depends on the players involved (i.e., NGOs, civil society, government, corporate sector), and where the initiative is being implemented. Context can also be temporally affected, restrained by what may be happening economically, politically,

and/or socially within a country. Moreover, inherent cultural values may be considered a necessary aspect in terms of the acceptability of a new technology or program related to WASH. Other aspects to consider include knowledge and education on WASH, perceived risk of illness, and willingness to pay for services in exchange for improved health (Dreibelbis *et al.*, 2013). There are also many physical aspects that can affect the context of WASH, such as infrastructure needed for delivery of quality water (i.e., pipelines) and availability of raw materials to provide technological solutions. The following section explains some of these elements in more detail.

The who, where, and when aspects of a WASH initiative make up the external factors that will influence its success. Generally, the more stakeholders engaged in WASH-related decisions, including NGOs, civil society, government, corporate sector, and local religious leaders, the more integrated the initiative will be. Montgomery *et al.* (2009) suggest that engaging local government and other leaders is the key to building trust with community members because these stakeholders have strong influence within the community network, and community members must be engaged to provide the local perspective and identify local needs. The authors discuss a particular example from Moser and Mosler (2008) who examined the diffusion of a new water treatment technology in Bolivia, using interviews to understand what motivated people to adopt the technology. They found that 'opinion leaders' heavily influenced adoption; although the identity/social position of these opinion leaders was not identified, a key point is the influence of the social network (Moser & Mosler, 2008). Thus, it is best to consider and engage as many stakeholders as possible, as they may influence each other. Location and timing will also influence a WASH initiative. The political, social, and economic environments as well as the social norms, culture, and values will greatly influence the capacity of a community to be involved in a WASH initiative (Integrated Water Resources Management,

2000). Civil wars, political and social unrest, and any kind of social tension are not conducive to successful WASH initiatives (Cross & Coombes, 2013).

Culture also contributes to the context and is therefore a necessary element to be considered when implementing a WASH initiative. Culture includes gender roles, norms, and religious beliefs, all of which will impact the type of WASH initiative that is acceptable (Zakiya, 2014). Beliefs about the environment and provisional human necessity (i.e., waste removal) will impact the uptake of a new product, service, or system, depending on how the program changes the way humans interact with their environmental water source. For example, in rural Bangladesh amongst the Muslim communities it is socio-culturally and religiously unacceptable to handle human excrement, making sanitary waste disposal systems that must be cleaned manually an inappropriate technology (Uddin, Muhandiki, Sakai, Al Mamun, & Hridi, 2014). Working with religious leaders in addressing acceptability is the first step to improving uptake, because they have influence on cultural norms (Uddin, *et al.*, 2014).

It is also important to consider what influences an individual's perceptions about WASH, including general knowledge of WASH, perceived risk of water-borne illness, and willingness to pay for improved WASH (Dreibelbis, *et al.*, 2013). These aspects are interrelated in that understanding of WASH impacts perceived risk and willingness to pay. For example, Jalan and Somanathan (2008) examined how education on WASH influenced willingness to pay. Tests were taken from households that were already treating their water as well as households that were not. The "treatment" group was told the results of the test and a "control" group was not told the results. Eight weeks later both groups were asked about changes in treatment, with the purpose of testing to see whether knowing that the water was "dirty" (meaning tested positive for *E. coli*) or "clean" (no *E. coli*) impacted behaviours. The results demonstrated that more

information on water quality increased water treatment, as well as willingness to pay for such treatment. This example focused on education about water quality and how it influenced an individual's choice to treat the water. Understanding the need for improved WASH is impacted by education (Zakiya, 2014).

Finally, it is also important to consider what physical challenges may affect WASH initiatives. Physical challenges to improving or implementing WASH initiatives include limitations in current infrastructure and water sources, available resources, and technology for water distribution, treatment, and waste disposal. For example, in Kenya, one study examined rainwater collection as an improved water source in reducing diarrheal disease in a community (Garrett *et al.*, 2008). The community did not attempt to make a large rainwater collection system because of limited time and resources but, instead, community members used buckets to collect rainwater for their own households, which still decreased the risk of diarrhoea in the community (Garrett, *et al.*, 2008). Nevertheless, the solution was dependent on climatic reliability of the rain. This example demonstrates that the availability of resources will limit what can be done in a community, but also that local small-scale solutions can have a positive impact on the overall burden of waterborne disease.

In summary, for a project to have a successful impact it is important to know the context and what is already present, including the availability of the necessary people, tools, and resources (Dreibelbis, *et al.*, 2013). These will determine what is both sustainable and reliable. How to measure that success, however, depends on the intended purpose of the initiative.

Evaluation of WASH initiatives

The common goals of WASH initiatives are to reduce water-borne illness, improve access to water, promote water treatment, address an outbreak, or react to new societal needs. The goals of the WASH initiative determine what needs to be evaluated with respect to its impact, what worked, and what could be improved. For evaluation, success refers to a WASH initiative that had the intended positive impact and failure refers to initiatives that physically broke down; there is also the potential for non-success, meaning a project that did not have a positive impact but was still physically functioning correctly. However, it is worth noting that success, non-success, and failure are not necessarily the appropriate labels to use when considering evaluation, as there can be varying degrees of success and unintended impacts. Evaluation itself is complex, and developing full evaluation criteria is not within the scope of my thesis.

The elements that make up a WASH initiative discussed above (i.e., the who, when, where, how, what, and why) can all be used to measure the overall impact of an initiative. The details such as who is involved can be included in the process evaluation; process evaluation measures the effectiveness of the process of the initiative (Patton, 1987; Saunders, Evans, & Joshi, 2005). Process evaluation focuses on the design, sources of information used, and how those data are collected, managed, and used (Saunders, *et al.*, 2005). The goal is to understand what worked well and what could be improved; stakeholders are especially important in contributing to this evaluation (Patton, 1987). But in particular, the 'why' -the purpose of the initiative- will determine what is being focused on as the outcome, and therefore will be used for the impact evaluation (Khandker, Koolwal, & Samad, 2010), which is ultimately what is used to determine the overall success of the initiative in terms of public health impact.

There are many ways to measure public health impact, both quantitatively and qualitatively, especially when it comes to WASH initiatives. Different factors that can be measured quantitatively include: burden of water or soil-transmitted infections (Strunz *et al.*, 2014); bacteria, virus, and protozoa presence on hands, toilets, and in faeces (Greene *et al.*, 2012); absenteeism from school (Freeman *et al.*, 2012); nutritional status (Dangour *et al.*, 2013); observing behaviour change (Huda *et al.*, 2012); diarrhea-associated mortality (Cutler & Miller, 2005); gender-based violence (Cairncross, *et al.*, 2013); and respiratory infections (Aiello, Coulborn, Perez, & Larson, 2008; Rabie & Curtis, 2006), among others. These measures all require rigorous quantitative data collection, including baseline measures, as well as methods and tools for measurement.

Qualitative measures may offer a deeper understanding of 'why' public health outcomes were achieved or not, using tools such as field observations (Dreibelbis, *et al*., 2013; Hanchett, Akhter, Khan, Mezulianik, & Blagbrough, 2003). The most effective way to understand this 'why' is to work with the people who experienced the change. They are experts of their own lives so they know best how to measure the impact something has on their quality of life. Qualitative information gathered from a community will reveal the impact on the community according to the community. Thus, one possibility for measuring impact would be to get each community to create personalized criteria. The exact qualitative questions that would be asked would be based on the intervention.

The outcomes of water initiatives are not often restricted to the anticipated and intended outcomes (Loevinsohn *et al.*, 2015). The unanticipated results can directly affect the intended outcome, either positively or negatively. For example, Loevinsohn *et al.* (2015) discuss a study conducted in Buenos Aires, Argentina that found reduced childhood diarrhea after provision of a

safer supply of water (Galiani, Gonzalez-Rozada, & Schargrodsky, 2009). Loevinsohn *et al.* (2015) expand on the original findings Galiani *et al.* (2009) to demonstrate that there was a compounded benefit: households receiving the safer supply no longer had to pay for a private water source and therefore had more money to pay for quality food, which could also contribute to reduced diarrheal illness rates. Loevinsohn *et al.* (2015) conclude that Galiani *et al.* (2009) may have found an exaggerated impact because of the poverty of the population being studied. Ideally, WASH evaluation should measure all possible outcomes, not just disease reduction. Because water can affect so many of the determinants of health, WASH strategies are complex, and their evaluation can benefit from different perspectives.

Measuring the impact of a WASH initiative is complex because human-based systems are dynamic, and therefore, changes cannot always be necessarily attributed to the initiative (Blum & Feachem, 1983). The various strategies discussed in the literature vary based on time, region, and community, and the only apparent reality is that there is not a linear trajectory for improving WASH - there are however, certain strategies and aspects that contribute to success.

The section that follows analyses recommendations from the literature with respect to successful WASH initiatives. I included research as describing a successful WASH initiative if the authors so characterized the initiative and discussed the extent to which the stated goal(s) of the initiative was met. All twenty-five articles used were taken to have provided valuable contributions to the literature on how to make WASH initiative successful. Following this discussion of considerations, I discuss the recommended implementation process, followed by the recommended approach.

Considerations for WASH initiatives

From the literature, eight key considerations for a WASH initiative were identified, namely user-friendly programs, social marketing, sustainable resources, endogenous development, local government participation, communication, changing perceptions, and behaviour change. The considerations can be roughly divided into three categories: tangible needs, community participation, and education provision. This literature review utilized the current meta and systematic reviews to gain a broad understanding of the current climate in the WASH field, thus the considerations are meant to be lessons learned from the field.

Category #1: Tangible needs for WASH initiatives

The first category of considerations is tangible needs, which refers to the physical considerations that contribute to the development needed for a WASH initiative. The considerations are: user-friendly programs, social marketing, and sustainable resources. These considerations are key to the successful implementation of a new product, service, or system (herein referred to as a program) to improve WASH. First, any program should be user-friendly, meaning the end-user is able to consistently benefit from the initiative without external assistance (Garrett, *et al.*, 2008; Lantagne, Quick, & Mintz, 2006; Rothstein *et al.*, 2015). This requires thinking of many aspects of a program, including the amount of time it takes to use the product, if there are any other resources needed, and the availability of parts when the technology fails. A successful example in rural Kenya was a hypochlorite-based point-of-use treatment product was developed in a 500-mL bottle, so that one bottle would last a six-person family for about two months (Garrett, *et al.*, 2008). The bottle was labelled with the instructions in the local language and with pictograms, intended to make the product accessible to people

who are illiterate. The lid of the bottle was designed to be used as the measuring device for treatment, so that the only other resource needed was a storage container. Success in this study was determined by the overall reduction in diarrhea rates found in an eight-week follow-up (Garrett, *et al.*, 2008); this particular initiative was a part a multi-pronged approach, therefore the extent of the impact specifically from the treatment could not be determined. However, the product was designed with the user in mind and according to this study it contributed to a reduction in diarrheal disease (Garrett, *et al.*, 2008). The importance of a user-friendly program lies in how easily it can be adopted into daily life.

The second consideration is the available resources and labour capacity when developing WASH technology, and ensuring sustainability by utilizing only what will be consistently available in the community (Brown, Proum, & Sobsey, 2009; WHO, 2009). As an example, in rural Cambodia ceramic filters were distributed to households; the research followed up on a sample of the households approximately three years later, finding that there was a decline in filter use of about 2% per month. The researchers did not claim this initiative to be successful or unsuccessful, however the decline was attributed to the lack of available replacement filters, so once a filter was broken it could not be replaced (Brown, *et al.*, 2009). Sustainability of an initiative is dependent on the availability of the resources needed to support the technology.

Finally, social marketing helps to make WASH technology a valued investment by making the program a commodity that the average consumer will want. For example, Population Services International (PSI), an international NGO that focuses on social marketing, was involved in the development and distribution of Clorin, a point-of-use water treatment option. Lantagne *et al.* (2006) described the initiative as a "successful social marketing intervention that creates demand for a product and makes it widely available through the commercial sector" (pg.

5). The success of this project is related to uptake of the product through social marketing, where sales went from 732 bottles/month in October 1998 to 132,000 bottles/month in November 2003 for treating water for drinking. However, in an independent cross-sectional study, Lantagne *et al.* (2006) found that diarrhea rates were not different between those who used Clorin and those who did not, and further that there was only residual chlorine in 13% of the households who claimed to use the product (Olembo, Kaona, Tuba, & Burnham, 2004). Given that a cross-sectional study cannot be used to infer causation, and that there could be factors influencing the results that were not accounted for, this study alone is not indicative of the impact the Clorin initiative had on health. What can be concluded is that the initiative successfully increased awareness and demand for water treatment.

In summary, the first consideration for a WASH initiative is the availability and utilization of tangible needs. User-friendly programs, social marketing, and sustainable resources are the three aspects that are key for the tangible needs of WASH initiatives. They contribute to the sustainability of an initiative. The best way to accomplish the development and marketing of the tangible needs is to involve the community in the production of the product.

Category #2: Community participation in WASH initiatives

Community participation is the second broad category for designing WASH initiatives, within which there are three considerations: endogenous development, local government participation, and communication. Endogenous development is the use of internal social, cultural, political, and economic norms to drive the process of development, "…empowering local people to take control of the solutions to development challenges that they face" (Zakiya, 2014). Although the term itself is not common in the literature, it encompasses the concept of

community-driven initiatives discussed in many articles: using tradition to help build and guide the process (Cross & Coombes, 2013); working off of current social norms (Rainey & Harding, 2005); and participation as active involvement (Cross & Coombes, 2013; Lantagne, *et al.*, 2006; Waterkeyn & Cairncross, 2005). In Zimbabwe, an NGO started local health clubs, and were run by trained community members who taught club members about how to improve WASH in their community, and subsequently put those lessons into practice, such as building latrines (Waterkeyn & Cairncross, 2005). Those who joined the club had statistically significantly better hygiene practices (measured using seventeen different variables such as handwashing). The authors concluded that "…if a strong community structure is developed and the norms of a community are altered, sanitation and hygiene behaviour are likely to improve" (Waterkeyn & Cairncross, 2005). Moreover, the authors noted that the choice of a club is in line with traditional social structures, making the initiative culturally appropriate (Waterkeyn & Cairncross, 2005). This example demonstrates the elements of endogenous development and a successful WASH outcome in terms of behaviour change.

Actively engaging local government and leaders is also key, as these players are instrumental in building community trust, and engagement of local leaders often results in increased participation from the broader community (Lantagne, *et al.*, 2006; Montgomery, *et al.*, 2009; WHO, 2009). Moreover, the local government can provide the link to many different facets needed for the development of a project, such as mobilizing resources (Cross & Coombes, 2013; Montgomery, *et al.*, 2009). Another example by Lantagne *et al.* (2006) discusses the impact of engaging with the district health department and training local health workers to disseminate information about solar disinfection of drinking water (SODIS) as a viable treatment option. The authors concluded that having the local government involved contributed to the

sustainability of the project. A key component of the implementation was not only engaging trusted local health officials, but also providing the relevant education to those leaders who could in turn provide this education to the community.

Finally, transparent and open communication with all stakeholders is a key consideration for the successful implementation and maintenance of a WASH initiative (Integrated Water Resources Management, 2000; Jones, 2011). Inclusive communication may require professional translation and materials that are accessible to those who are illiterate (Cross & Coombes, 2013). An example of open, non-hierarchical communication in Mexico is a Groundwater Technical Committee that provides a medium for communication between the water users and the government authorities, allowing for communication across sectors and incorporates democratic decision making (Integrated Water Resources Management, 2000).

In summary, the active engagement and continuous inclusion of the recipient community is key for a WASH initiative. For there to be strong community participation, community members and local government must be at the core of the WASH initiative, and there must be open communication amongst all stakeholders. An important element of community participation is a mutual understanding of the WASH-related challenge being addressed.

Category #3: Education for WASH initiatives

Education represents the last of the three categories for developing WASH initiatives. Broadly speaking, education means increasing understanding of why improved WASH is important and the available options for improving WASH. This is especially important for women (Hoque, Juncker, Sack, Ali, & Aziz, 1996; Nanan, White, Azam, Afsar, & Hozhabri, 2003). Within education there are two aspects to consider for a WASH initiative: changing

perceptions and behaviour change. Negative perceptions of certain programs lead to failed initiatives, therefore education that targets negative perceptions and promotes values related to WASH that are important within the community will provide a foundation for a successful WASH initiative (Akpabio & Takara, 2014; Brown, *et al.*, 2009; Cross & Coombes, 2013). This is linked to behaviour change, as changing behaviours starts with changing perceptions, and behaviour change is the crux of a successful WASH initiative (Cross & Coombes, 2013; Dreibelbis, *et al.*, 2013). Examples of how education is included in a WASH initiative are present in most of the preceding examples, from the bottle of Clorin having appropriate instructions for Kenyans (Lantagne, *et al.*, 2006) to the trainers teaching members of the Health Club in Zimbabwe (Waterkeyn & Cairncross, 2005). Education is a key step in achieving change and it requires meeting people within their reality, and working to engage individuals to achieve improved WASH.

It is important to recognize that education is not unidirectional. All stakeholders must understand each other, and realize that everyone has a role in both teaching and learning. A part of this is taking time to learn the indigenous knowledge about how the community understands their environment (Zakiya, 2014), and this often entails learning the social and cultural norms, and political and economic structures of the community (Waddington & Snilstveit, 2009). Education needs to be considered with respect to the different levels within the community that will require 'behaviour' change (societal/structural, community, household, individual, habitual) (Dreibelbis, *et al.*, 2013). Zakiya (2014) discuss a case study in Ghana where several NGOs worked together with the local community to learn about their beliefs and values. This knowledge sharing experience resulted in greater understanding of the important role of spiritual beliefs in water, such as the purpose behind having a borehole dug beside a river that was

considered sacred (Zakiya, 2014). This kind of information contributes to the design of a WASH initiative, especially at the beginning of the initiative.

Implementation process for WASH initiatives

Building from these eight considerations for successful WASH initiatives, there is a suggested process for implementation of WASH initiatives. Planning prior to implementation is critical for a successful initiative (Dreibelbis, *et al.*, 2013; Montgomery, *et al.*, 2009; Moser & Mosler, 2008). The implication is that much of the activities related to considerations come during the pre-implementation phase, whereas during and after implementation the activities are more focused on evaluation.

Pre-implementation planning is when community participation should begin, starting with the process of building trust. This requires entering into the community slowly and thoughtfully, taking time to build trust and engage with the community members at different levels (Montgomery, *et al.*, 2009; Zakiya, 2014). External stakeholders start learning the indigenous knowledge held within the community and active citizen participation in teaching and planning commences. Beginning the process of community participation requires bringing together citizens who represent the community (Cross & Coombes, 2013), and it is important to include the most impoverished community members (Hanchett, *et al*., 2003). Early adopters of an initiative are those who are involved in the process, therefore, locals must be engaged prior to implementation (Moser & Mosler, 2008).

During implementation, it is critical to keep all stakeholders who were engaged during pre-implementation actively involved in the process. This requires continuous communication, planning, process evaluation, and assessing changing needs (Integrated Water Resources

Management, 2000). It requires constant check-ins with those involved and active discussions (Cross & Coombes, 2013). Without consistent and open communication the trust that should have been built in the pre-implementation phase can be lost (Jones, 2011). By the time the initiative is being implemented all planning, coordinating, and engagement should be initiated, making the implementation phase more focused on open communication.

Post-implementation is when follow up and impact evaluation become critical, which entails finding out what else is needed, what worked, and what needs more work (Curtis & Cairncross, 2003). Discussing the project with the stakeholders is an important part of evaluation (Fenn, 2012; Patton, 1987; Saunders, *et al.*, 2005). An evaluation strategy should have already been developed during the pre-implementation phase, making the process more about maintaining contact to measure impact using pre-assigned indicators. Consistent engagement is important post-implementation until the initiative is considered sustainable.

Approach to WASH initiatives: Focused versus holistic

Although much of the literature provided common ideas and understandings of what is needed to successfully implement a WASH initiative, there was also some conflict in regards to the scope of the initiative. Specifically, there is contention as to whether to focus on one of the four aspects of WASH -water supply, water treatment, sanitation, and hygiene- or to target WASH as a single, holistic (meaning encompassing all four aspects) initiative. In regards to the context of safe water, there is debate on whether to focus on water supply (e.g., drilling wells for high quality, but less accessible, groundwater that does not need treatment) versus water treatment (e.g., collecting accessible rainwater but which always needs to be treated).

Starting with the arguments for the most focused approach, multiple systematic reviews have concluded that it is better to focus on one aspect of WASH, often specifically focusing on water treatment. This conclusion is based on appraisals of research on the impact of different WASH initiatives on diarrhea (Clasen, Schmidt, Rabie, Roberts, & Cairncross, 2007; Curtis & Cairncross, 2003; Waddington & Snilstveit, 2009) as well as other WASH related diseases (Esrey, *et al.*, 1991). In regards to focusing WASH efforts on water treatment, a meta review found that initiatives that focused on water treatment resulted in a reduction in rates of diarrhea regardless of other WASH improvements such as those related to water supply, sanitation, or hygiene (Clasen, *et al.*, 2007). In contrast, other reviews argue that improving water supply is the first step to improving WASH overall (Fry, Cowden, Watkins Jr, Clasen, & Mihelcic, 2010; Schmidt & Cairncross, 2009). Waddington and Snilstveit (2009) explicitly state that initiatives related to water treatment, hygiene, or sanitation are better than focusing on water supply, but Fry *et al.* (2010) argue that studies that measure improvement in water supply are usually not specific to the amount available to individuals, making it difficult to measure impact related to population. There is little research suggesting that focusing only on sanitation or hygiene would be the most beneficial approach to WASH. Although there is some agreement that a single focused approach is best, which aspect of WASH to be targeted is contested, making the arguments for the focused approach inconsistent.

There is also an argument for a combined focus on water supply and sanitation for WASH initiatives. One of the papers that argues for this approach is one of the most commonly cited pieces of literature on WASH initiatives, a review by Esrey *et al.* (1991), which discusses evidence demonstrating the most effective initiatives for reducing diarrhea and other WASH-related diseases were those that targeted water supply and/or sanitation. Almost two decades later

another review found similar evidence (Schmidt & Cairncross, 2009). Targeting supply and sanitation simultaneously adheres more closely to the multi-barrier approach compared to a single focused approach, making it a relatively more rounded approach, but also one that may be more costly to implement.

Finally, some research suggests that the best approach is a holistic one that tackles water (supply and treatment), sanitation, and hygiene together (Garrett, *et al.*, 2008; Hoque, *et al.*, 1996; Lantagne, *et al.*, 2006; Nanan, *et al.*, 2003; Waterkeyn & Cairncross, 2005). This argument recognizes that the four aspects are interconnected and a holistic approach is conducive with the multi-barrier approach (Garrett, *et al.*, 2008). This approach comes in the wake of the United Nations declaring sanitation a human right along with water, and putting both to the front of the development agenda (UN, 2010b). The evidence for this approach is more recent and adheres to the key public health principle of holistic solutions.

These positions are important to consider, as the approach to the WASH initiative will determine what the program will look like. However, WASH is always context-specific, therefore the evidence for each argument is also context-specific. Thus, this evidence should be included as just one perspective when creating the design for the WASH initiative, along with the indigenous knowledge and other stakeholder perspectives.

An example of a WASH initiative

An excellent example of a well-evaluated WASH initiative (albeit a failed WASH initiative), is provided by Rainey and Harding (2005), which discusses a project in Kathmandu Valley, Nepal, that sought to improve water quality using SODIS. In a village of 5685 people the two common types of water sources were wells and a pipeline with taps located outside the

village; the primary method for water treatment was straining water through a cloth. The stated goal of this study was to learn about the indigenous knowledge on WASH to fill the research gap on SODIS acceptability in Nepal, and to apply this knowledge to future initiatives. The initiative consisted of a one-time training session and provision of the clear plastic bottles needed for treatment. The study was conducted in 2002 over six months, from February to July. The village was separated into three wards, of which fourteen households were selected from each ward, two households to serve as controls and twelve to receive the SODIS initiative. During the two-hour training session participants were educated on how water becomes polluted and how polluted water can make a person sick, as well as on how the SODIS treatment makes water safe. At the end of the training session the participants were provided with the clear bottles needed for SODIS (Rainey & Harding, 2005).

Follow up consisted of surveys focused on self-reported diarrhoea as well as perspectives on SODIS and on the participants' current sources of water (Rainey & Harding, 2005). Of the thirty-four households that were given the two-hour training and resources, three were using SODIS routinely. The results demonstrated that there was little understanding of the disease transmission route and concern about the amount of time SODIS takes to treat water and the overall acceptability of the treatment method. A major factor that led to this low acceptability was the lack of understanding of what causes diarrhoea, including the belief that warming water during SODIS will make it worse. Despite the training, many did not believe that the SODIS would work. The greatest reported barrier to routine uptake was the added time burden SODIS required compared to not treating the water (Rainey & Harding, 2005).

Rainey and Harding (2005) state that community involvement in identifying the challenges and finding solutions to use of SODIS could greatly increase uptake of the treatment,

and the following recommendations were made: implement public health education that targets women; work off the current social norms of boiling water for the sick and pregnant; integrate SODIS into the school setting; make the bottles needed for SODIS more available; and consider all possible water treatment solutions. Nevertheless, the initiative was not successful in improving WASH (Rainey & Harding, 2005).

There are several factors in this study that could benefit from the considerations presented in my literature review. Firstly, there was no pre-implementation community engagement; the product was brought to the community without any preliminary conversations or community participation in the planning of the initiative. Moreover, the initiative included education from an "outsider" who was not a trusted member of the community, and there was only one two-hour training session. This led to a lack of trust in the trainer and the treatment option, which meant the product would not benefit from social marketing. The initiative utilized a scientifically sound water treatment option, but failed to follow a responsible approach to implementing the product, rendering the product contextually useless.

Applying the recommended considerations and process, the best step for improving this situation and ideally implementing a successful WASH initiative is to re-start the process. As examples, researchers could:

- Respond to the concern about the time burden by considering a different treatment method that required less work and treated the water more quickly.
- Implement technologies that do not require the importing of resources and use what is already available in the village.

- Bring all possible options for water treatment to the community and discuss the most suitable method together.
- Once impact evaluation has demonstrated positive outcomes in increasing water treatment and reducing diarrheal disease (or other determinants of health), utilize social marketing to spread the knowledge and success of the treatment method.
- At the onset, build trust amongst the stakeholders, including the researchers, local government, and involved community members, and ensure open communication and understanding of the context, the potential solutions, and the capacity of the community to lead the initiative.

Discussion of findings from literature review on WASH initiatives

As evidenced, community-driven WASH initiatives, or endogenously developed initiatives, are the most effective WASH initiatives because they utilize a grassroots approach. Often "community engagement" in a WASH initiative entails consulting the community once a solution has been developed, as was the case in the SODIS example. Endogenous development requires that the community is involved in the entire initiative (Zakiya, 2014). Even more impactful is to let the community lead the initiative. Ellerman (2009) talks about having the community "in the driver's seat" of development, putting the NGO in the background as a resource for needs identified by the community. The findings in many different WASH initiatives, including the SODIS example, suggest that community engagement is a necessary component of success (Cross & Coombes, 2013; Lantagne, *et al*., 2006; Rainey & Harding, 2005; Waterkeyn & Cairncross, 2005).

There are, however, potential barriers to community engagement, such as language, which determines how a concept is understood, experienced, and discussed. Language is a determinant of health that is not often considered and is not included in the list of health determinants listed by the Public Health Agency of Canada (PHAC, 2011), but will still contribute to the overall impact of WASH. Language as a determinant of health is not widely prevalent in the literature, although there have been a few studies that have demonstrated the impact of language on health, specifically on new-comers in Canada (Dunn & Dyck, 2000; Pottie, Ng, Spitzer, Mohammed, & Glazier, 2008). When translation of language is a component in a WASH initiative there will be an added challenge in communicating needs and engaging all of the stakeholders. Even so, it can be necessary to address a language barrier depending on the nature of the WASH initiative; this should be included in the pre-implementation community engagement strategy.

Community engagement is a core component of public health. Any strategy that involves working with people is complex. A complex strategy does not offer a solution but instead offers ways to address the problem as it suits at the time (Westley, *et al.*, 2009). When it comes to WASH initiatives, each barrier, such as language and communication difficulties (social/culture barrier), drought/water availability (physical barrier), or lack of local leadership (political barrier), should be worked on using the key considerations identified in this literature review. A WASH strategy should utilize an adaptive framework that works with the complexity of community engagement.

Chapter 4: Field research on WASH Challenges in rural Tanzania

Introduction to WASH in Tanzania

The population of Tanzania is 51,045,882, with a population growth rate of 2.79% and a life expectancy at birth of 61.71 years (CIA, 2014). In Tanzania 23 million people depend on unsafe water for all their needs (WaterAid, 2016). This is especially an issue with the poor (Madulu, 2003). With such a large portion of the population still using an unimproved water source and lacking sanitation, one of the greatest infectious disease threats in this country is waterborne illness, especially diarrheal diseases (CIA, 2014). Consequentially, primary school enrolment rate is not at 100% even though school is mandatory for children from age seven to fifteen (Burke & Beegle, 2004). Absenteeism due to time spent fetching water was found to be a particularly pertinent reason for missed school in Northern Tanzania (Burke & Beegle, 2004). In addition, 21% of children in Tanzania are child labourers (CIA, 2014). Furthermore, Tanzania faces drought and extreme weather fluctuations (Shongwe, van Oldenborgh, van den Hurk, & van Aalst, 2011); the particular impact of this depends on the region within Tanzania.

Introduction to Kikongo, Tanzania

Kikongo is a rural village with a population of about 800 people. It is located approximately nine kilometers south of a paved main highway that leads to the economic capital city of Dar es Salaam (approximately seventy km east), and seven kilometers south of the larger town called Mlandizi where I lived. From Mlandizi there is one graded dirt road that leads to Kikongo, just wide enough for two cars to pass each other. The most common mode of transportation is by motorcycle, but bicycles and small trucks are also used. The only road that a vehicle can drive on in Kikongo runs through the east side of the village. Just off this road is the

dispensary (local health clinic) and Kikongo's primary school. Behind the primary school is a rainwater collection system that SIHA had constructed by a Tanzanian company in 2012. Beside the health dispensary there is a water tap for a pipeline that brings water from a neighbouring village that was built by the government in 2012. This tap is one of the four taps in Kikongo that is connected to the pipeline. There are three different types of sources of water in Kikongo: two shallow wells, one pipeline with four taps, and rainwater. These are the only water sources available for Kikongo's 800 residents.

A 50,000-foot view of WASH in Kikongo: Results from the context analysis

From the visual observations of the water sources and surrounding environment conducted during the 2015 context analysis, a map for Kikongo was created. This map demonstrates the proximity of the water sources to the village and the locations of the BSFs (Appendix C: Maps). In terms of frequency and patterns of use of these sources, an accurate evaluation was not feasible during my research. However, this measurement of usage will be critical before implementing a new initiative, as will be discussed.

The context analysis revealed that water scarcity was a major concern for Kikongo. One of the main sources of water for Kikongo is rainwater. In Tanzania rainwater availability is seasonal; there are two rainy seasons in the region, one longer season from March to May and one shorter season from October to December (Tanzania, 2016). In Kikongo, during the rainy season there was sufficient water for the community in the wells and public rainwater collection systems, and residents also collected rain at home using handmade gutters attached to their roofs and personal storage containers. When rainwater was available it was the preferred source. Another source that Kikongo technically had access to was the pipeline that was built by the

government. The pipeline was connected to a neighbouring village called Ngeta (henceforth I refer to this pipeline as the Ngeta pipeline, as it was called by the community members), and used a diesel-powered engine to pump water to other villages like Kikongo. Unfortunately, the Ngeta pipeline did not supply water consistently, usually running only twice a week.

In Kikongo there were two shallow wells located outside of village, one that was two kilometers northeast from the dispensary and the other three kilometers southwest from the dispensary. These wells could only be accessed by ungraded sand paths, passable by foot, bicycle or motorcycle. They were both partially covered, with an open space for people to put their own buckets into the well to get water. The water level in the wells fluctuated greatly between the rainy and dry seasons. Water availability for the wells a was sufficient during rainy season, however, during the dry seasons there was extreme water scarcity and the sources were less reliable.

Although the WHO recognizes two of these sources (Ngeta pipeline and rainwater collection) as 'improved', meaning adequately protected, all of the sources are considered at risk of contamination and require treatment (JMP, 2016). In terms of protecting water through having proper sanitation facilities, in Kikongo there were toilet facilities located behind the dispensary and at the school. Those were the only options for improved sanitation. Like access to the water sources, access to water treatment options were also scarce. Water Guard (a chlorine based point-of-use treatment option) was available for purchase in local stores, and there was, in 2016, one functioning BSF in the primary school. There was also the option of boiling water. These were the only water treatment options available to people living in Kikongo.

Community perspective of WASH in Kikongo

I engaged the community further to learn about the local perspective on water quality. I spent one day in Kikongo talking to community members about what they think of the water quality in their community. Thirty-two people in Kikongo were questioned, aiming for saturation in the answers to get the general sentiment although in no way providing a full representation. The results of the informal survey in Kikongo revealed that most people said that they 'do not know' about their water quality; there seemed to be little concern or certainty about the water quality. Two men identified the need for instruments to measure water quality and two people suggested that if water is clear it is safe, indicating relatively little awareness about testing the water quality and water safety. It was identified that because they have consumed the water all their life, it is safe. One person said that he "leaves it to God". The key theme is that they know water is safe when it does not make them sick. Overall, my survey revealed the biggest challenges related to water quality were the lack of knowledge of water quality and what makes water safe.

Strength, weaknesses, opportunities, and threats of SIHA's Biosand Filter WASH initiative in Kikongo

In 2013 and 2014 SIHA attempted to help community members in Kikongo improve water quality by providing BSFs as a water treatment option (SIHA, 2016). BSFs were chosen because the 2013 SIHA team found a non-profit organization located in Morogoro (130 km west of Kikongo) that made BSFs (SIHA, 2013). In 2013 three BSFs were installed, one at the health dispensary, one at the community center, and the last at a private household in the community. A fourth BSF was installed a year later at the primary school. The purpose of choosing these four

places was to be able to evaluate the effectiveness of the BSF in different locations in terms of public use. The same year that the fourth BSF was implemented in the school, the SIHA team expanded the project to include education on WASH, and addressed the concerns that community members had about poor sanitation practice and lacking resources at the Kikongo primary school. By 2015, three of the four BSFs were dried out as a result of being unused; the only BSF still in use was in the school. In 2016, two of the previously unused BSFs were moved to the primary school in the other village that SIHA works in and are being used regularly (SIHA, 2016).

I chose a SWOT analysis as an evaluation tool; I conducted this analysis with SIHA in 2015 during my context analysis, to assess the initial implementation of four BSFs in Kikongo. Strengths and weaknesses refer to the challenges that were within SIHA's control to manage (i.e., internal origin), such as education on the BSFs; opportunities and threats were elements that are outside of SIHA's command (i.e., external origin), such as amount of rain (Abdi, *et al.*, 2011; Helms & Nixon, 2010). To understand the process for the implementation of the BSFs, I consulted three different groups: the 2014 SIHA team, who were responsible for implementing the fourth BSF in the school; the 2015 SIHA team, who were responsible for evaluating the BSF project; and the Kikongo Water Committee, who were consulted on the project.

First, I gathered the perspective of the SIHA 2014 team, who planned, organized, and implemented the fourth BSF. This perspective was of those involved in the decision to continue the BSF project, including the pre-implementation discussion, implementation, and use of the BSFs (Table 1). In summary, the team thought that prior to implementation the BSF seemed to be a simple treatment method that they believed would be accepted by the community because it results in tasteless water. The team saw the placement of the BSFs in different places (three

public, one private) as a strength as it was meant to promote water treatment; the main concern was that because SIHA paid for the installation the project might not have been sustainable once the community had to take on additional costs. This team had limited insights on post implementation, as no one returned and no evaluation was done during their time in Tanzania. From the SIHA 2014 perspective, the BSF project was positive in that there was opportunity for expansion and the physical presence of the BSF increased awareness of water treatment.

I also collected the perspective of the 2015 SIHA team, who were not involved in the implementation but were meant to evaluate the project. Their perspective provided a more objective and critical perspective of the implementation and use (Table 2). The information on implementation came from the final reports (SIHA, 2013, 2014). The 2015 team offered an extensive discussion, as evaluation was part of their responsibility. Some of the more frequently discussed aspects included the weaknesses in regards to the implementation process, mostly related to a lack of education provided and a lack of community ownership of the process. The project was considered a failure from the perspective of the SIHA 2015 team, as the BSFs were not being used properly.

Table 1: SIHA 2014 SWOT Analysis of Biosand Filters as a WASH initiative in Kikongo

Pre-implementation		
Internal origin	Strengths • Use of sanitation method without the burden of travel • Central location with supervision • Simple structure and construction with local materials • Easy to teach use and maintenance • Easy to maintain • NGO partner reachable by car • Results in tasteless water (vs. Waterguard) • Limited cost with continued use	Weaknesses • Had not been implemented before and representing a completely new technology for the community • Only able to supply limited amount of water (72 litres/day) • Unclear whether community would be fully accepting of the technology • Expensive initial upfront cost
External origin	Opportunities • Potential to expand to every household	Threats • Lack of understanding of how to use the BSF could cause misuse • Misuse of the BSF could cause it to be ineffective • Lack of reporting in log book could mean use is not recorded
Implementation		
Internal origin	Strengths • Targeted different settings: private, public, and community • The school BSF targeted youth demographic • Support of school teachers and students via “Water	Weaknesses • Unclear impact of BSF in disease prevention • SIHA paid for the entire project, meaning there was no buy-in from the community

	Club”	
External origin	Opportunities • Potential to adopt use of BSF in different settings: private, public, and community • Through the youth, opportunity to involve households (other demographics) in BSF and other water sanitation projects	Threats • Unsustainable because the community members cannot afford the initial cost, making the BSF initiative dependent on SIHA
Post-implementation		
Internal origin	Strengths • None identified	Weaknesses • None identified
External origin	Opportunities • Potential to adopt similar set-up in other villages	Threats • Alternative, more accepted water treatment method could render the BSF unused

Table 2: SIHA 2015 SWOT Analysis of Biosand Filters as a WASH initiative in Kikongo

Implementation		
Internal origin	Strengths • Pilot project was small, not overwhelming the community or SIHA with too many BSFs • Targeted a variety of different settings (household, dispensary, public shop, school) • The water committee was involved in the implementation • Putting one in the school helps to teach younger generations about the importance of water treatment (for school BSF)	Weaknesses • Education on how to use the BSF was provided to only one teacher for the school BSF • How to maintain the BSF was not communicated to the woman in charge of the dispensary BSF • Household BSF was provided to someone living alone, who did not use enough water to keep the BSF in good condition

		• Responsibility for each BSF was not delegated effectively • Providing the BSF free of charge reduced the perceived value of the BSF • Partnership with SON International not guaranteed to be sustainable because of distance from Kikongo (not in SON's operational range), therefore continued partnership with SON International could be expensive and unsustainable • BSFs were implemented for community use, and the BSF developed for household use- can filter a maximum of 72 litres a day meaning not everyone who has access to the BSF can use it • Create perception of SIHA providing aid/donations • Failed filters create frustration, disappointment, discouragement • The unused BSFs are visually present in the community, making them seem useless • Moving the BSF could result in breakage. Choice of location is critical
External origin	Opportunities • The Kikongo Water Committee is a local partner interested in supporting the project • There was no other filtration option available for the community	Threats • SON International could refuse to work with SIHA and provide assistance in the future • Other community members could become jealous that some have more access to the

	• Local government supports SIHA's initiatives • SIHA has a relationship with the school (water club)	filters • Water source is far away, time spent gathering water makes taking more time to filter the water difficult • Diarrheal disease and water quality is not a great concern in the community, BSF may seem unnecessary
Post-implementation		
Internal origin	Strengths • Temporary improved clean water consumption	Weaknesses • No one maintains the community BSFs • 3 of the 4 BSFs were dried out, leaving the failed project visually apparent • Community members would need to be only drinking BSF-cleaned water to see an impact on diarrheal disease
External origin	Opportunities • In the school context, students may see positive impacts from using the filter and from WASH education and then spread that knowledge to their families (potential for future use of BSFs or other water quality tools) • Economic prosperity could lead to increased demand for BSF	Threats • Other NGOs may see the dried-out filters and provide other options. (e.g. Plan International providing an alternative filter for the dispensary) • Causes other than drinking water quality are the cause of diarrheal disease, making the project have no impact • A drought could mean not enough water is available to be filtered • Economic downturn could mean there is no extra funds to have the BSF fixed when it needs maintenance

Finally, I talked to the Kikongo Water Committee, whose perspective offered the local view of the entire process. I consulted the local leaders for the project, getting the local perspective on implementation and use (Table 3). Because of translation and communication barriers, rather than discussing the BSF project in terms of pre-implementation, implementation, and post-implementation I focused the conversation on each of the different BSFs. The BSF that was installed outside a shop had one main strength, that the water coming out was visibly more clear, however according to the Kikongo Water Committee the community members did not understand the importance of treating or how the BSF was treating the water. Thus, the Kikongo Water Committee thought that people should first understand this before using the BSF. The BSF in the school was thought to help with this education, yet the Kikongo Water Committee thought that the teachers did not know enough about the BSF. There was also a brief conversation about the private BSF in one of the Kikongo Water Committee's house in which the Committee member expressed that he liked the BSF and he thought it worked well, and he did not say anything more about it. The main point discussed, which was considered both a weakness and a threat, was that there was not enough understanding of the purpose and use of the BSF.

Table 3: Kikongo Water Committee's SWOT Analysis of Biosand Filters as a WASH initiative in Kikongo

On the community BSF		
Internal origin	Strengths • Good for providing quality water • Although there is no way to measure bacteria, there was a visual difference, you could see the water was clean • Cost is less, because you only pay for the BSF one time	Weaknesses • Takes too long to filter the water • People do not understand the importance of treating their water, and do not understand how the BSF treats the water • It causes conflict, people will re-contaminate each other's water while it is being filtered
External origin	Opportunities • None were explicitly mentioned	Threats • The community lacks knowledge on water quality and water treatment, so treatment can be seen as unnecessary. People first need to understand the importance of water treatment
On the school BSF		
Internal origin	Strengths • The school is a foundation place, teaches knowledge they can take home • Create interest in more education on all aspects of WASH	Weaknesses • Not enough understanding of how the BSF works and how to maintain it for teachers and students
External origin	Opportunities • A community without knowledge on WASH who could be taught	Threats • Not enough access to water

In summary, SIHA and the Kikongo Water Committee saw the BSF as a durable, low cost, culturally acceptable tool to filter water that had the potential to decrease the prevalence of diarrheal disease. The weaknesses identified during and after implementation were that the BSF requires filling each day and the BSF needs to be managed carefully to function optimally; unfortunately, a perceived lack of ownership resulted in a lack of routine maintenance. The Kikongo Water Committee suggested that the root cause and greatest challenge was a lack of education about the BSF and WASH. Water scarcity was considered a threat to the initiative because water scarcity can cause the BSF to cease functioning but is outside of SIHA's capacity to address. All parties identified the major barriers to the success of the BSF as the lack of ownership and accountability for the BSF, and the lack of conviction for the value of the BSF as a tool to provide safe and clean water.

I would like to note that the BSF alone is not effective in treating water to acceptable drinking quality, as the WHO Drinking Water Guidelines affirm that no *E. coli* should be present and the BSF alone does not have total bacterial removal capabilities (CAWST, 2012; WHO., 2004). Chlorine tablets are meant to be used on the finished product to ensure public health safety from form bacteria and viruses (CAWST, 2012). This was an oversight by the SIHA teams involved in implementation and evaluation. The effectiveness of any potential WASH program must be thoroughly researched before implementation. As well, an evaluation plan should have been developed prior to implementation.

Table 4: Summary of SWOT Analysis of Biosand Filters as a WASH initiative in Kikongo

	Helpful	Harmful
Internal origin	Strengths • Durable • Low cost • Culturally appropriate	Weaknesses • Not enough education on the BSF • Poorly chosen locations • Filters slowly
External origin	Opportunities • Local government could have picked up on/continued project	Threats • Perceived lack of ownership • Water scarcity

Exploring possibilities for IDEXX's water quality testing kits in Tanzania

Given that IDEXX specializes in water quality testing and considering the Kikongo Water Committee's concern for knowledge on water quality and perceived lack of resources needed to understand water quality, the utility of bringing in water quality testing kits was explored. I consulted different levels of government -locally the Kikongo Water Committee and regionally the district water engineer- as well as the manager of the private company that supplies water for Mlandizi and other larger towns. Based on the responses from these stakeholders about the importance of education, I also consulted academic literature to learn about examples of using water quality testing kits for education. This investigation into the possibilities for water quality testing kits was meant to reveal opportunities for IDEXX that aligned with their core business operations.

I met with two members of the Kikongo Water Committee, along with a translator and SIHA's In-Country Representative, on July 11, 2015 for their perspective on the value of bringing water quality testing kits to the community. Our meeting entailed a supportive

conversation, the Kikongo Water Committee saw value in bringing testing kits into the community to raise awareness about water quality. Education was identified as a key element that should accompany the water testing. They challenged "what next?"- meaning what will happen after the water is tested, which is an important question that did not have an answer, and thus requires further investigation. The Kikongo Water Committee would like to continue to be consulted in any future initiatives.

At the regional government level, the Regional Water Engineer said that he believed that the water quality in the region is good. He said that testing, which was done by the government in a government-run laboratory, was supposed to be done every quarter-year but in reality it was only done about once a year- the barrier he identified was the lack of funds available. His comment exemplified two challenges: no one knew the quality of the water in rural villages and there was little money to do testing. The Regional Water Engineer mentioned that the government was investigating more simple testing kits for the villages, however he was not well informed about water testing, and was unable to answer further questions about these "simple kits". He provided me with contact information for the manager at Dawasco, a private company that provided the infrastructure and water to cities and towns in the Kibaha district.

I met with the manager at Dawasco, who explained that Dawasco was regulated by a government body called Ewura. Dawasco distributed water to government designated locations. There was a big testing plant in Dar es Salaam at the Dawasco headquarters and a testing plant in Mlandizi where the treatment plant was. The manager was unsure of the exact tests used. He was in support of testing water for educational purposes, however he was not involved at the community level and therefore had a more removed understanding of the situation. I found

talking with people working at the regional level was a challenge because there was little knowledge about rural water quality and who was responsible for this.

I investigated the potential for using water quality testing kits for education in reaction to the Kikongo Water Committee's comments about the importance of education. Current research on using water quality testing kits for educational purposes demonstrates that providing information on water quality contributes to changing behaviour (Hamoudi *et al.*, 2012; Hanchett, Nahar, Van Agthoven, Geers, & Rezvi, 2002; Jalan & Somanathan, 2008; Luoto, Levine, & Albert, 2011; Madajewicz *et al.*, 2007; Opar *et al.*, 2007; Somanathan, 2010). By visually demonstrating that the water is contaminated using water quality testing kits people will choose to change their water drinking behaviours (Hamoudi, *et al.*, 2012). Education is an important part of behaviour change, as demonstrated in the literature on WASH initiatives (Cross & Coombes, 2013), and using water quality testing kits as an education tool was also found to be beneficial.

Based on the local perspective and the current literature, the use of water quality testing kits for education seems to a viable option. As well, the regional use for testing purposes is also a possibility, although the regional government and private company did not indicate any interest in pursuing that possibility. Overall, according to all the stakeholders, there are opportunities for water quality testing kits, but these opportunities require more research.

Important findings from the context analysis

The context analysis revealed that most of the community prioritizes drinking water specifically, rather than WASH holistically. This determined the focus of the analysis; because the community had already identified access to water as the greatest concern and priority, it was important to listen to what had already been said and follow that direction. Moreover, the

disconnect between the regional and local understanding of the challenges faced was apparent, making the need for further investigation into the perspective of those who live the experience. Thus, the second field season took a targeted approach focusing on water challenges in Kikongo.

Diving deeper: A community perspective of water access challenges in Kikongo

This qualitative research describes the context of the water access challenges in Kikongo from a co-constructed understanding amongst the participants, the research assistant, and I. Each interview entailed a discussion that revolved around four main interview questions:

1. How do you get water?
2. What are the factors in the community that make using water difficult?
3. If there was something that could be done to improve the current situation, what would it be?
4. Leaving the domestic uses of water, what else do you want to tell me about how water plays a role in your life/in the community?

The first two questions focused on the main topics within water: access and use. The third question was directed at learning about any solutions the participant may have thought of. The last question was meant to provide the participant the opportunity to discuss anything else about water that was important to that individual. The overall focus of the discussions revolved around accessing water. From this discussion seventy-five codes arose, which were then organized into seventeen categories. There were nine themes describing the barriers, needs, and solutions to accessing water. Each of the following sub-sections represents one of these themes; each distinct theme will be discussed and explained in detail using the categories within that theme.

Barrier to accessing water #1: Availability

The two main categories discussed in relation to availability were rainfall and population. The participants described that between the rainy and dry season the difference was enough to warrant concerns, and this variation led to inconsistent availability from all sources. Inconsistent availability was discussed as a major challenge amongst the participants. Participants described going days without bathing because there was not enough water. Along with the variation between seasons, a growing population was also straining the availability of water. Participants mentioned immigration and big families were key contributors to the increasing strain on availability. Availability, or a lack thereof, was a major barrier to meeting the water needs in the community.

Barrier to accessing water #2: Cost

The participants perceived the cost of getting water as high and often unaffordable. The cost included paying for: fuel, storage containers, and transportation. These high costs were related in some way to all the sources. For the Ngeta pipeline the cost was for fuel. For the two wells the cost was for transportation (either the physical mode of transport or the manpower for someone who made a living transporting water). For rainwater collection, the cost was for storage containers. The least directly financially costly option was for the individual to go to the wells and collect water, as the only direct cost was for a storage container. I included this barrier as a part of poor access, as some of the water sources were financially inaccessible.

Barrier to accessing water #3: Distance

The physical distance was discussed both in terms of the time it took to get water as well as the energy and physical strain it required to walk and carry the water. Participants described waking up very early to walk to the wells and still taking most of their day to get the water back to their home; some days meals would not be made and often chores were not completed. They also described feeling physically exhausted and being in pain from carrying the heavy buckets full of water. Physical access was challenging for everyone, and the distance led to lost time, physical strain, and drained energy.

Barrier to accessing water #4: Poor cooperation and leadership

Identification of poor cooperation and leadership as a barrier was unique because I could not have observed it, and it was not something that all participants were willing to talk about openly. A lack of cooperation amongst the community members as well as a lack of leadership within Kikongo was discussed as factors acting against improvements to accessing water in general, and specifically in regards to the Ngeta pipeline. Poor cooperation amongst community members had two distinct challenges; firstly, poor cooperation led to a lack of money to pay for fuel for the Ngeta pipeline. It also led to confrontations amongst community members at the wells when the water level was low. These confrontations were described as disputes over getting water from the well amongst women and between men and women. Some participants were willing to openly speak about the sensitive topic of how the Ngeta pipeline was a poorly planned attempt at providing more water. As previously mentioned, the Ngeta pipeline was considered an inconsistent supply, often only supplying water twice a week in Kikongo. This challenge was discussed amongst the participants in relation to poor leadership. According to the

participants, people were willing to contribute, but needed leadership to organize the community and promote cooperation.

Need for improving access to water #1: Improved leadership

Having better leadership meant government support would need to be increased, which was identified as one of the two key needs. I found this theme more difficult to navigate because of the general hesitation amongst participants to discuss authority negatively. However, some participants were still willing to openly discuss the need for government support to get improved sources or to improve the current sources. As well, it was deemed important to have support to facilitate cooperation in collecting money to pay for the costs associated with the Ngeta pipeline -including paying a community member to buy the diesel and bring it to the water pump in Ngeta and paying the watchman at the pump in Ngeta. As suggested previously, the participants were willing to contribute to improvements, but they needed leaders to organize the community.

Need for improving access to water #2: Improved, consistent water source

The strongest theme amongst the participants was the agreement that the primary need was better access to a consistent source of water. Participants discussed needing more sources, closer sources, deeper wells, affordable sources, pipelines, better storage, and personal sources. A pipeline was discussed as the ultimate source, one that would meet the need for water supply indefinitely. Improving the Ngeta pipeline to be a consistent source was discussed, however some suggested getting a different pipeline entirely, with the source from the Ruvu River or continuing the pipeline from Disunyara, a neighbouring village with a piped water source. As well, having more storage containers for times of scarcity was discussed as a need to improve

water availability. A consistent supply of water was needed; in the words of many of the participants, they need water all the time.

Solution for improving access to water #1: Money

Securing funding was discussed as essential to obtain storage containers, have a pipeline built, or dig a well. The participants discussed money as a need and the high cost as a barrier, and therefore saw donated money as a solution. This solution was discussed as addressing the cost barrier, the idea was to contribute to developing a closer source that would provide a consistent water supply so that the other two barriers (availability and distance) would no longer be an issue. Potential sources of this money were often left vague, referring to 'sponsors' that could contribute, but some participants explicitly mentioned SIHA as a source of funding. The general theme was that money from an external source was needed.

Solution for improving access to water #2: Advocacy

The participants discussed the need for an external person or organization to help them improve leadership and cooperation in the community. Participants specifically expressed wanting help from my research assistant and I, to get the leaders to act, wanting the researchers to be advocates for the community. From the discussion about advocacy it was evident that the government was considered the key driver for change, but required external pressure to motivate action. Considering the apprehension in discussing their government negatively, the participants clearly saw advocacy from an external source as a need.

Other needs for improving WASH in Kikongo: Education and awareness

Concern for water quality was not discussed, however there was some discussion about increasing education on water treatment. Although treatment options were available, there was little knowledge on water quality in Kikongo and there was little perceived need to treat water. Some participants discussed the lack of knowledge as a challenge in the community, and the need for education to improve people's understanding of water treatment. This need did not fit into the themes or the overall identified concern of access, but was another concern held by the participants.

There was one negative case worth noting. One participant emphasized the importance of promoting awareness about water conservation. I followed up on this idea with other participants, but it was not discussed by anyone else. The participant emphasized the importance of conserving water and expressed frustration that when water was available, many people in the community used it irresponsibly and wastefully. While this sentiment was not echoed by any other participant, it was still an idea in the community.

Discussion of findings on water access challenges in Kikongo

Barriers, needs, and solutions are often intertwined in a WASH initiative. The combination of cost as a barrier and money as a solution make for a vicious circle, wherein the people are unable to afford improved sources, and therefore lose time and energy going to collect water from the wells. This time and energy could be spent working for an income that could then be contributed to improving sources of water (Haller, *et al*., 2007; Lawrence, *et al*., 2002; Sullivan, 2002). In Kikongo, wells were a free source in terms of monetary cost, however, the wells had the greatest opportunity cost in terms of distance. The opportunity cost was the time

spent fetching water that could have been used for working. This vicious circle is common in developing countries with water challenges, and links back to the social determinants of health: water poverty and financial poverty often go hand in hand (Lawrence, *et al.*, 2002; Sullivan, 2002). The other barriers identified by the people in Kikongo fit into this, as distance and availability contributed to the burden of water poverty.

Of the four barriers -availability, cost, distance, and a lack of leadership- the first three were discussed as acting on the individual and the individual's ability to control these factors was perceived as insignificant; this, however, should not necessarily be the case. Perhaps the greatest challenge was the lack of available water due to seasonal rains and a growing population; yet neither of these were in the control of the individual. Thus, availability was a barrier that the community must learn to work with. The issue with cost however, should be addressed. Having one time costs for improving water sources such as buying a storage container is more sustainable than an ongoing fee (Fry, *et al.*, 2010). More sustainable costs make water supply for the individual more consistent. Improving sources costs more up front, but in the long run saves money (Fry, *et al.*, 2010). One possibility for improving sources could be to bring the sources closer, which would also address the distance barrier. Getting a closer source that is less expensive was discussed as a need by the community and it is within human control to develop this, however it requires leadership to mobilize the people and the necessary resources.

This need for leadership was directly contrasted by the last barrier, poor leadership. While the other barriers acted on the individual, poor leadership was discussed as a barrier that acted on the community, because no individual felt personally affected by it, but all individuals felt the impact of poor leadership on improvements. Poor leadership was related to the inadequacy of the Ngeta pipeline and the confrontations at the wells, suggesting that the

participants thought that these challenges were out of their hands. This sentiment was reinforced in the solutions suggested, as both required external help. The participants clearly felt a lack of control over their own circumstances.

This relates to the overarching sentiment expressed by the participants that described the water situation. People living in Kikongo 'need water all the time', but they did not feel capable of making this happen. While all four barriers could be addressed, the perceived need for external support was evident. This external support could come from any organization, including a corporation with expertise in WASH, such as IDEXX. This possibility is discussed further in Chapter 5.

Analysis of BSF technology as a WASH initiative in Kikongo

The purpose of this section is to apply lessons from some of the key concepts from the literature (Chapter 3) to the findings from the field, taking the recommendations into account.

Evaluating SIHA's implementation of the BSFs in Kikongo, based on the recommendations from the literature review (Chapter 3), the challenges and ultimate failure of this WASH initiative lies in the lack of interaction and dialogue with the people living in Kikongo. Examining this failure will help deduce what went wrong and this information can be used to inform future practice (Westley, *et al.*, 2009). The two key issues were the lack of sufficient, appropriate education and the lack of non-hierarchical community engagement. To start, although the BSF itself is user-friendly (CAWST, 2012), proper training was not provided to the people who were responsible for the BSF. Education on how to use the BSF was provided to only one teacher for the school BSF, and BSF maintenance was not taught to the woman in charge of the dispensary BSF. The education that was provided failed to provide the necessary

understanding of both how the BSF worked and why it was important to use it. Thus, there was no motivation to use the BSF, other than the novelty of having something new, so once the BSF stopped working properly the community stopped using it: there was no behaviour change. This lack of education meant the foundation for behaviour change was not present (Brown, *et al.*, 2009; Cross & Coombes, 2013).

The other fundamental element missing from the SIHA WASH initiative was appropriate community engagement. Firstly, there was very little pre-implementation engagement as the project was completed on SIHA's timeline and the team was only in Tanzania for ten weeks. Although there was already some trust built with the community because of SIHA's presence in previous years, there was little or no time invested in building trust specifically related to the project. Local government and the Kikongo Water Committee were consulted, however none of the local stakeholders were actively involved in the process; community engagement was left at consultation and the BSF initiative lacked the community-driven aspect (Cross & Coombes, 2013).

During the time of pre-implementation the SIHA team did not learn about the cultural norms and values around water (Zakiya, 2014). It could be that in Kikongo sharing a resource for water treatment was not socially acceptable, and therefore making the BSF a public resource was not adhering to social norms. As discussed in the qualitative description, in times of drought there were confrontations at the shared public wells. This issue could have been revealed if SIHA had taken the time to learn from the Kikongo Water Committee, and could have impacted the placement of the BSFs, but the lack of engagement left this possibility unknown.

Finally, no evaluation plan was developed or carried out in a timely manner. The SWOT analysis conducted by the team two years later would have been beneficial after the first three BSFs were implemented, and would likely have impacted the decision to put in a fourth BSF. The value of evaluation has been discussed and cannot be overstated: the BSF initiative would have greatly benefitted from evaluation.

There are still ways to move forward from this failed project. The example of the attempted SODIS initiative in Nepal is similar in that the selected treatment method was not adopted by the community, and therefore, the WASH initiative did not have the intended impact. In that sense, the same recommendations made for the SODIS project in Nepal can be made for this BSF project Kikongo. This includes starting over, firstly with continuing discussions with the Kikongo Water Committee, an important local stakeholder, about what did not work with the BSFs and what aspects of a WASH initiative are needed for Kikongo. Second, using this information to research all the potential options for improving WASH that fit the expectations of the Kikongo Water Committee. And finally, having an open discussion about WASH prior to planning an initiative to promote a sense of community ownership of the project. The BSF project is an example of a failed WASH initiative that can be learned from and improved upon with external support, which could be from a corporation such as IDEXX that works in the water field (Chapter 5).

Intersecting concepts from the WASH literature and the field research in Kikongo

From the literature and the field, three main pieces that are key to a WASH initiative are evident: stakeholders, values, and outcomes. Stakeholders are those who drive the initiative; this is stated in the literature and is reflected in the breadth of knowledge and understanding learned from the various stakeholders engaged in Tanzania. Likewise for the critical need for

incorporating values, wherein the literature values were discussed as the piece that both drives an initiative forward and maintains its boundaries, and in Tanzania taking time to learn the ideas and values of the community during the qualitative description led to a deeper understanding of the challenges. Finally, outcomes, and specifically identifying and evaluating those outcomes, is explicitly discussed as important in the literature and it was clear from the lack of process evaluation by the previous SIHA teams that an in-depth assessment was warranted for informing the decision-making process. Although a full outcome evaluation is out of SIHA's scope, discussing the impact with the community would contribute to future projects. As mentioned, it may have resulted in a summer spent evaluating and improving the process of the BSF initiative rather than implementing a fourth BSF.

Conclusion of field research: The greatest challenge is accessing scarce sources of water

People living in Kikongo experience severe water scarcity. As was revealed through discussions, the greatest priority is getting reliable access to water. Unfortunately, it is also clear that the local population thinks that the solutions are out their control. Both solutions, advocacy and money, were discussed as coming from external sources. This leaves a gap between the indicated needs and the solutions; this gap is an opportunity for engagement, one that could be filled by a corporation that works in the field of WASH. As was discussed, there may not be an immediate opportunity for IDEXX's water testing kits, however that does not rule out the possibility for engagement that focuses on mutual benefit. IDEXX's involvement could contribute to the WASH initiatives by bringing expertise in the field. The following chapter will discuss how IDEXX, my example of a corporation interested in pursuing CSR, could fit into an international project on WASH.

Chapter 5: Results on CSR at IDEXX

Knowing what a community needs to improve WASH will inform how a corporation that is interested in contributing to water initiatives can get involved; however, it is also important to identify the most suitable approach for a corporation to take. For purposes of this discussion, CSR initiative refers to a project in its entirety and 'values' refer to the principles and ideals of a corporation that guide CSR initiatives and practices. This section will lay out IDEXX's current CSR initiatives (internal and external) and stated values, and then use that information to identify where IDEXX is on the CSR spectrum. From this, the approach IDEXX should take for future CSR initiatives related to WASH will be discussed. This corporate-level reflective analysis is intended to create a tangible assessment of whether a corporation acts upon its core CSR values (i.e., 'words-to-action'), and can i) help identify where on the spectrum of CSR approaches a corporation aligns, and ii) be used to navigate the spectrum of CSR approaches to where the corporation may ultimately want to be.

Introduction to CSR at IDEXX

IDEXX is actively engaged in a wide variety of CSR initiatives; these are worth noting because they help indicate where IDEXX may currently reside in the spectrum of CSR approaches (Figure 3, Chapter 1: Introduction). Internal initiatives are those practices that are run within the corporation and the benefit typically remains within the firm, in comparison to external initiatives that are conducted in the broader community for a benefit beyond the corporation. The internal CSR initiatives at IDEXX range from providing a fitness centre at work to giving employees two paid days to volunteer in their community. Not all internal practices will only benefit the firm; paying employees to volunteer is an internal process, but the practice

could benefit both the employee who is volunteering in the community as well as providing a benefit external to the company. Therefore, it is easier to discuss the different initiatives in terms of the impact of the initiative. The following four categories were created to organize the various internal/external CSR initiatives that IDEXX is currently engaged in: a) human resources retention/employee morale; b) traditional philanthropy; c) marketing/partnership building; and d) customer retention. These categories demonstrate the areas that IDEXX is currently focusing their CSR efforts in.

A clear distinction between innovative business practice and CSR is difficult to define in some cases - even the goal of the strictly business approach may not be directly financial, but could be to retain employees, increase morale, build markets, and retain customers. However, the intent underlying these initiatives ultimately sheds light on the overall corporate values of the organization, and consequently where the organization sits on the CSR spectrum. Thus, for purposes of this chapter, each of IDEXX's activities are addressed as CSR (internal/external) and aligned to the values of the organization to determine the intent of the CSR initiative.

I evaluated all IDEXX initiatives to understand their purpose based on the following criteria: employee morale, employee retention, customer recruitment, customer retention, entering new markets, profit-driven, and innovation. These different criteria are thought of separately, although it is possible that they could work together. For example, it is possible that if employee morale is high then innovation will increase, but for this analysis the two are distinct. If the initiative is standard business practice then it is seen as something that helps IDEXX stay current, it can be seen as base measure. Each type of CSR initiative/category has also been evaluated using the SWOT analysis technique.

CSR category #1: Employee retention and morale practices

Within the category of employee morale and retention, there are five different CSR initiatives in IDEXX. These five initiatives are targeted at providing a holistically healthy work place and promoting a healthy work-life balance. They contribute to employee wellbeing, to aid employee recruitment and retention.

1. GiVE (Global IDEXX Volunteer Efforts) program for employees: two works days per year employees go into the community and volunteer with different projects.

   Evaluation: The GiVE program is not standard business practice. It will likely increase employee morale and give the employees a sense of humanity and self-fulfillment. Providing employees with this opportunity annually may help with employee retention. It will also make a positive impact in the community that IDEXX works in and leave a good impression of IDEXX. This may get IDEXX into new markets within the community. This initiative will not necessarily help drive profit or lead to more innovation.

2. Employee Fitness Center: built by IDEXX only for employee use.

   Evaluation: Providing a fitness center at work is not standard industry practice, although it is not unique to IDEXX either. It is likely to attract desirable employees to IDEXX and keep employee morale high. This will also help with employee retention. The fitness facility will have a positive internal impact however it will not drive profit, get IDEXX into new markets, or help with innovation.

3. Healthy food served in cafeterias: IDEXX employs specialty chefs to cook a variety of nutritious meals.

   Evaluation: Offering healthy meals made by specialty chefs in the cafeteria will have a similar impact as the fitness center. It can be attractive to potential employees, keep current employees happy, and thus keep these employees working for IDEXX. The program demonstrates IDEXX's commitment to health and wellbeing of their corporate employees. It will not directly impact profit, innovation or get IDEXX into new business markets.

4. Employee collaborative workspace: the new building has a variety of different meeting spaces that provide room for employee collaboration and engagement.

   Evaluation: Providing spaces for collaboration will likely improve innovation and could also increase employee morale, as working together can be encouraging. It could also help with employee retention if the employees enjoy working together and find it beneficial. Providing these spaces will not directly improve profit, nor will it help IDEXX get into new markets.

5. After 10 years at IDEXX, every employee is given a one month paid sabbatical and then once every five years after that.

   Evaluation: Providing a paid sabbatical will attract employees to IDEXX. It is also incentive for employees to stay with IDEXX, and it will likely increase employee morale, especially around the time of the sabbatical. It is not going to necessarily increase profit, innovation or get IDEXX into new markets directly.

Table 5: SWOT Analysis of CSR for Employee Retention and Morale

	Helpful	Harmful
Internal origin	Strengths • Improves and maintains employee morale • Puts IDEXX apart from its competition	Weaknesses • Expensive
External origin	Opportunities • Could help with recruitment of desirable employees	Threats • Expense may not pay off • Might be perceived as frivolous by potential employees

CSR category #2: Traditional philanthropy

Within traditional philanthropy IDEXX tends to stick to non-monetary donations, especially within the Water Business. Most donations are of their water quality testing kits, and sometimes IDEXX will also send employees to the sites that need the testing. Examples of IDEXX's recent corporate non-monetary philanthropy initiatives are provided in Table 6. All the following initiatives have one evaluation (Table 7), as they are similar in nature.

Table 6: Examples of CSR for Philanthropy

Initiatives	Evaluation
1. Donation of water quality testing kits to the City of Calgary after the 2013 flood 2. Testing pets in Japan after 2011 tsunami 3. Donated kits to people who are working on water quality in developing countries, including a family in Guatemala, a man in Benin, and a researcher working in the Dominican Republic 4. Donated kits to China's Center for Disease Control and Environmental Protection Agency after an earthquake in 2008 5. Donated kits to a fifth-grade school teacher in California 6. Donated medical equipment to a hospital in Haiti after the earthquake 7. Continuously provides subsidized kits to Riverkeeper, a New York based non-profit dedicated to keeping New York's waterways clean (http://www.riverkeeper.org/water-quality/testing/what/)	Improves: ✓ Employee morale ✓ Customer recruitment ✓ Entering new markets Does not impact: o Employee retention o Customer retention o Drive profit o Innovation

The information in Table 6 suggests that donating IDEXX's products or services could increase employee morale, as employees may feel good about the company they work for. It may also help IDEXX enter new markets, as it showcases their products and services and provides free advertising. This will not directly improve employee retention, nor increase profit or innovation because the focus of the initiatives is not on employees, innovation, or selling the kits, but rather this activity indirectly improves the corporate image (internally and externally) for the organization.

Table 7: SWOT Analysis of CSR for Traditional Philanthropy

	Helpful	Harmful
Internal origin	Strengths 1. Improves and maintains employee morale 2. Media reporting on these actions provide IDEXX free advertising 3. Sets IDEXX apart from its competitors	Weaknesses 1. Expensive 2. Not necessarily providing what is needed
External origin	Opportunities 1. Could help IDEXX enter new markets	Threats 1. It could appear that IDEXX is not genuine, donating kits only for publicity 2. If kits fail, could damage IDEXX's reputation

CSR category #3: Marketing and partnership building

IDEXX values partnerships and uses creative marketing strategies to attract both employees and new partners. Of the two current initiatives that fit into this category, one is focused on creating and improving partnerships while the other is focused on attracting new partners/interest.

1. pethealthnetwork.com: An online forum aimed at enabling and promoting information sharing between veterinarians and pet owners.

   Evaluation: Although this may not traditionally be considered CSR, this initiative is not standard business practice and it will likely have positive outcomes for profit for IDEXX, as the veterinarians use and will encourage the use of IDEXX's products. It may also open new markets for IDEXX, as veterinarians may appreciate the focus on veterinarian-pet owner relationship. It will likely not have a direct impact on employee retention or morale, nor on innovation.

2. The main building at the IDEXX headquarters in Westbrooke, Maine is LEED (Leadership in Energy and Environmental Design) certified, meaning it is environmentally friendly and better for the surrounding community, thus presenting elements of environmental concern and stewardship that align with the defining features of CSR.

   Evaluation: The headquarters could attract new employees as well as keep employees working there, depending on the values of the employee. It could also possibly get IDEXX into new markets, if potential customers are looking for an environmentally responsible company. It will likely not improve profit, employee morale, or innovation.

Table 8: SWOT Analysis of CSR for Marketing/Partnership Building

	Helpful	Harmful
Internal origin	Strengths 1. Attracts groups with specific values 2. Builds partnerships	Weaknesses 1. Not guaranteed to be effective 2. Expensive
External origin	Opportunities 1. Could attract new customers 2. Could attract new employees	Threats 1. Cost might not provide any benefit

CSR category #4: Customer retention practices

There are six different CSR initiatives focused on customer retention. As mentioned, CSR and innovative business practices are not necessarily distinct, there can be overlap. For this discussion IDEXX's initiatives that target customer retention are considered CSR because they require a financial investment with the main purpose of benefitting their customers. Moreover, they have been developed and implemented with the customer's best interests and needs in mind. Although these initiatives primarily target customers, some employees may value how the company they work for treats their customers; therefore, these initiatives could also impact employee morale or employee retention.

1. Customer points program: earn points, 1 point= $1, providing customers with an added benefit and ability to purchase more.

   Evaluation: The points program could help to entice new customers as well as retain current customers. This will help drive profit, but will not help IDEXX get into new markets or drive innovation.

2. Information Management Systems that are customer friendly, making it easy for customers to find needed information for use of IDEXX products, services, and other related resources.

   Evaluation: This will help with product and company referral because the products are user-friendly, which may get IDEXX into new markets. It will also help with customer retention. It will not impact profit or innovation.

3. Providing free learning and education: webinars, seminars, and private courses, contributing to customer's knowledge and understanding of the health-related information related to IDEXX's products and services.

   Evaluation: Providing these educational opportunities is similar to making customer friendly information systems, in that it will improve customers' rapport with IDEXX, and thus increase customer recruitment and retention. It will not impact innovation or profit.

4. Complimentary consultations with customers, making needed information financially accessible to customers.

   Evaluation: This is the same nature of initiative as the online consultations, but with the added value of a personal interaction. This will enhance customer-employee relationships.

5. Strong customer support that provides several different support lines to call, improving the accessibility of information to customers around the world.

   Evaluation: The phone support will also provide the same benefits as the online courses and the in-person consultations. The convenience of having someone who can help be a phone call away gives added value to customers, especially those who live further away.

6. Facebook page posts stories about IDEXX's work and helpful information about water testing, animal care, and other fields that IDEXX is involved in. Questions can be posted to this page, making it a forum for IDEXX customers and employees.

   Evaluation: The Facebook page provides customers with a way to keep in touch with the company and find out what is new. This contributes to customer retention and offers potential customers a way to learn more about IDEXX, which could help with recruitment. This will not directly increase profit or innovation.

Table 9: SWOT Analysis of CSR for Customer Retention

	Helpful	Harmful
Internal origin	Strengths 1. Customer recruitment and retention 2. Sets IDEXX apart from competitors	Weaknesses 1. Requires significant employee input
External origin	Opportunities 1. Satisfied customers could give referral, getting IDEXX into new markets 2. External evaluation of companies' customer service could give IDEXX a high rank	Threats 1. Could cause employee burn-out 2. Employees who are not well trained could make bad impression

Corporate values at IDEXX

Something that should be reflected in these various initiatives are IDEXX's values, the principles that the company upholds in their work. Sustainability, innovation, responsiveness, leadership, passion, creativity, quality, and partnerships are all named on their website (https://www.idexx.com/corporate/home.html) and are reflected in their work. During my visit to the IDEXX headquarters, I saw firsthand that IDEXX's products and services reflect these values. Quality, innovation, and creativity come primarily in the form of product and service design, which contribute to leadership in that IDEXX is a leading global competitor for testing products (and as reflected in their corporate growth over the last two decades). The company is responsive to the demands of customers, as demonstrated by the wide variety of services offered. The external CSR initiatives are one example of how IDEXX is committed to partnerships, even those that may not be profitable, and the internal CSR initiatives contribute to the company's sustainability by promoting employee morale and retention. IDEXX's commitment to CSR

initiatives demonstrates the passion the company has for the fields it is working in. Seeing these values during the visit helped to enhance the perspective that came from the website.

Information on CSR from IDEXX

I gathered information directly from IDEXX during my visit to the IDEXX headquarters. From this perspective, most of the current external CSR initiatives are conducted on a case-by-case basis, and are often done at the local level. For future CSR, IDEXX aims to narrow down the range of groups that receive the donations, make the projects more relevant in terms of public health outcomes, and to publicize these initiatives. In general, there was the sentiment that IDEXX is already making a positive impact. New products are saving animals lives, donations are being given out, but no one is advertising it. The impression that I got during the visit was that IDEXX is science first, marketing later. IDEXX's leaders do see the value in marketing the impact of their work, but the demand is not there yet. Many of the scientists who were interviewed see IDEXX's social responsibility as furthering the science and that is enough. To learn more about the direction IDEXX is looking to go in, I investigated four main topics: how IDEXX does marketing for their current CSR initiatives, whether there is evaluation of these initiatives, their plans for future initiatives, and finally, where the leaders would put IDEXX on the CSR spectrum.

Currently the CSR projects are mostly marketed to employees, and potential candidates for recruitment. The Water Business does their own marketing, and employees see this as a strength of the Water Business within the larger corporation. From the marketing currently being done, IDEXX has not faced any negative feedback and there are usually requests for more advertising. According to the employees there is no concern about misrepresenting their CSR projects, the current stories can be entirely understood and managed, and advertising is

straightforward. It will be important to continue to market responsibly, and to consider including the impact of the project when increasing marketing to external stakeholders, such as customers.

Evaluation is needed to understand the impact of a project. The IDEXX employees did not discuss measuring impact, as the current initiatives were considered either minor, one-time projects, or the initiatives were assumed to have a positive impact. It was not clear from the discussion that there was any rigorous evaluation of the impact (positive or negative) of the current CSR initiatives on the recipients. However, in regards to the impact of the initiatives on IDEXX employees, IDEXX states that:

> *"IDEXX conducts an annual employee engagement survey to all its employees - both traditional and contingent workers. The survey covers multiple strategic themes, and items that speak to areas of interest such as corporate social responsibility, manager effectiveness, communication and overall organizational health. IDEXX is proud of the efforts of its managers and employees to create a meaningful and engaging work experience."*[4]

Going forward it will be beneficial for IDEXX to develop and implement evaluation of their CSR initiatives, to measure effectiveness and impact.

For future CSR initiatives, IDEXX should consider its capacity, in terms of what the company is already capable of doing and what the company could add to its capacity. For example, an important defining factor of any WASH-related CSR initiative is IDEXX's capacity in regards to contributing to water quality. Water treatment is beyond IDEXX's current capability. The leaders at IDEXX identified the need to find partners and/or other funding for the

[4] From an email conversation with IDEXX's Global Marketing Lead for the Global Executive Marketing, Sales, Strategic Planning

solution side. Thus, from the IDEXX perspective their role is to provide testing - they are not currently in the position to offer treatment options. This is important to note in moving forward, as it demonstrates IDEXX's limits in their capacity to contribute to a WASH initiative. How IDEXX's skills and goals can fit into the needs of Kikongo is discussed in Chapter 6.

When I asked where IDEXX sits on the CSR spectrum, the general agreement was that IDEXX works within the altruistic side of the spectrum. Employees agreed that IDEXX is very involved in giving back to the communities that the company works in with no expectation of immediate return. Their current CSR initiatives are not profit-motivated, although the purpose and anticipated results are specific to each initiative. For example, IDEXX's partnership with Riverkeeper, a non-profit organization that maintains the sanitation of the waterways in the state of New York (http://www.riverkeeper.org/water-quality/testing/what/). IDEXX gains some profit from the testing kits sold at a subsidized cost to Riverkeeper. In contrast, another CSR initiative in Kenya with Dr. Metcalfe entailed providing testing kits at no cost to contribute to his work with using solar cookers to treat water. Two benefits of any CSR initiative recognized by IDEXX employees are publicity and marketing. However, most of the current initiatives are localized, therefore publicity from the current CSR initiatives is limited. Until there is more demand for the company to start managing their donations there is not much marketing being accomplished. Currently, IDEXX's CSR initiatives are not done with the expectation of future business but when kits are donated the awareness about IDEXX is increased.

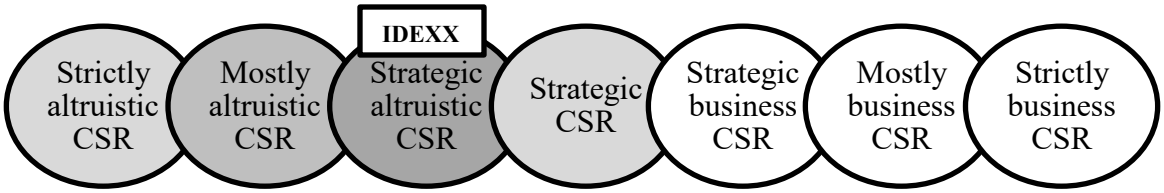
IDEXX on the CSR spectrum

Where IDEXX fits on the CSR spectrum is dependent on several factors: where the leaders think IDEXX is and where they want the company to be; what IDEXX is currently doing in terms of CSR; and what the plans are for future CSR. According to the leaders in the Water

Business, they see IDEXX's CSR as strategic-altruistic CSR; although this may differ from the perspective of the other employees who were interviewed, it does not indicate that there is a misunderstanding of IDEXX's CSR. Given the current CSR initiatives, IDEXX is engaging in financially responsible endeavours that are bringing a return, in some form, to the company, but have the purpose of benefitting all stakeholders. For example, IDEXX markets their CSR initiatives and even if the marketing is only to their employees, this demonstrates that IDEXX sees benefit in publicizing what the corporation does. Based on the expressed interest in engaging in international external CSR where market access/profits are small, it is evident that IDEXX is not focused on profits alone. Figure 5 visually demonstrates IDEXX's presence on the CSR spectrum, using a label to indicate where IDEXX seems to be aiming to work within the spectrum and colouring to demonstrate that IDEXX is currently, at least to some degree, working within various approaches along the spectrum (darker shading indicates a stronger presence).

Throughout the investigation a reality came to light that is important when discussing IDEXX's future CSR. IDEXX is not a social enterprise; it is a corporation that is integrating CSR into its business practices. IDEXX is accountable to shareholders, and it is important to justify costs bearing in mind that a corporation is responsible for making a profit. Therefore, although the company demonstrates passion for improving water quality globally, IDEXX should not be engaged in strictly altruistic CSR, as it is not responsible for the company. While IDEXX's current CSR initiatives that entail donating kits are mostly altruistic, these are still marketed; moreover, other CSR initiatives are more clearly strategic, such as those initiatives that target employee retention. Therefore, the most appropriate corporate and socially responsible approach for IDEXX to take is within the realm of strategic altruistic CSR.

Figure 5: IDEXX on the CSR Spectrum



The corporate community and external stakeholder engagement in CSR

Expanding on the concept of sharing the information from CSR initiatives, this requires engaging stakeholders. From the firm perspective, employees who may not be directly involved in the project should still be aware. This is critical for the internal aspect of CSR; Frame (2005) submits that internal participation in development of corporate practice is necessary to create CSR that is beneficial for the corporation. The reason why it is important to have stakeholders involved in the process is explained by Von Schwedler (2011), who found that the employees, as well as other stakeholders, were uncertain of what exactly CSR meant for them and for the company. Because of this uncertainty many of the ideas about CSR came from people's personal beliefs and position within the company. There was not any information provided universally to clarify what CSR should be within the company and the expected role of each employee. It is important to make CSR initiatives clear to everyone (Von Schwedler, 2011). Without this clarity the employees will not understand the benefit and "in order for initiatives to provide returns to the company, initiatives must first provide a return to individual stakeholders" (Bhattacharya, Korschun, & Sen, 2009). This is related to the discussion about regulation (Chapter 1: Introduction) in the sense that employees have certain expectations of the corporation they work for, such as expecting the corporation to act ethically and in the best interests in society. Thus,

the aforementioned return for the corporation will be, at least to an extent, regulated by the expectations of the employees.

Conclusion: IDEXX engages in strategic-altruistic CSR

IDEXX is already actively engaged in a diverse range of CSR initiatives, and the company has a positive reputation. All the CSR initiatives uphold and contribute to the values of the company; in regards to the Water Business, the initiatives reflect the passion that IDEXX has for improving water quality. The company is in good standing to expand the scope of their strategic-altruistic CSR initiatives. How exactly this can be pursued will be discussed in the following chapter, using engagement with Kikongo as an example.

Chapter 6: A framework for sustainable, ethical, and meaningful corporate and non-profit sector engagement in public health-based WASH initiatives

Using the lessons from the literature, the field research on the WASH initiatives in Kikongo, Tanzania, and the knowledge learned from IDEXX's corporate goals, a framework for corporate engagement in WASH initiatives is the focus of this chapter. To promote clear communication and reference to the framework, I titled it -*A Threefold Process Framework for Corporate Engagement* (hereinafter, the **Threefold Framework**). It is important to note that the Threefold Framework is meant for any group looking for sustainable, ethical, and meaningful engagement in a WASH initiative, not just for corporations looking to pursue CSR. This chapter lays out three **principles** of the CSR framework required for corporate engagement in WASH initiatives – those being *sustainability, ethical responsibility,* and *meaningful public health outcomes*- and then illustrates the three **phases** needed for execution (preparation, introduction, and implementation) and three **components** (stakeholders, values, and outcomes) for ensuring that these CSR principles are met. From this, recommendations are made for IDEXX, taking into account the current CSR initiatives and direction the company is going in, using the field research as an example of how the Threefold Framework could be applied to IDEXX engaging in CSR-related WASH activities in Tanzania.

Sustainability, the first principle of the framework, implies that the result of the framework and subsequent engagement should ultimately lead to self-sustaining initiatives in the community. As opposed to a one-time philanthropic donation, this concept aims to guide the process of developing projects that will be continuous, eventually being completely community-driven. Sustainability can include economic, environmental, social, and political aspects. In this

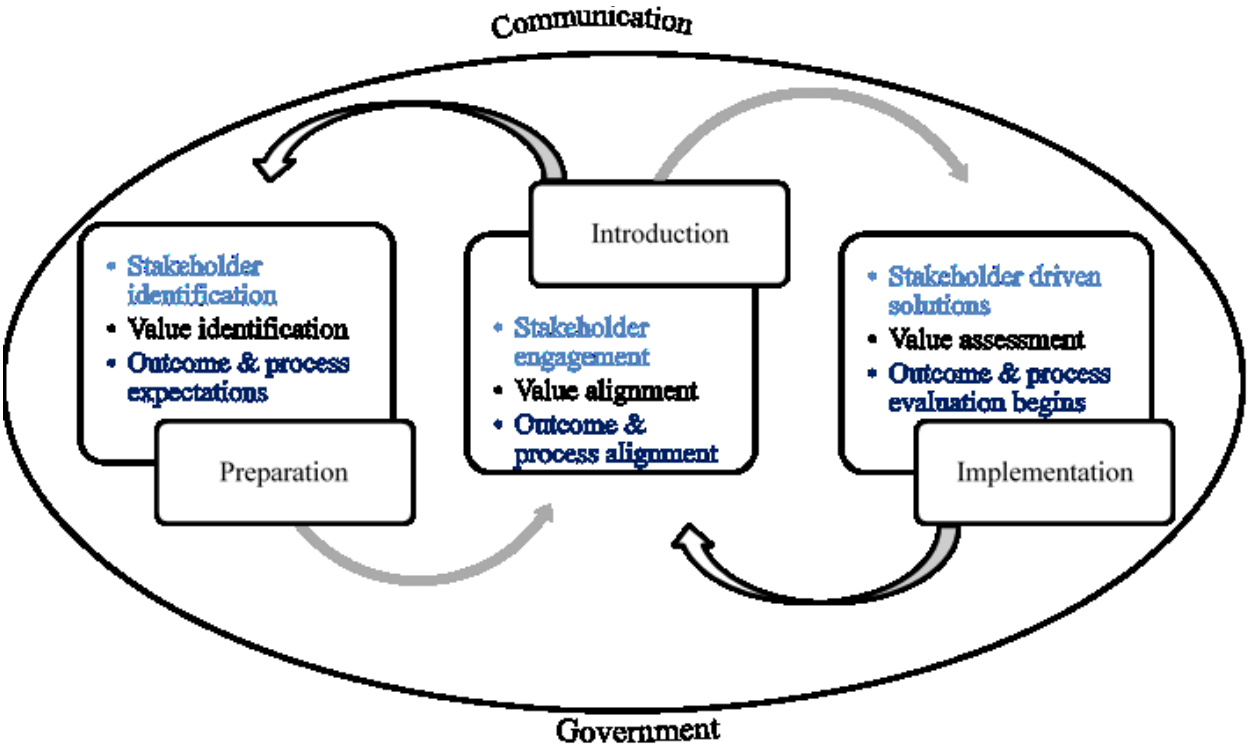
case, the WASH initiatives that are supported by CSR as a result of the framework should meet these criteria (i.e., economically sustainable, environmentally sustainable, and politically sustainable).

The second principle of *ethical responsibility* applies to various lines including business ethics, social ethics (e.g., social justice), and political ethics. Ethics can be a difficult field to navigate, particularly when it is international. However, some ethical principles have generally been accepted as objective, many of which have been declared human rights. As discussed in Chapter 1: Introduction, these principles include dignity and participation. When applied to water, these principles mean that people have the right to water for life and the right to be involved in how their water is managed. By explicitly including this term in the framework the importance of these ethical principles is being recognized. Moreover, the framework is meant to guide initiatives that will uphold the importance of ethical actions and is intended to hold the user accountable.

Meaningful public health outcomes, as a principle of this framework, denotes that for all parties the outcomes should have a relevant positive public health impact. This can vary from an individual learning about global health to an individual getting access to safe water and a latrine. This term is used to emphasize that the framework must guide the process of creating initiatives that have a positive health impact, and it is intentionally vague as the impact can vary greatly amongst the different stakeholders. An example from this research would be IDEXX finding meaning in having an impact on reduced waterborne disease while community members in Kikongo see getting access to clean water as meaningful; how these can align will be discussed later, using the Threefold Framework. As a principle of the framework, meaningful is closely related to evaluation; and therefore, evaluating impact is included in the framework.

These three principles are fundamental to the framework as a valuable tool for companies engaging in CSR and for other organizations seeking corporate engagement. Although these principles are not visible in the Threefold Framework (Figure 6), they are reflected in the three components that fit into the three phases that make up the Threefold Framework. The following sections discuss the components and phases, and how the principles are reflected in the components.

Figure 6: Threefold Process Framework for Corporate Engagement



Explaining the Threefold Framework: Definitions of the components

All-encompassing components: Communication and government

Communication is critical in any public health initiative. Communication is defined by transparent, consistent, frequent conversations amongst all stakeholders, and it is key for a successful WASH initiative (Integrated Water Resources Management, 2000; Jones, 2011). In this framework communication visually encompasses all the actions in the framework, but the reality is that communication is not only encompassing but is also foundational and permeates all three components in the three phases of the Threefold Framework. Continuous communication is what keeps the framework together, and therefore must be emphasized from the beginning.

As discussed in Chapter 3, inclusive communication can require resources such as translators and other interpretive materials (Cross & Coombes, 2013), and may also require encouragement to get started. For example, looking at the previously discussed example of the Groundwater Technical Committee in Mexico that acts as a medium for multilateral discussion, without that encouragement of open discussion the different stakeholders would remain in silos, making consensus amongst stakeholders difficult to achieve (Integrated Water Resources Management, 2000). In any initiative, all stakeholders are accountable for providing the necessary information and input for the initiative, including the discussion about values and evaluation (Daily & Walker, 2000).

Government, referring to the government of the recipient community (including local, regional, and possibly national, depending on the nature of the initiative and the country), must be considered throughout the initiative. Within the framework, the government should be a stakeholder. However, given the complexity of non-governmental groups being involved in

providing a basic human need that should (normatively speaking) be provided by government, government involvement should go beyond stakeholder engagement. There are challenges with government in LMICs (Chapter 1), particularly that often the citizen voice is not accounted for by the government and that government is not always responsive to citizen needs, even a fundamental need like WASH. In the Threefold Framework, this challenge can be overcome by including the government in every step of a WASH initiative. My research engaged the local and regional governments at a consultative level, however moving forward that engagement should be enhanced with engagement whenever possible, as well as more frequent updates and requests for input. This addresses the need for improved WASH in a responsible way that is accountable to the government.

As mentioned, pressure from government can motivate CSR initiatives, and may result in more sustainable initiatives, such as promoting local entrepreneurship for the initiative. Moreover, government should be regulating the activity of the initiative, especially in regards to human rights related initiatives. As stated in the literature (Chapter 3), success depends on government involvement.

First component: Stakeholders

Stakeholders must represent all players involved in the WASH initiative. In the five capabilities for CSR, Black and Härtel (2004) discuss stakeholder engagement and the importance of focusing on stakeholder interests; in this context the 'stakeholders', although not defined by the authors, are those directly related to the firm. However, in the proposed Threefold Framework stakeholders represent all the different players who should be involved -either actively or through consultation- because of their association with the initiative and to ensure success of the initiative. As mentioned above this can include executives and employees in the

corporation pursuing CSR, individual community members who are recipients of the WASH program, experts in the field of community engagement and WASH development, and leaders in the community or government. The stakeholders can be broken down into three groups: initiators (i.e., corporate employees/executives, non-profit organizations, community groups); recipients (i.e., people in the community benefitting from WASH); and mediators (i.e., governments, community leaders, non-profit organizations). Who the initiators are depends on the nature of the initiative and how the idea for the initiative started; in this example, IDEXX is the sole initiator and SIHA was brought into the initiative as a mediator.

The individuals representing these stakeholder groups are heterogeneous, encompassing a variety of values. Thus, all stakeholders should be identified and the needs and perspectives of the individuals in these stakeholder groups should be accounted for. External to the firm, CSR should be treated as a broad initiative that engages all stakeholders, including the mediators and recipients, to clearly make it beneficial to all, rather than just for the benefit of the company (Brei & Böhm, 2011); all stakeholders should have a voice in the initiative. And it is important that all the stakeholders involved are accountable to each other, rather than seeing the initiators as solely responsible (Daily & Walker, 2000; Newell, 2005). However, when it comes to developing a WASH initiative, not all voices carry equal weight. The community/recipient voice should be the strongest voice. CSR is negative when it can diminish the voice of the community by providing 'good will' that would be threatened if those on the receiving end spoke up with concerns against the corporation (Newell, 2005).

Rather than emphasising outcomes during the process of stakeholder engagement, emphasis should be placed on engagement with the recipient community, thereby increasing "effectiveness through innovative means of engagement with end users" (Frame, 2005). As was

clearly demonstrated in the literature, community engagement and active community involvement is key for a successful WASH initiative. This lesson was reflected in the interviews with people in Kikongo: engaging leaders is especially important for success. With very few sources of water and extreme variability in the available supply, people living in Kikongo were primarily concerned with access to water and that is what they discussed as the priority. This is apparent from the observations and informal discussions; however, the details of the barriers that the people of Kikongo experienced could not have been understood without engaging the community members. The importance and process of community engagement discussed in the literature on WASH initiatives was apparent firsthand in this experience during which community engagement was learned and practiced. Moreover, how the community members were engaged provided an example of what kind of partnership is meaningful to them and who should be involved in this partnership.

Second component: Values

One of the important lessons from the literature is the necessity of identifying and aligning values; this is an essential component for both CSR (Porter & Kramer, 2011) and for a WASH initiative (Akpabio & Takara, 2014; Brown, *et al.*, 2009; Cross & Coombes, 2013). When it comes to CSR that targets WASH, because of the alignment of public health goals with CSR goals on the CSR spectrum, public health values also need to be incorporated into a WASH initiative. Public health values are focused on improving the health of the population, and therefore include aspects such as education, risk reduction, and reduced morbidity and mortality (Kass, 2001). How to align values depends on the stakeholders and the nature of their relationship, but it starts with each stakeholder internally determining its values.

It is important to note that every stakeholder has values that should be taken into account, and that these values are determined differently depending on the stakeholder. There are the corporation's values; Black and Hartel (2004) explain that a firm's ethical values are based on providing a caring atmosphere and caring identity. The exact definitions or construct of a corporation's values are up to each firm, however any CSR initiative should reflect these values (Black & Härtel, 2004). A firm's values should define what the company does in terms of CSR. There are also the community's values; these values can be influenced by a variety of factors within and outside of the community, such as religion and culture (Zakiya, 2014). In turn these values influence how the community views WASH. The values and priorities of the community determine what kind of solution are meaningful to them, and prioritizing community values is a fundamental part of a successful WASH initiative.

In this example, the values held by IDEXX may include leadership, quality, and innovation, while the values of SIHA include anti-oppressive protocols and multi-faceted action. These values are different and distinct, demonstrating that there is no set list of possible values - they are completely dependent on the stakeholder group. However, they can still align or be worked with concurrently as long as they do not directly contradict each other. This example will be expanded on below when the Threefold Framework is applied as an example for IDEXX to pursue CSR activities in Tanzania. When stakeholders are working together the values of each group should be incorporated into the engagement process. Identifying, aligning, and upholding the values of all stakeholders requires communication throughout the process (Black & Härtel, 2004).

Third component: Outcomes and evaluation

Creating an evaluation plan for the initiative requires discussing all the anticipated outcomes, expected results, and expectations for the process, as well as considering possible unintended outcomes. Again, success in this context refers to the WASH initiative having the intended impact for all stakeholders, non-success is when there is no impact, even though the initiative went as planned, and failure refers to the deterioration of the initiative. Earlier these terms were used to determine how to categorize and describe the current research on WASH (Chapter 3: Review of Current WASH Initiatives). These terms are not necessarily descriptive enough, as they broadly group initiatives that may have had some success, some non-success, and some failure all within the same initiative. When discussing evaluation in the Threefold Framework, the user should consider that one initiative can have varying degrees of success. Success can be defined as meeting the collective outcomes for all stakeholders. For example, an initiative may be deemed a non-success when a corporation's altruistic strategic CSR approach did not lead to the desired outcome of increased public awareness or support for the corporation, even though the outcomes for the recipient (e.g., reduced diarrheal disease in a water-challenged community) and mediator (e.g., local government investing in treatment technology) stakeholder groups were achieved. Success in this example would require the corporation to receive the tangible benefits from the investment made.

Evaluating both the process and the impact of the identified outcomes of a WASH initiative is critical for defining success. As discussed in Chapter 3: Review of Current WASH Initiatives, process evaluation is focused on the design of the initiative, seeking to assess what went well during the process (Saunders, *et al.*, 2005). As the impact of this process begins,

impact evaluation that focuses on outcomes becomes essential (Khandker, *et al.*, 2010). All the components of the Threefold Framework are necessary for a successful WASH initiative.

Explaining the Threefold Framework: Defining the three phases

The Threefold Framework is divided into three discrete phases. The preparation phase is the first phase, and the three components of this phase are meant to be done internally by the different stakeholders. The second phase is the introduction phase, during which the initiating stakeholders bring in the mediators and recipients to collaborate on the plan for the initiative, including aligning values and expected outcomes. In the third phase, the implementation phase, all stakeholders work together to implement the initiative, focusing on the three components: stakeholders, values, and outcomes. The preparation phase is internal to the organization, while the introduction and implementation phases are collaborative among all stakeholders.

In terms of the progression of the process, all the phases are iterative. Westley *et al.* (2009) discuss that with any social initiative, things evolve and people change, so the reality is that introductions never stop. The iterative nature of the process requires that there is a point at which the corporation exits the process and leaves the project to the recipients and potentially the mediators, depending on the nature of the initiative, thereby fulfilling the requirements of sustainability. Stakeholders must work together to determine when this point should be; sustainability is a useful concept when defining this point, as when the initiative is being run by the recipients without external support, the initiators can step away from the project.

Phase One: Preparation

The preparation phase is the starting point for the initiators seeking to implement a WASH initiative. However, the initiating stakeholders may already have ideas and plans, placing them further in the process of the preparation phase. To complete the preparation phase the

initiators should already have an idea of who the mediator and recipient stakeholder groups are. This likely means that a location and/or a community/group has already been contacted or identified and preliminary discussions have begun. If not, the preparation phase may take longer as it includes seeking out opportunities and potential recipient stakeholders.

The preparation phase is for internal planning, firstly by the initiators of the initiative; internal planning is critical, as it provides a strong foundation for leadership (Frame, 2005). Once the mediators and recipients are contacted (which is done in the next phase), they also engage in the preparation phase components. Even if the initiative was conceived by multiple stakeholders, this phase should still be an internal process. During this phase, the initiators involved (such as the corporation and a non-profit organization) need to work internally to determine values and expected outcomes. Using these values and expected outcomes, the key aspects for evaluation of the initiative are determined. Not all stakeholders are present to discuss and plan in the preparation phase, so project planning in this phase is limited to discussions about internal opportunities. For example, for the corporation as an initiator, this may mean CSR opportunities that the corporation identifies and which potentially align with the corporate CSR approach (e.g., strategic altruism).

The first component of the preparation phase is stakeholder identification, which simply means asking the question: Who is going to be involved? This question is only a starting point and likely leads to other questions, such as who would want to be involved? For example, internally for the corporation using this framework, this may refer to identifying employees and leaders involved in CSR planning and reporting. Externally this means identifying: a) the recipient community and b) mediators, which can be inclusive of any non-profit organization, experts/professionals, government bodies, and any other individual or group with an association

to the initiative. This activity should start with those who have taken the lead on the initiative within each stakeholder group and continue as the identified stakeholders within the organization are included in the discussion, until there is saturation in the list of identified stakeholders.

In regards to value identification, the stakeholders ask themselves two critical questions: a) "Why do we want to do this?" and b) "What matters most to us?". Again, these questions are meant to be starting points that likely lead to other questions. These broad questions allow for an open-ended discussion. The answers to these questions result in a list of values that are important to the stakeholder group. This step is important for firstly all the initiators, then later for the mediators and recipients. Specifically for the corporation, by identifying the values prior to engagement, the corporate stakeholder is defining boundaries, an essential need when engaging in CSR, as discussed in Chapter 1: Introduction

Outcome identification occurs during the first phase. During this phase, ideas about the intended and unintended outcomes are discussed, as well as expectations for the process. The following critical questions help guide the discussion: a) "What can we offer?"; b) "How can we offer this?"; and c) "What are we hoping to achieve?". This discussion helps each stakeholder group determine its focus and contributes to keeping the organizations accountable to the goals outlined by the stakeholder.

Phase two: Introduction

The next phase -the introduction phase- is the time for the initiators to engage the other stakeholder groups identified in the preparation phase. If there are multiple initiators they first need to engage with each other, then bring in the other stakeholders. The preparation and introduction phase are iterative because the initiators must first determine who the other stakeholders are in their preparation phase, then meet with them in the introduction phase, after

which the newly engaged mediators and recipients must complete the components of the preparation phase. Once the mediators and recipients have completed the preparation phase they can contribute to the discussion about values and expected outcomes, thus emphasizing the iterative nature of the framework. During this phase, stakeholders work together to align values and expected outcomes, and use these shared values and expectations to develop the evaluation plan.

This is also the time to focus on the needs related to WASH: a needs assessment must be conducted that includes assessing the frequency and patterns of use of water sources, available water treatment options, sanitation facilities, and hygiene resources. The proportion of the community using these different sources of WASH demonstrates the important resources for the community. During this phase, stakeholders should work together to determine the appropriate program for the WASH initiative. As discussed in Chapter 4: Field research on WASH Challenges in rural Tanzania, a certain technology such as biosand filtration may work in one community, but may not be the best option for another community. It is essential to consult current research on all the available technology options, looking for efficacy, effectiveness, and other evidence of the impact.

Phase two includes stakeholder engagement. The intent behind this portion of the introduction phase is for collaboration and learning about the other stakeholders. For the corporation, this may include internal members (i.e. employees/executive) collaborating to understand what is important and how information should be communicated to the corporation including those who are not actively involved in the planning and preparation. With the recipients, engagement should follow the slow process of building trust between the corporation and other initiators (if applicable) and the recipient community, learning the needs of the

community and the indigenous knowledge and values (Cross & Coombes, 2013; Montgomery, *et al.*, 2009; Zakiya, 2014). With the mediators, the exact method of engagement should follow a similar trust-building process, adapting to the nature of the relationship.

Value alignment means bringing together all stakeholders to determine shared values, ensuring there is alignment and that the initiative adheres to these values. Some values may be shared while others may be unique to only a few of the stakeholders. One conversation could be where the corporation should position itself within the CSR spectrum; this depends on the interest in this concept from stakeholders other than the corporation. All values identified should be discussed amongst the stakeholders and taken into account, regardless of whether they are shared or unique. As mentioned, there is not a defined boundary in what constitutes a value, so it is important to work together to develop a common understanding of the identified values. A value can be based on organizational structure, such as valuing leadership, or it can be based on ethical standards, such as anti-oppression, or on the values of the field, such as technological innovation. If there is disagreement between the values of the stakeholder groups, and these cannot be solved through discussion, it may mean that the stakeholders are not compatible and should not work together. Because values are so fundamental to each stakeholder group, the inability to accept the values of another stakeholder group indicates potential irreconcilable differences that could lead to frustration, thereby not meeting the basic principles of the framework (sustainability, ethical responsibility, and meaningful outcomes). An agreed upon list of stakeholder values helps to guide the initiative.

Outcome and process alignment the third and final part of the introduction phase that entails open and honest discussion about the expected outcomes of all stakeholder groups and the projected impact. Similar to aligning values, the expected outcomes and process may differ

amongst the different stakeholder groups; this is not an issue as long as the stakeholders can agree on and incorporate the expected outcomes and process identified by each stakeholder. Once again, if an agreement cannot be reached, this may be an indication that the initiative should not move forward. After the identified outcomes have been aligned, the stakeholders can begin to discuss how to evaluate these outcomes. The same goes for the identified expectations for the process. A process evaluation should be created to measure progress and evaluate how all of the stakeholders are contributing; the goal is to measure the effectiveness of the process (Patton, 1987; Saunders, *et al.*, 2005). An impact evaluation should be created to measure outcomes based on expected results (Khandker, *et al.*, 2010). Both evaluation pieces should include how the shared values fit into the process and outcomes.

Phase Three: Implementation

Plans are put into action during the implementation phase. The introduction and implementation phases are iterative because stakeholders may change and new roles that warrant new stakeholders may come up, requiring new introductions and realignment of values and expected outcomes. As was discussed in the literature on WASH initiatives (Chapter 3: Review of Current WASH Initiatives and reaffirmed during engagement with the community members in Kikongo (Chapter 4: Field research on WASH Challenges in rural Tanzania, community driven solutions are key to success, thus the stakeholder component emphasizes stakeholder-driven solutions. During this phase evaluation should begin, starting with process evaluation, and as the implementation phase continues and the initiative begins to produce outcomes, impact evaluation can begin.

Having stakeholder-driven solutions means ensuring that the recipients of the initiative have the first voice and all other stakeholders are committed and involved. The form of

stakeholder input depends on the nature of the initiative. Although not all stakeholders are necessarily actively involved, input from all stakeholders is still key. This comes back to importance of having frequent iterative communication throughout the initiative.

Value assessment helps the stakeholders continuously uphold the values previously determined. Keeping the shared values as the guiding foundation for the initiative holds the stakeholders accountable to each other, and it requires maintaining communication of needs. Values may change over time, so continuous assessment is best; this step is best done by incorporating it into evaluation.

Evaluation begins when the evaluation plans are fully prepared and ready to use. This means beginning the process evaluation, working through the expectations originally laid out and adapting according to the changing needs of stakeholders (Integrated Water Resources Management, 2000; Westley, *et al.*, 2009). Once the initiative is in effect, impact evaluation should start, assessing the agreed upon outcomes. Stakeholders should continue to be engaged through evaluation, as they help provide the data necessary for evaluation (Fenn, 2012; Patton, 1987).

How the Threefold Framework is ethical, sustainable, and meaningful

The components of the Threefold Framework (stakeholders, values, outcome/evaluation) fit into the key principles (ethical, sustainable, meaningful) of the framework. The key principles describe the type of engagement the Threefold Framework is aiming to guide; these principles are critical for responsible international development. Therefore, the components of the Threefold Framework must reflect these principles.

Including values, evaluation, and stakeholders in the process is critical for understanding and adhering to the ethical principles of value to all stakeholders. Explicitly including values in the Threefold Framework directly contributes to the ethical nature of the framework because there are ethical values, and specifically for the firm, ethical norms accepted by the firm influence what that the firm values (Black & Härtel, 2004). To learn these values, all stakeholders must be engaged. Involving stakeholders contributes to the ethical nature of the framework because community (defined as any group with a vested interest) participation is a right (Rahaman & Varis, 2005). Moreover, stakeholders inform ethical expectations. Evaluation indirectly contributes to the ethical nature of the framework by acting as tool that measures the components of an initiative, ensuring it is ethical in terms of processes and impact. Any initiative guided by the framework should be ethical and uphold the values of the stakeholders and other agreed upon ethical principles.

Sustainability in the framework comes from understanding what is working with respect to process and impact. Thus, evaluation contributes to the sustainable nature of the framework directly by indicating what is going well and what needs to change to keep the initiative going. Stakeholders also contribute directly because they are the catalysts and drivers that make the initiative happen. Values contribute to the sustainable nature of the framework indirectly, in that something that incorporates values is more trusted and therefore more sustainable. Stakeholders are the key contributors to making the framework sustainable.

Finally, what is meaningful is determined by the stakeholders' values and needs. Thus, values and stakeholders contribute to the meaningful nature of the framework directly in that values determine what is meaningful, and stakeholders contribute their perspective when determining the values. Evaluation contributes to the meaningful nature of the framework

indirectly, as a part of evaluation is to measure if the initiative is working meaningfully. What is meaningful depends on the stakeholders and their values, emphasising that stakeholders are a key piece of the framework.

Applying the Threefold Framework to the example of IDEXX and Kikongo

The Threefold Framework is a result of learning from SIHA, people living in Kikongo, and IDEXX. Much of the first phase of the Threefold Framework was inevitably conducted in the process of learning about these stakeholders. The engagement of a corporation, non-profit organization, and community in need of improved WASH led to the development of the framework. In turn, to demonstrate how this framework can be used in practice, IDEXX, SIHA, and the community of Kikongo will be used as an example of stakeholders looking to pursue a WASH initiative. In this example IDEXX is the initiator, SIHA is the mediator, and the residents of Kikongo are the recipients. This example preceded the development of the Threefold Framework, thus the example demonstrates the components and phases mid-initiative in the preparation phase. This section first explains the preparation phase for all three stakeholders, followed by the hypothetical process of the introduction and implementation phase using information learned during the research. In practice, IDEXX would go through the preparation phase, then engage with SIHA and the residents of Kikongo, then the latter two stakeholders would go through the preparation phase. The purpose of this activity is two-fold: first, to demonstrate the utility of the Threefold Framework and, second, to contribute to IDEXX's potential future CSR activities.

Preparation phase for IDEXX

Starting with stakeholder identification, IDEXX has both internal stakeholders as well as external stakeholders who are key for a WASH initiative. The internal stakeholders include:

employees in the Water Business, leaders in the Water Business including the Senior Director/General Manager, the Global Marketing Lead, and the CEO of the corporation. The external stakeholders are: the Kikongo Water Committee, the Village Executive Officer (elected government official for Kikongo), the Ward Executive Officer (elected government official for the ward), the manager of Dawasco, the District WASH Executive in Kibaha, and, importantly, people living in Kikongo who are interested in being involved. As well, SIHA, as a local organization that acts as a trusted intermediary can be considered a mediator stakeholder in this process.

I determined the values of the corporation using public information, including: sustainability, innovation, quality, partnerships, collaboration, and accountability. Leaders of the corporation determined these values, which are meant to be upheld in the workplace and externally by all employees of the company. Chapter 5: Results on CSR at IDEXX discussed IDEXX's commitment to upholding their values and how the values are reflected in their current CSR initiatives. This affirms that IDEXX is working to demonstrate and align the values determined by the corporation with the actions of the corporation.

The identification of the outcomes should also emerge from discussions amongst IDEXX's internal stakeholders. Certain evaluation criteria that align with IDEXX's current business should be included, such as the goal of having the public health impact of reduced water-borne disease. While the actual impact of the project on water-borne illness will be difficult to determine, using this metric demonstrates the commitment to that outcome and estimates of impact can be achieved.

Preparation phase for SIHA

As a student-run non-profit, SIHA is focused on working at a grassroots level with partner communities. Therefore, the stakeholders identified by SIHA are those within Kikongo, specifically the local government and the Kikongo Water Committee, as well as the regional government. SIHA aims to work with the community, making those groups primary partners.

SIHA's values are their five guiding principles: Multifaceted Action, Community Driven Initiatives, Anti-oppressive Processes, Sustainable Solutions, and Knowledge Translation Strategies. These are listed on SIHA's website (siha.ca). The guiding principles align closely with SIHA's grassroots approach to its initiatives.

As a non-profit organization committed to health promotion, SIHA aims to improve the health and wellbeing of the communities in which it works. Therefore, the expected outcome of any initiative that SIHA participates in is improved community wellbeing. This is a broad outcome that could be defined in many ways. Metrics to determine this outcome will depend on the initiative. In this case, to determine if a WASH initiative has had a positive impact on community wellbeing, metrics will include the specific needs of the community: access to clean water.

Preparation phase for the residents of Kikongo

As the local group with limited external engagement, the residents of Kikongo are currently focused on working with stakeholders who are already involved in the community. Thus, the key stakeholders for Kikongo are their local representatives, the Kikongo Water Committee, and SIHA. Other groups, such as the regional government, could also be considered, but because the regional government is not currently involved in the WASH initiatives in

Kikongo, they would likely not be considered a stakeholder by the community. Communication with the community will be necessary to confirm the participation of stakeholders.

The values held by the community of Kikongo were not fully explored in this research. Although the qualitative description did not specifically research the values of the participants, some values were revealed, such as valuing community cooperation and shared contributions. It will be important to better understand what all the values look like for the community to determine how the community's values should play a role in future WASH initiatives.

Through the qualitative description the community members in Kikongo identified a very specific goal, and that was to get improved access to a safe and reliable source of water. This outcome is succinct and measurable, and can easily be included as a metric of evaluating success that can be incorporated with the expected outcomes of IDEXX and SIHA.

Introduction phase

Stakeholder engagement entails the slow process of entering the community described in Chapter 3: Review of Current WASH Initiatives; this will be when IDEXX is dependent on SIHA to be the mediator for engagement. Leaders and government should be engaged first: the first point of contact in Tanzania should be the Tanzanian Regional Government for the Coastal Region, which grants permission for activity in the Coastal region. This government body granted approval for this research (Figure 9). The first point of contact in Kikongo should be the Village Executive Officer. Following this, the Kikongo Water Committee should be engaged, as they are a trusted community group actively involved in WASH. A member of the Kikongo Water Committee acted as a gatekeeper for this research and that relationship can be built on. Finally, through the Kikongo Water Committee, local community members can be involved.

Stakeholder engagement itself is a process and will take time, but the trust building process is critical.

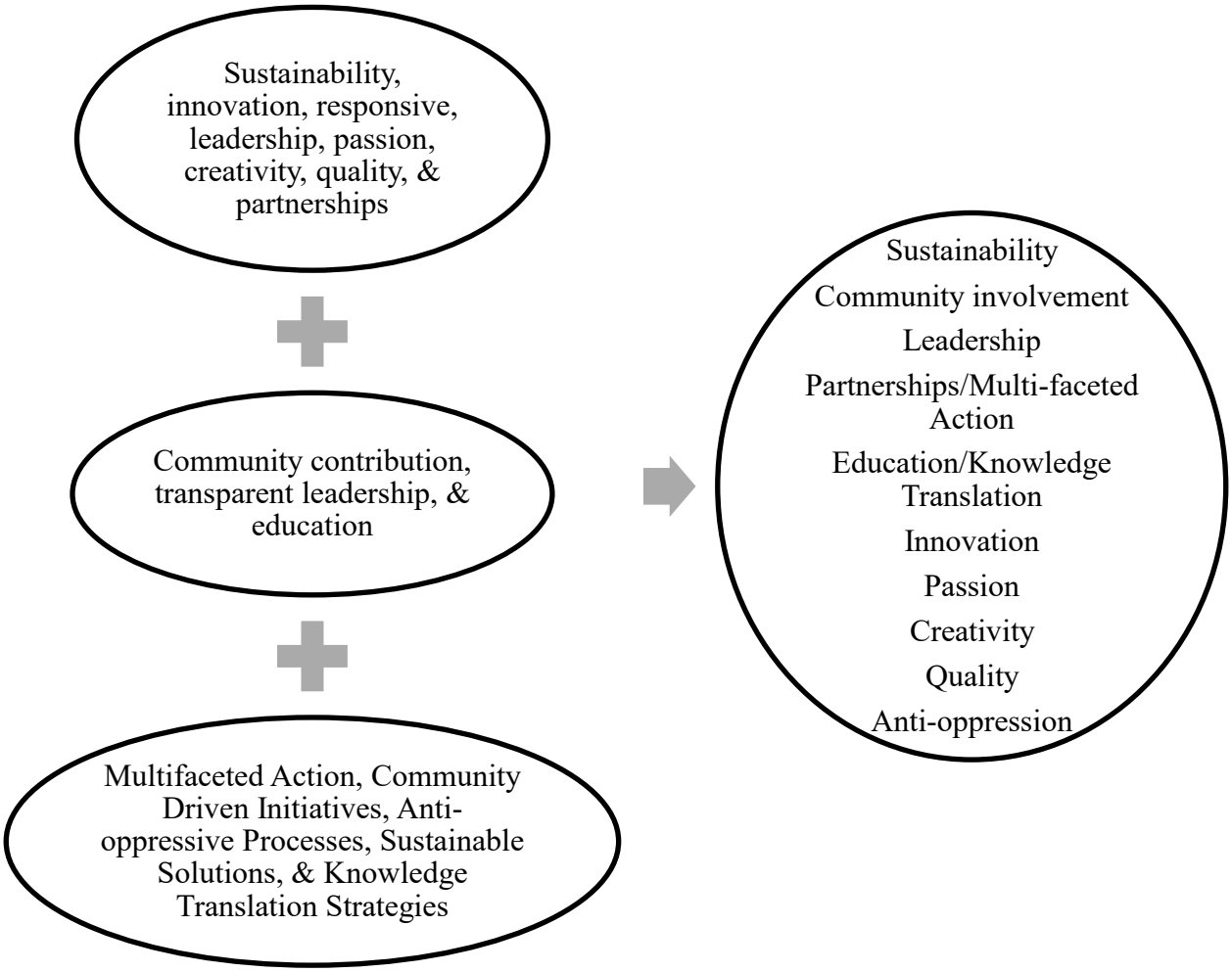
Once stakeholders are engaged and trust is built, each stakeholder group can share its values and work together to align them. Bringing together IDEXX's identified values, SIHA's values, and values of the stakeholders in Kikongo will require open communication about what can be combined and how they fit together. For example, in Table 10, the values amongst IDEXX, SIHA, and Kikongo are listed and the overlapping values are identified, namely sustainability, community involvement, leadership, partnerships/multi-faceted action, and education/knowledge translation.

Table 10: Example of Example Stakeholder Values

IDEXX's Values: Sustainability, innovation, responsive, leadership, passion, creativity, quality, partnerships	Overlap: Sustainability Community involvement Leadership Partnerships/Multi-faceted Action Education/Knowledge Translation
Values in Kikongo: Community contribution, transparent leadership, education	
SIHA's values: Multifaceted Action, Community Driven Initiatives, Anti-oppressive Processes, Sustainable Solutions, Knowledge Translation Strategies	

There are some values that do not overlap, however that does not mean that these values can be disregarded; in fact, after sharing these some stakeholders may adopt new values. For example, SIHA might see value in adopting creativity and IDEXX may consider implementing anti-oppressive protocols. Thus, when combining stakeholder values, both the shared values as well as the values that may not be shared but have been mutually agreed should be incorporated into the WASH initiative. Figure 7 provides a visual demonstration of how values can be consolidated.

Figure 7: Example of Aligning Stakeholder Values



These values should be kept in mind during outcome alignment and evaluation development; this step requires discussing expected outcomes amongst the stakeholders, considering potential unexpected outcomes, and planning for the appropriate metrics for evaluation and how these metrics will be measured. IDEXX and SIHA will have the tools and skills needed to help with measurement, however the Kikongo Water Committee and Village Executive Officer will have the knowledge and connections needed to conduct evaluation. IDEXX aims to achieve a public health impact in terms of reduced water-borne illness and

improved overall wellbeing; this goal is echoed by SIHA and those living in Kikongo. If the aim of the WASH initiative is to reduce disease and improve wellbeing, public health metrics could be used to measure the impact on these outcomes: reported rates of diarrhoeal disease at the dispensary and attendance at the Kikongo Primary School could be used for quantitative metrics. Interviews with community members receiving the WASH initiative on their perceptions of health and wellbeing could reveal qualitative information on the impact. As discussed, none of these measurements are perfect. Because WASH is complex, any correlation between the WASH initiative and disease rates or school attendance does not necessarily imply causation. And any qualitative findings are limited to the experience of the individual, which may not indicate overall impact. Thus, using a broad range of measurements will contribute to understanding the impact.

Implementation phase

The implementation phase is action based and will take all the planning from the introduction phase and put it into practice. In this example, the nature of the WASH initiative will depend on how the stakeholders collaborate and work together. Considering the expected outcomes, the WASH initiative will at least include implementing an improved source water; beyond this, the scope and details of the initiative cannot be determined until the first two phases have been completed.

Implications of the Threefold Framework for IDEXX

Incorporating the suggestions of the framework with the information gathered from the two field seasons in Tanzania, some conclusions can be drawn that will direct IDEXX in future CSR endeavours. Some of these implications come from learning from SIHA's attempts to improve WASH using the BSF.

From the SWOT analysis of the BSFs which highlighted the errors that led to the failure of the project, there is an important lesson: a lack of community engagement led to an unsustainable WASH initiative. Although this project still has potential ways forward, as discussed in the section on Strength, weaknesses, opportunities, and threats of SIHA's Biosand Filter WASH initiative (Chapter 4: Field research on WASH Challenges in rural Tanzania, the SWOT analysis in combination with the Threefold Framework suggest that the SIHA BSF project is not an appropriate avenue for IDEXX to get involved in. In its current state the project is, at best, not successful. There is little trust in the BSFs and it is safe to conclude that there is not currently any public health impact in terms of disease reduction. Fitting this initiative into the Threefold Framework, the project has technically gone through all three phases: the preparation and introduction phases were led by SIHA, with the other stakeholders -the Village Executive Officer and the Kikongo Water Committee- as consultants. The initial implementation of the BSFs does not fit into this framework in that it did not follow the recommended process; however, because of the iterative nature of the framework there is still the opportunity to return to the introduction phase, discuss and align values with the stakeholders, and create an evaluation plan. After this IDEXX could be recruited as a new stakeholder in the iterative process, however it would first require SIHA to rebuild trust with the community members. Therefore, at this point it would not be responsible for IDEXX to get involved in the BSF initiative.

During the first field season, a list of opportunities for IDEXX to pursue potential CSR initiatives within Kikongo was created. The opportunities range from direct involvement to monetary donations to contributing to education. The different opportunities were assessed for sustainability, feasibility, impact on IDEXX, and impact on the community (Table 11). These opportunities were made based on what the community identified as needs, within the confines

of what IDEXX could provide. Since this activity was completed in 2015, the research progressed and the Threefold Framework is now developed, providing the space to apply these opportunities to the framework. Thus, the third column in the table is a brief explanation of applying the opportunity to the Threefold Framework. The opportunities identified and discussed are meant to demonstrate how the Threefold Framework can be used. In theory, an organization should start using this Threefold Framework prior to discussing specific projects. Thus, although in ideal circumstances a project would be developed after stakeholder engagement occurs, Table 11 demonstrates the Threefold Framework can be applied to a variety of circumstances.

Table 11: Opportunities for IDEXX identified in 2015 and how they fit into the Threefold Framework

Opportunity for an initiative	Assessment after first field season	Applying to the Threefold Framework
Provide water quality testing kits for educational seminars on the positive impact of the BSF in treating water for bacteria in the school	Sustainable: The initiative is potentially sustainable if a new SIHA member comes every year and teaches students about the testing kit, but this would become redundant. Feasible: The initiative is very feasible in terms of cost and organization. Impact on community: The testing kit could help to teach the younger generations about safe water, which would hopefully be passed on as they grow up. Impact for IDEXX: There would be minimal corporate impact, it would mostly be something to advertise on the website.	For both opportunities that suggest using the testing kits for education, there is a potential risk: because the BSF may not treat the water to an acceptable level (WHO., 2004), the test will likely come back positive for *E. coli*. This would make education difficult. It is possible that with chlorine treatment the test could come back negative. Prior to engaging the community further with this idea, the biological potential must be thoroughly researched. Thus, these possibilities would have to be internally reviewed.
Provide water quality testing kits for education in the community to demonstrate the need for treatment	Sustainable: The initiative could be sustainable if it was made an annual activity that entailed someone with the testing knowledge and skills coming with SIHA. Or it could be a one-time initiative, which is by definition not sustainable. Feasible: The initiative is feasible in terms of cost. Impact on the community: According to the literature, the education could spark behaviour change in the community. Impact on IDEXX: If the initiative was ongoing IDEXX could send their employees to Mlandizi as a part of their sabbatical. It could also spark interest from neighbouring communities, and if testing was done at a price could potentially open the door to a new market.	
Partner with regional government to provide testing kits and education so that the government can in turn test the water sources in the	Sustainable: If the kits are partially paid for by the Tanzanian government, it could be sustainable. Feasible: The initiative could be feasible if budgeted properly by both IDEXX and the Tanzanian government.	Prior to pursuing this possibility, the government would have to be fully engaged and planning would have to occur between the government and IDEXX. As mentioned, the sustainability of the project

region	Impact on the community: The initiative could have an impact if it stimulates the government to provide treatment options when they realize the quality of the water. Impact on IDEXX: The corporate impact depends on how the education is provided, meaning whether they send employees to educate on water testing.	would be questionable, as the government would be dependent on IDEXX for the kits, but these details could be worked out. This opportunity could be brought to the Tanzanian government as possible stakeholder.
Fund building wells	Sustainable: Although it depends on external funding, if the initiative was successful it would provide a sustainable source of water that could be maintained by the community. Feasible: The feasibility depends on the cost and how much IDEXX is willing to put into it. Impact on the community: The initiative provides the community with a sustainable source of water. Impact for IDEXX: There would be minimal corporate impact, it would mostly just be something to advertise on the website.	These two opportunities are focused on providing funding. This may not align with IDEXX's values; for example, the aim for leadership and quality, as these initiatives would not necessarily guarantee quality outcomes. Internal assessment of expectations of this project, including anticipated outcomes to be included in the evaluation.
Provide assistance or resources to fix the Kikongo Rainwater Collection System	Sustainable: Although it depends on external funding, if the initiative was successful it would provide a sustainable source of water that could be maintained by the community. Feasible: The initiative is feasible in that it not be expensive to pay a local company to fix it, and would only require the transfer of money. Impact on the community: The initiative would provide a source of clean water, which is the greatest need in the community. Impact on IDEXX: If employees were physically involved it could have a positive impact on employee morale. It could also be something to advertise on the website.	

Going forward, I think it is important that IDEXX fully engages in the Preparation phase of the framework first, prior to any further action or investment. The leaders of the corporation must determine the scope and capacity of IDEXX's CSR, including where they want IDEXX to work within the CSR spectrum. It may be that future stakeholders might also have input on where they think IDEXX should be on the CSR spectrum. Along with the answering the questions laid out in the Preparation phase, the leaders at IDEXX should consider whether they are equipped to start their own long term CSR initiative, which would require significant human resources and likely a new positon at IDEXX. Alternatively, the corporation could consider partnering with groups like PATH (path.org), and contribute to initiatives that are run by other groups. These decisions will help develop a responsible approach to CSR for IDEXX.

Conclusion: Summary and future utility of the Threefold Framework

There are many different perspectives needed for a successful WASH initiative and the Threefold Framework is designed to inform corporate involvement. Developing the Threefold Framework utilized academic and NGO research, considering those publications as expert knowledge on the field of WASH. It also accounted for the expertise of those with the lived experience of poor WASH, as was recommended in the literature. Rather than depending entirely on the literature, on the views of IDEXX, or on the needs of the community, all perspectives were used to inform the framework.

The Threefold Framework presented in this thesis is a conceptual model that needs to be tested, critiqued, and updated in future research. Communication as the foundational, encompassing piece implies that the Threefold Framework itself should be discussed and modified for the needs of those using it. While stakeholders will always be the driving force

behind an initiative, and values and evaluation should be included in the initiative, there may be other pieces to be incorporated. Moreover, there may be other intermediate steps in the process, and the final step for the external organization could be more clearly laid out in the Threefold Framework. The use of the Threefold Framework beyond corporations should also be explored and tested. The current design of the Threefold Framework is a starting point for researchers and organizations to build on, with the final goal of improving public health.

Chapter 7: General Discussion

Significant Contributions

This research incorporated a diverse range of fields and therefore has a variety of significant findings. Each set of results from each phase of the research has findings that have been discussed in the preceding chapters, however, there are also broader findings that are significant as they contribute to filling the gaps in the current research. This section summarizes those key findings.

One gap in the current research on WASH is identifying the specific considerations that are important when pursuing a WASH initiative. The question that I presented was, "What makes WASH initiatives fail or be unsuccessful?". A complete answer is likely beyond the scope of any single research project, however my research could contribute to answering the question. From the literature review on WASH initiatives it was evident that communication and working collaboratively towards solutions are critical when addressing a WASH challenge. This finding was confirmed during both phases of the field work, along with the importance of listening to the community when determining what action to take. The WASH projects that I focused on during my field research were failed initiatives. From this I submit that it is valuable to investigate and learn from failure. Learning about the failed WASH projects illuminated an important lesson: taking action without knowing what the community needs can and often will lead to inappropriate or ineffective initiatives. Specifically related to the role of CSR in WASH initiatives, the most significant finding is that a corporation must first listen to the community and then decide if what it can offer has utility.

I have proposed a new method of distinguishing CSR; my research suggests there are three broad approaches to CSR -business, strategic, and altruistic- and these different approaches can be put on a spectrum. The spectrum is an accurate, succinct way to portray the different approaches to CSR because it recognizes that the three broad approaches are not necessarily distinct, but a CSR initiative can be coming from an approach that combines, for example, strategic and altruistic elements. The CSR spectrum is a tool that can be used when considering how to approach CSR.

As discussed in Chapter 1, I consider approaches that incorporate strategic CSR as the most balanced, responsible approaches because the strategic approach addresses the reality that a corporation is responsible for making a profit while at the same time ensuring that all parties involved in the CSR initiative are benefitting. Published studies rarely compare different approaches to CSR as being better or worse. However, the focus of strategic CSR is to provide a shared benefit and therefore strategic CSR promotes a symbiotic relationship amongst stakeholders. For IDEXX the benefit would not be monetary but would be through demonstrating the corporation's commitment to improving water quality through advertising, making the initiative seem altruistic at the local level. This could be a benefit for IDEXX in their international markets, although it is unlikely that it would create a market in Tanzania, making the initiative strategic on the global scale. Therefore, for IDEXX the most responsible approach in terms of corporate and social responsibility is within the realm of strategic altruistic CSR.

Finally, a key finding of this research, included in the Threefold Framework, is that aligning values and expectations is an integral part of collaborating with a corporation on a public health initiative. This is related to the importance of communication and community engagement. Working within identified and agreed upon values and expectations leads to

responsible partnerships. This requires a public health approach and incorporating stakeholders, values and evaluation, as is included in the Threefold Framework. The following sections expand on these three components -stakeholders, values, and evaluation- in regards to the example in this research and public health research in general.

Stakeholders: Limitations of targeted initiatives and public health strategies for engagement

For targeted WASH initiatives, a typical limitation is the level of change that is being targeted, in that focusing on the bottom-up approach to improving WASH neglects systematic, high-level barriers. By providing a locally-based initiative that targets individual actions, potential social/structural reasons why action has not already been taken to improve WASH is being overlooked. It is important to recognize that only targeting the individual will not address the roots of the problem; social change needs to coincide with individual change (Israel, Checkoway, Schulz, & Zimmerman, 1994). This is a limitation of the field that must be considered when engaging in a WASH initiative.

Engaging stakeholders starts with partnerships; maintaining partnerships is critical to success in CSR (Werther Jr & Chandler, 2010). Although the exact nature of the partnership depends on the stakeholders and their relationship, there are some strategies in the public health literature, especially health promotion, to managing and maintaining a responsible partnership. For example, in this research there were many partnerships, including: IDEXX and I, and SIHA and I. These partnerships both went through three phases: cooperation, coordination, collaboration (Skage, 1996). Cooperation and coordination were necessary to develop the project plan; these phases included talking with the main contact from IDEXX and the Vice President of the International branch of SIHA's 2014 executive about what would be done for the project, and

importantly, how these actions would benefit them. The last phase, collaboration, is an ongoing process (Skage, 1996); it is (and was) important to continuously check in to ensure that both parties are fulfilling their purpose (Goldblatt, 2007). Some important considerations to use for checking the utility of partnerships include: are all parties continuing to fulfill their roles and responsibilities, is there discussion about expansion, and is there still mutual agreement (Skage, 1996; Westley, *et al.*, 2009). While these partnerships are not necessarily going to continue, the process of developing a strong partnership with the community and other stakeholders is key to success.

Values: How aligning values contributes to positive public health outcomes

Learning each of the stakeholders' values will create a strong foundation for the WASH initiative. It is critical to take time to discuss and align values; this finding is not unique to this research. Coming back to the case study in Ghana that focused on a partnership amongst several NGOs to improve WASH, the various stakeholders worked together to learn and understand the local beliefs and values, the result of this effort was a better initiative in terms of understanding and collaboration (Zakiya, 2014). Consider another example discussed earlier in Bangladesh, in which the handling of human waste was considered taboo; knowing that the community values a sanitation method that does not require manually handling waste contributed to the selection of a WASH program that was considered culturally appropriate for the community (Uddin, *et al.*, 2014). Applying this example to corporate engagement in WASH initiatives, if one of the other stakeholders involved was a corporation that had IDEXX's values, for example sustainability, then providing a culturally appropriate technology would be a part of value alignment because the WASH initiative was acceptable and therefore (theoretically) would be used and sustained by the community. When values align, the initiative is meaningful to all stakeholders.

Evaluation of WASH initiatives: Using public health criteria

Public health plays a key role in evaluation. First, public health encompasses health outcomes that can be used as metrics to measure success. And second, public health research provides a variety of potential evaluations tools and models. With respect to WASH initiatives, deciding what to measure for both impact and process evaluation aligns with public health: the goals of a WASH initiative are public health goals, in that the intended impact is to improve health and wellbeing.

The public health outcomes that can be used as metrics to measure success include both the quantitative elements as well as the qualitative aspects that are useful for measuring impact (examples discussed in Chapter 3: Review of Current WASH Initiatives). Considering the social determinants of health that were discussed earlier (Chapter 1: Introduction) social aspects such as school attendance, especially for girls, can be used in evaluation, therefore contributing to measuring the impact of a WASH initiative. It is important to consider both the determinants of health that are meant to be impacted by the WASH initiative -the intended impact-, as well as which determinants may be impacted unintentionally -the unexpected outcomes. Public health literature offers a variety of measurements, both quantitative and qualitative, for different determinants of health.

Some recommended models for evaluation derive from public health research. For evaluating the process, Campbell *et al.* (2000) propose a framework for evaluation of complex interventions that uses four phases with both qualitative and quantitative measures. Although this framework is focused on evaluating randomized control trials, the four steps -defining components, defining design, identifying challenges, and promoting effective implementation- can be applied to many different initiatives (Campbell, *et al.*, 2000). Other researchers build on this framework,

providing guidance for process evaluation (Moore *et al.*, 2015). These are two of the more commonly cited guides for process evaluation. One example of impact evaluation mentioned in Chapter 3: Review of Current WASH Initiatives is a cluster-randomized trial in Kenya that evaluated the impact of a school-based WASH program on student absenteeism; this study used two interventions groups and one control group, measuring school attendance to determine the impact of a WASH intervention (Freeman, *et al.*, 2012). This study faced challenges in terms of compliance and confounding factors including civil violence; the authors conclude that while these factors made measurements challenging, after adjusting for them, the WASH intervention had a positive impact on school attendance for girls (Freeman, *et al.*, 2012). The exact nature of an impact evaluation will depend on the public health outcomes being measured. Public health research offers a variety of frameworks and possibilities for evaluating an initiative.

Evaluating the Threefold Framework: Evaluation of the process

The Threefold Framework itself will need to be systematically evaluated. This will require taking into account how each principle, element, and individual process within the framework contributes to the overall success of the framework. It will be important to remember that the overall goal of the framework is to inform corporate engagement in water initiatives, and consider how and if this goal was met. Moreover, one must consider whether the process that the framework provides contributed to informing the initiative that was created. I recommend evaluating this framework each time it is used.

If the Threefold Framework is not useful or is lacking, a variety of factors could be considered. It could be that the result is not beneficial for all the stakeholders, which would mean the 'responsibility' part of the project was not fulfilled. Within Tanzania, there are some clear ideas about what would be an unsuccessful project, such as having no community interest or

resistance from the local and/or regional government. An unsuccessful framework could also be the result of factors external to the community. Poor communication with IDEXX and what the company expects from this project needs to be included, or the framework will not be a useful tool for the company. Thus, evaluation of the framework will be an important part of its application.

How the Threefold Framework fits into CSR research

The principles of the Threefold Framework -sustainability, meaningful public health outcomes, and ethics- encompass the important capabilities for CSR discussed by Black and Härtel (2004), including *stakeholder engagement* in sustainability, *dialogue*, and *value-attuned public relations* in meaningful outcomes, and *accountability* and *ethics* in ethical considerations. The Threefold Framework expands on these five capabilities by describing the different types of stakeholders who can exist for a corporation pursuing CSR -initiators, mediators, recipients. This distinction of stakeholders makes communication easier to break down amongst the different stakeholder groups, clarifying what Black and Härtel's *dialogue* can entail. This also makes *accountability* and *value-attuned public relations* easier to understand, as the different stakeholders will provide different perspectives, and when the distinction amongst the stakeholder groups is made, distinguishing expectations and values is more clear. The Threefold Framework can be seen as more detailed, process-based model compared to Black and Härtel's (2004) five capabilities of CSR.

Similar to the Threefold Framework, Lindgreen *et al.*'s (2009) Four Cluster Model also provides a breakdown of the different stakeholders that exist, and how these stakeholders can be impacted by CSR. The four clusters, however, exclude the reality that when a CSR initiative is external there are multiple groups involved that have specific roles in the process of the

initiative. Lindgreen *et al.* (2009) acknowledge that there are many ways to be responsible and that there are many stakeholders who could be impacted, but fail to provide the process as to how to engage the stakeholders and provide a meaningful impact. The model is focused on defining types of CSR, not the process. The Threefold Framework provides a detailed description of the process of stakeholder engagement and contribution to meaningful public health outcomes.

This detailed process described by the Threefold Framework inevitably relates to CSR activities described by Matten and Moon (2008) as explicit. By engaging with stakeholders external to the firm and working on initiatives that are meant to benefit those stakeholders, the corporation is going beyond 'business as usual' -or implicit CSR (Matten & Moon, 2008). The Threefold Framework is meant to guide a corporation looking to engage in CSR that is external to the firm. It builds on the recommendations laid out in the literature: it inevitably will guide the firm to engage in CSR that is congruent with the firm's objectives (Menon & Kahn, 2003; Newell, 2005) and promotes strong community involvement (Newell, 2005).

With respect to regulation, the Threefold Framework depends on community-driven regulation, as discussed by Newell (2005). Community however refers to all the different stakeholders external to the firm, including non-profits, governments, and the recipient community. If the Threefold Framework is adhered to, this 'soft-regulation' will comprise a built-in aspect of the process, because the Threefold Framework depends on stakeholders, and therefore community-driven regulation is inherent to the process.

There are other frameworks for private sector development partnerships. Carney (2014) discusses various international development agencies statements on partnerships with the private sector. For example, the Swedish International Development Cooperation Agency (Sida) is

discussed by Carney, and offers a specific process for selecting private partners. Sida (2012) offers ten key principles and criteria for public private development partnerships, stressing that the development agency and the private sector partner have a shared focus, including the social challenge being addressed and the recipient country, and there should also be opportunity for scaling up and market improvement. Another example from the Canadian Institutes of Health Research (CIHR) is an Ethics Framework for Partnerships with the Private Sector (CIHR, 2011). The Ethics Framework from CIHR emphasises the outcome of the partnership as a key part of selecting a partner. These different criteria and frameworks offer partnerships guidelines for a development agency looking to partner with the private sector, while the Threefold Framework focuses on partnership amongst various stakeholders, with the corporation being as involved as other stakeholders. Much of the core ideas are the same among the Threefold Framework and these other guidelines, such as transparency, shared values, and mutual interests (Carney, 2014). The Threefold Framework takes these criteria a step further by providing a process for engagement.

The Threefold Framework is a novel contribution to the current research on CSR and corporate engagement in public health. As such, dissemination of the Threefold Framework will help build the academic fields of CSR and public health.

Knowledge Translation: Disseminating significant findings

Communication was a key recommendation in the literature that contributes to building trust and maintaining relationships with all partners and stakeholders. It is critical to share the findings of this research with the stakeholders involved and the broader academic community involved in WASH research. The following organizations/individuals are considered key stakeholders who will be receiving or have already received the outcome of my research: the

Government of Kikongo, the Tanzanian Regional Government for the Coastal Region, SIHA, and IDEXX, as well as the University of Alberta School of Public Health and the broader academic community. Each of these stakeholders will benefit most from different findings; moreover, each group requires a different method of knowledge translation, considering language, culture, and need for information. To appropriately disseminate the findings from the qualitative description to all stakeholders, several different communiques were developed with language and content tailored to the intended audience. The following sections describe how information was disseminated to each stakeholder during the research project.

Disseminating research findings to the regional and local government in the Coastal Region and Kikongo, Tanzania

The first phase of knowledge translation was in Tanzania. For the Coastal Region Government a two-page document was provided that included the following information: project summary, research findings, implications for Kikongo, and research dissemination strategy (Figure 13). For the Government of Kikongo an almost identical two-page document translated to Kiswahili was provided (for the English version see Figure 14). The only difference between the two documents was the explanation of research dissemination, each describing that the document was provided to the other. This document highlights the key findings from the qualitative description, specifically that the two greatest needs are for a consistent source of safe water and for assistance from government and other sponsors to make this happen. It describes the four main barriers that were identified -scarcity, distance, money/resources, and cooperation- and the suggested solutions of getting new closer sources, covering the current wells, and making the current sources more affordable. The implications section highlights that ideas for solutions already exist in the community.

The document was presented in person to the Village Executive Officer and other local government officials in Kikongo, allowing for in person discussion. The Regional Government was given the document via email to the contact who provided the ethics approval for the research. There were not any questions from the local or regional government. SIHA was provided with these documents so the organization had record of what was communicated to their partners in the community. For the Tanzanian governments, this information was meant to provide guidance for future directions.

Disseminating research findings to SIHA

Along with the documents that were provided to the Government of Kikongo and Regional Government, SIHA was also given a report on the implications for the non-profit (Figure 15). This document discusses the research summary and findings, as well as implications for SIHA. My contact information was provided, encouraging future SIHA members to ask questions at any time.

Within the section on implications, the recommendation was made to discontinue involvement in any water projects and to not engage in any future work with water access. This is based on the complexity of the field and the need for expertise when working on something that is a fundamental human need. As SIHA is a student-run organization, SIHA does not have experts in any particular field, but instead offers the ability to work with the community towards community-driven solutions. Therefore, it was also recommended that if SIHA and the community want to continue working on water-related projects, one potential avenue that would be responsible and within SIHA's scope would be helping teachers improve WASH education and capacity in the school setting. This would entail supporting the teachers with educational and technical resources for WASH such as soap and stored water. Providing advice and experience to

inform future work is meant to help the organization develop its policies and practices in global health.

Academic research dissemination

The next phase of knowledge translation occurred upon return to Canada. Within the School of Public Health, a 15-minute presentation was given during the MSc Seminar Series, a forum for MSc students to engage with each other. As well, a poster was presented at the School of Public Health's international conference, the International Forum on Public Health Education. External to the School of Public Health this poster was presented at the Campus Alberta Student Conference on Health (CASCH). Moreover, at the Global Symposium for Health Systems Research in Vancouver the research was presented during an oral session. The goal of attending these conferences is to share experiences and find other researchers working in similar fields to discuss ideas and future directions with.

Disseminating research findings and implications to IDEXX

The outcome of this research is the Threefold Framework, developed with IDEXX in mind as a corporation that could use the framework. After the first field season the findings were presented to IDEXX; after the second field season the framework was created and shared with IDEXX, presented to the leaders who were the main points of contact during this research. The full thesis has been provided to IDEXX, which includes recommendations for future actions.

Limitations to the research

There are several important limitations to this research, which will be discussed in this section. Briefly, the methodological limitations are related to language and interpretation, availability of information on IDEXX, and scope. A result of the limited scope is that the

framework has only been applied in one context. Related to this, the context and stakeholders were selected out of convenience, meaning that the stakeholders in this research may not be the most indicative of possible success. The framework itself is limited to initiatives that include partnerships with organized stakeholders. As well, any work in the field of WASH is inherently limited by the complexity of WASH and the multitude of factors that could impact a WASH initiative.

In Tanzania, the qualitative research was limited by the human resources available. Ideally, I would have audio-recorded the interviews, had someone who spoke Kiswahili transcribe the recordings, and had at least one person translating the transcripts to English. This would have contributed to validity (Mayan, 2009), however by having my research assistant directly involved in translating, interpreting, and analyzing the interviews, those actions were at least kept consistent. For the purposes of a qualitative description, having direct interpretation of the interviews still provided the raw data needed to answer the research question. In future research that further investigates the challenges faced when accessing water and ideas for solutions, interviews should be audio-recorded and transcribed to allow the researcher to consider and interpret meaning. Moreover, more time should be spent building relationships with the participants to enhance trust.

With IDEXX, the research was limited by availability of information about the corporation and the purpose of the current CSR initiatives, a result of limited connection with the corporation. Given the time and resources, more about the intentions of the corporation would be beneficial, particularly understanding the values of the employees and how CSR initiatives could be influenced, and in turn could positively impact employees. Gathering this information was limited by the availability of leaders from IDEXX, something that could be overcome by having

one specific point of contact for the project. IDEXX should consider investigating employee understanding and perception of CSR, another future research project.

The scope of this research was primarily focused on one corporation, one non-profit organization, and one community. As such, the framework was developed using a limited frame of reference. Until the framework has been put into practice and tested in different contexts, it is limited to the context of the information used to develop it. Future research using this framework should include going through all phases of the framework with a corporation and partner stakeholders. The more the framework is used and discussed with all stakeholders, the more it can be enhanced.

My research process was based on what was available given limited time and resources. This meant that relationships were formed with the stakeholder groups based on necessity, and engagement was limited to necessary interactions. Ideally, more time would have been invested in developing relationships with leaders of IDEXX and the local government in Kikongo. Moreover, more time would have been spent developing the plan for data collection in the second field season, which would have mitigated the limitation of only having field notes as data.

In future work, the selection of the different stakeholders should target the scope, capacity, and needs of each stakeholder group. For my research process, I selected SIHA and Kikongo based on convenience. Due to a lack of intentional selection, IDEXX's capacity did not align with the needs of the recipient community, which hindered my ability to apply the framework during the research. On the other hand, by facing these challenges, the importance of acknowledging values and outcome expectations prior to engagement was highlighted.

Purposeful selection of stakeholders is ideal, and must be considered in future research. The applicability of the framework is limited. If a corporation is looking to be involved in an initiative where there is no other organization to work with, the framework is not helpful; a caveat of the framework is that there must be organized groups of stakeholders. As well, WASH is a complex field, and as such there will always be situations where an initiative may fail regardless of the inclusion of the three keys factors in the framework (i.e. stakeholders, values, evaluation). It will be necessary to consider the social, political, and economic environments when putting the framework into practice.

Conclusion: Summary and future directions

WASH initiatives that are considered CSR from the corporate perspective must be recognized as a viable means of promoting WASH as a basic human right (Emeziem, 2015). There are many different voices and perspectives that contribute to a WASH initiative; these are the stakeholders. The values of these stakeholders determine what an initiative encompasses. And evaluation contributes to how the initiative is carried out. These three pieces are key to a sustainable, ethical, and meaningful initiative.

This research has contributed to the identified need for more information on corporate sector engagement in public health (Frame, 2005; Whyle & Olivier, 2016). However, it has equally opened the field to myriad future research in a variety of fields, including ethics, evaluation, and business. It will be important to further understand the ethical implications of corporate engagement in the provision of a basic human right and in public health in general. Future research should also look at different evaluative metrics that can be used to evaluate the Threefold Framework, as well as looking at identifying models of evaluation that are particularly useful for WASH initiatives. Moreover, the impact on the corporation warrants further

investigation, especially the perceptions of CSR from the employee perspective and how CSR that focuses on external activities can impact the internal functioning of the corporation. This thesis provides a novel tool, the Threefold Process Framework for Corporate Engagement, that needs to be put into practice, evaluated, and added to, thus presenting a new research topic.

The Threefold Framework could be applied to other partnership based initiatives beyond corporate engagement. The fundamental components, phases, and principles are not specific to corporate partnerships, and can be applied to any multi-organization partnership. The application of the Threefold Framework to non-corporate partnerships warrants further research.

Because of the time and energy of the participants, this research has contributed to understanding community engagement, the complexity of WASH, and the challenges that lead to poor WASH. During the field research the people living in Kikongo took time from their day to share their concerns and ideas, and greatly contributed to my understanding of the complex WASH context in which the people of Kikongo live. The only request from the community for sharing their lives and their time was to help them get access to clean water. This need, and ideas for solutions, have already been identified; thus, work towards developing and implementing a solution has already started. As such, the next step -which could be taken on by IDEXX- will be to continue working with people in Kikongo to fill the gaps identified by the community to contribute to helping Kikongo have a safe, accessible source of clean water.

In that regard, IDEXX has already invested time and money into this project, and has already taken time from the community to learn what is needed. The socially responsible thing for IDEXX to do would be to see this investment through, either by following through with

Kikongo and contributing to the solutions discussed in this research, or by paying forward the lessons learned in another project.

In conclusion, corporations do have a role in improving public health. Within the corporate sector there is expertise and resources that can contribute to social development. The perception that corporations are only profit-driven fails to account for the reality that a corporation benefits from working in a healthy, thriving community, and therefore has incentive to contribute to the wider community. The corporate sector is an important part of society and already inherently plays a key role in development; working with this sector to improve public health demonstrates the collaboration and innovative approaches that public health espouses.

Conflict of Interest

This project started with a partnership between IDEXX, Inc. and Dr. Norman Neumann, and subsequent activities have been partially funded by a grant provided by IDEXX, Inc. The organization was not involved the study design, nor succeeding data collection and analysis. IDEXX, Inc. did not require any signing over of intellectual property, and the company has not indicated having any stake in a certain result.

I openly acknowledge my affiliation with the company, and declare that no competing interests exist.

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Appendix A: Research questions and ethics

Interview Questions in English and Kiswahili

Interviews Questions in English

1) How do you get water?
    iv. What is your experience getting water throughout the year?
    v. What are the factors in the community that make getting water difficult?
    vi. When accessing water, what are things face you?
2) What are the factors in the community that make using water difficult?
3) If there was something that could be done to improve the current situation, what would it be?
4) Leaving the domestic uses of water, what else do you want to tell me about how water plays a role in your life/in the community?

Maswali Ya Mahojiano (Swahili)

1) Unapataje maji?
    i. Ni uzoefu gani unao juu ya upatikanaji wa maji katika kipindi chote cha mwaka?
    ii. Sababu gani zinazosababisha upatikanaji wa maji unakuwa mgumu katika jamii hii?
    iii. Muda wa utekaji maji, ni vitu gani vinakukabili au unakumbana navyo?
2) Sababu gani zinasababisha matumizi ya maji yanakuwa magumu katika jamii hii?
3) Kama kutakuwa na hatua itakayochukuliwa kukabiliana na tatizo la maji lililopo, unafikiri ni hatua gani zichukuliwe?
4) Ukiacha matumizi ya maji ya nyumbani, unaweza kunielezea maji yanasaidia nini katika maisha yako ya kila siku au katika jamii yako?

Figure 8: Ethics Approval from University of Alberta Research Ethics Office

Notification of Approval

Date:	April 26, 2016
Study ID:	Pro00063963
Principal Investigator:	Jacqueline Noga
Study Supervisor:	Norman Neumann
Study Title:	Developing a framework for meaningful, ethical and sustainable corporate engagement in water, sanitation, and hygiene initiatives
Approval Expiry Date:	Tuesday, April 25, 2017

Approved Consent Form:	Approval Date	Approved Document
	4/26/2016	ConsentForm_NogaMsc

Sponsor/Funding Agency: IDEXX Laboratories, Inc.

RSO-Managed Funding:

Project ID	Project Title	Speed Code	Other Information
RES0024340	IDEXXLAB	ZB959	

Thank you for submitting the above study to the Research Ethics Board 1. Your application has been reviewed and approved on behalf of the committee.

A renewal report must be submitted next year prior to the expiry of this approval if your study still requires ethics approval. If you do not renew on or before the renewal expiry date, you will have to re-submit an ethics application.

Approval by the Research Ethics Board does not encompass authorization to access the staff, students, facilities or resources of local institutions for the purposes of the research.

Sincerely,

Anne Malena, PhD
Chair, Research Ethics Board 1

Note: This correspondence includes an electronic signature (validation and approval via an online system).

Figure 9: Research Clearance from Tanzanian Government

THE UNITED REPUBLIC OF TANZANIA
PRESIDENT'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT

Telagrams: "REGCOM COAST"
Tel. No. 02-2402500.
Fax No. 02-2402250/2402686/2402151
E- Mail: ras@pwani.go.tz
ras.pwani@proraly.go.tz

Regional Commissioner's Office,
Coast Region,
P. O Box 30080,
KIBAHA.

In reply please quote:
Reference No. FA.221/265/01A/41

13rd April, 2016

District Administrative Secretary,
P.O. Box 30175,
KIBAHA.

RE: RESEARCH CLEARANCE

I would like to introduce to you **Jacqueline Noga** - Principal Investigator and **Melkiory Noya - Investigator and Project Collaborator** from School of Public Health, University of ALBERTA.

At the moment they have been given a permission to conduct a research titled **"Understanding the current barriers to accessing and using water in rural Tanzania" - A Case study of Kibaha District.**

The period to which this permission has been granted is from **1st May, 2016 to 30th August, 2016.**

Your requested to provide necessary assistance which will enable them to complete the research successfully.

S. Mulibo
For. REGIONAL ADMINISTRATIVE SECRETARY
COAST REGION

C.C. Dr. Norman F. Neumann,
Professor and Program director, Environmental Health Sciences,
School of Public Health,
Room 3-57, South Academic Building,
Edmonton, Alberta, Canada.
T6G 2G7

" **Jacqueline Noga**
School of Public Health,
Univerty of Alberta
3-300 Edmonton Clinic Health Academy
11405 - 87 Avenue
Edmonton, AB T6G 1C9

" **Melkiory Noya**
School of Public Health,
Univerty of Alberta
3-300 Edmonton Clinic Health Academy
11405 - 87 Avenue
Edmonton, AB T6G 1C9

Figure 10: Letter approving preliminary thesis work from Health Research Ethics Board

Health Research Ethics Board

308 Campus Tower
University of Alberta, Edmonton, Alberta T6G 1K8
p. 780.492.9724 (Biomedical Panel)
p. 780.492.0302 (Health Panel)
p. 780.492.0459
p. 780.492.0839
f. 780.492.7808

May 27, 2015

Ms. Jacqueline Noga
MSc Environmental Health Candidate, 2016
3-300 ECHA
11405-87 Ave
Edmonton, AB T6G 1C9

Re: Preliminary thesis work for the development of a framework for creating the capacity to improve the availability and consumption of clean water in eastern Tanzania.

Thank you for your email correspondence dated May 25, 2015, which outlines your proposal to conduct exploratory activities in order to develop a contextual understanding of the two villages in Tanzania by creating a partnership between a non-governmental organization and a company that makes water quality test kits. Your proposal involves the partnership with Students International Health Associate (SIHA) and the use of their previous project proposals and final reports. Other activities include the generation of a causal map of potential sources of water pollution and informal discussions with village members at SIHA's educational seminars on water and sanitation (run by other volunteers) as well as discussions with government about how the water management is being conducted. As you have indicated, this information will produce a deliverable analysis to the company in order to allow them to determine their desired level of involvement. The information will also be used to create questions for focus groups and interviews with village members that will occur next summer, and within the context of a more focused research initiative for which ethics approval will be sought.

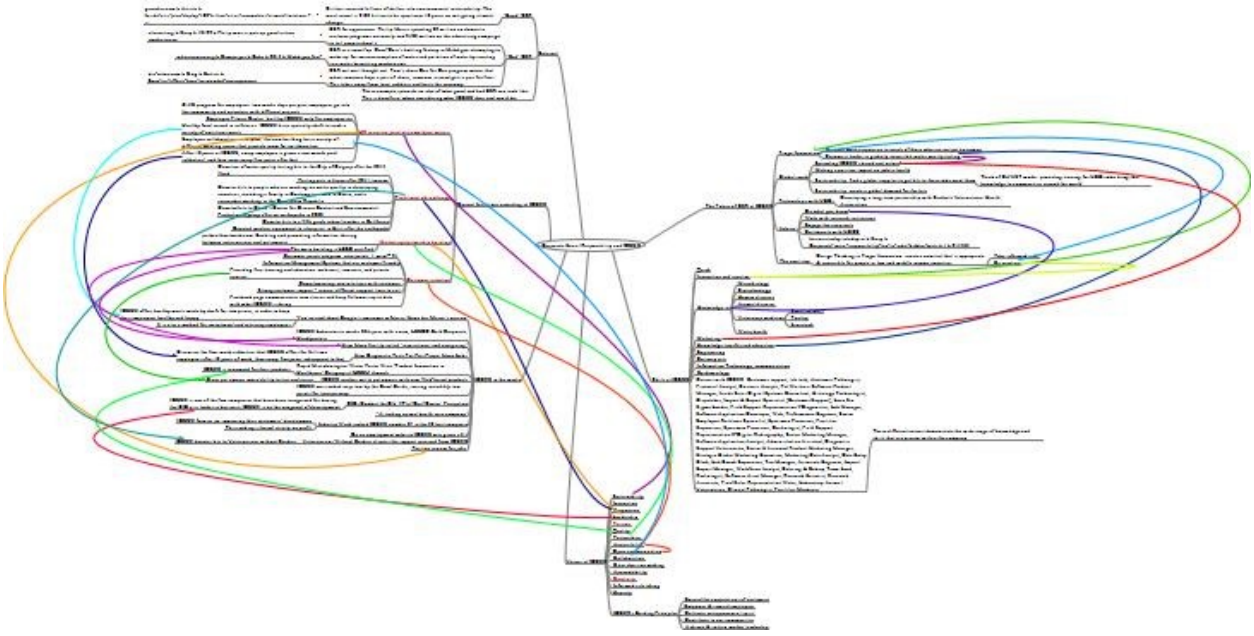
Based on the scope of research described in Article 2.1 and 2.5 of the Tri-Council Policy Statement 2: Ethical Conduct for Research Involving Humans, this project does not constitute human subjects research and is therefore outside of the mandate of this board.

Best wishes for your project,

Charmaine Kabatoff
Senior REB Coordinator, Health Research Ethics Board (Health Panel)

UNIVERSITY OF ALBERTA Alberta Health Services Covenant Health

Appendix B: Framework of Current and Future CSR at IDEXX



The framework in words:

1. **External**
   - *1.1. "Good" CSR*
     - 1.1.1. Citi has invested billions of dollars into environmental sustainability. The most recent is $100 billion to be spent over 10 years on mitigating climate change. http://www.greenbiz.com/article/inside-citis-plan-deploy-100-billion-cities-renewables-climate-solutions?utm_content=bufferaf459&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer
   - *1.2. "Bad" CSR*
     - 1.2.1. CSR for appearance: Phillip Morris spending $2 million on domestic violence programs nationally and $108 million on the advertising campaign to tell people about it http://www.alternet.org/story/10129/philip_morris_puts_up_good_citizen_smokescreen
     - 1.2.2. CSR as a cover-up: Coca-Cola's bottling factory in Mehdigan attempting to make up for overconsumption of water and pollution of water by creating rain water harvesting mechanisms http://www.indiaresource.org/campaigns/coke/2013/mehdiganjfact.html
     - 1.2.3. CSR not well thought out: Tom's shoes One for One program means that when someone buys a pair of shoes, someone in need gets a pair for free. This takes away from local cobblers and hurts the economy http://www.dix-eaton.com/blog/entries/even-csr-efforts-have-unintended-consequences
   - *1.3. These examples provide an idea of what good and bad CSR can look like. This is beneficial when considering what IDEXX does and could do.*
2. **Current Initiatives according to IDEXX**

2.1. HR retention practices/employee morale

2.1.1. GiVE program for employees: two works days per year employees go into the community and volunteer with different projects

2.1.2. Employee Fitness Center: built by IDEXX only for employee use

2.1.3. Healthy food served in cafeterias: IDEXX hires specialty chefs to cook a variety of nutritious meals

2.1.4. Employee collaborative workspace: the new building has a variety of different meeting spaces that provide room for collaboration

2.1.5. After 10 years at IDEXX, every employee is given a one month paid sabbatical, and then once every five years after that

2.2. Traditional philanthropy

2.2.1. Donation of water quality testing kits to the City of Calgary after the 2013 flood

2.2.2. Testing pets in Japan after 2011 tsunami

2.2.3. Donates kits to people who are working on water quality in developing countries, including a family in Guatemala, a man in Benin, and a researcher working in the Dominican Republic

2.2.4. Donated kits to China's Center for Disease Control and Environmental Protection Agency after an earthquake in 2008

2.2.5. Donates kits to a fifth grade school teacher in California

2.2.6. Donated medical equipment to a hospital in Haiti after the earthquake

2.3. Marketing/partnership building

2.3.1. pethealthnetwork.com: Enabling and promoting information sharing between veterinarians and pet owners

2.3.2. The main building is LEED certified

2.4. Customer retention

2.4.1. Customer points program: earn points, 1 point= $1

2.4.2. Information Management Systems that are costumer friendly

2.4.3. Providing free learning and education: webinars, seminars, and private courses

2.4.4. Complementary consultations with customers

2.4.5. Strong customer support - several different support lines to call

2.4.6. Facebook page communicates new stories and keep followers up to date with what IDEXX is doing

3. IDEXX in the media

3.1. You've read about Google's awesome cafeteria. Idexx has Maine's version

3.1.1. IDEXX offers healthy meals made by chefs for low prices, in order to keep their employees healthy and happy

3.1.2. It is also a method for recruitment and retaining employees

3.2. IDEXX Laboratories marks 30th year with a new, LEED® Gold Corporate Headquarters

3.3. New Idexx facility called 'inspirational and energizing'

3.4. New Diagnostic Tests For Pets Propel Idexx Labs

3.4.1. Discusses the four week sabbatical that IDEXX offers for full time employees after 10 years of work, then every five years subsequent to that

3.5. Rapid Microbiological Water Tester Wins 'Product Innovation in Healthcare' Category at IHEEM Awards

3.5.1. IDEXX is renowned for their products

3.6. IDEXX reaches out to pet owners with new Web-based products
3.6.1. Gives pet owners more ability to test and assess
3.7. IDEXX was ranked very low by the Good Guide, scoring incredibly low points for transparency
3.8. CIOs Combat the Old 'IT-as-Cost-Center' Perception
3.8.1. IDEXX is one of the few companies that have been recognized for having the CIO as a leader in business. IDEXX is on the vanguard of development.
3.9. "A leading animal health care company"
3.10. Industry Week ranked IDEXX number 24 in the 50 best companies
3.10.1. IDEXX focuses on improving their customers' development
3.10.2. This ranking is based strictly on profit
3.11. On an employment website IDEXX was given a 3.1
3.12. Veterinarians Without Borders discuss the support received from IDEXX
3.12.1. IDEXX donates kits to Veterinarians without Borders
3.13. Positive review for jobs

4. The Future of CSR at IDEXX
4.1. Frugal Innovation
4.1.1. Become more responsive to needs of those who are not yet customers
4.1.2. Become a leader in globally accessible water quality testing
4.2. Global reach
4.2.1. Spreading IDEXX's brand and values
4.2.2. Making a positive impact on public health
4.2.3. Sustainability: find a global supplier to get kits to those who want them
4.2.4. Think of CAWST model: providing training for NGOs who bring that knowledge to communities around the world
4.2.5. Sustainability: create a global demand for the kits
4.3. Partnerships with NGOs
4.3.1. Developing a long term partnership with Students' International Health Association
4.4. Advice:
4.4.1. Do what you know
4.4.2. Work with research institutions
4.4.3. Engage the recipients
4.4.4. Collaborate with NGOS
http://businesstoday.intoday.in/story/corporate-social-responsibility-tax-in-india-hidden-costs/1/214463.html
4.5. The next step
4.5.1. Design Thinking in Frugal Innovation: create a new test that is appropriate & accessible for people in low and middle income countries
4.5.2. Take informed risks
4.5.3. Be creative

5. Skills at IDEXX
5.1. Quick
5.2. Innovative and creative
5.3. Knowledge in:
5.3.1. Microbiology

5.3.2. Biotechnology
5.3.3. Human diseases
5.3.4. Animal diseases
5.3.5. Veterinary medicine
5.3.6. Small animals
5.3.7. Poultry
5.3.8. Livestock
5.3.9. Water health

5.4. Marketing
5.5. Knowledge transfer and education
5.6. Engineering
5.7. Culinary arts
5.8. Information Technology, communications
5.9. Epidemiology
5.10. Careers with IDEXX: Customer support, lab tech, Anatomic Pathologist, Financial Analyst, Business Analyst, Pet Wellness Software Product Manager, Inside Sales Digital Systems Consultant, Histology Technologist, Dispatcher, Import & Export Specialist (Customer Support), Lean Six Sigma Leader, Field Support Representative I-Diagnostics, Lab Manager, Software Application Developer, Web, Performance Engineer, Senior Employee Relations Specialist, Specimen Processor, Facilities Supervisor, Specimen Processor, Cardiologist, Field Support Representative II-Digital Radiography, Senior Marketing Manager, Software Application Analyst, Administrative Assistant, Diagnostic Support Veterinarian, Senior Ultrasound Product Marketing Manager, Strategic Global Marketing Executive, Marketing Data Analyst, Data Entry Clerk, Lab Bench Supervisor, Tax Manager, Associate Engineer, Import Export Manager, Workforce Analyst, Catering & Bakery Team Lead, Radiologist, Software Asset Manager, Research Scientist, Research Associate, Field Sales Representative Water, Laboratory Animal Veterinarian, Clinical Pathologist, Facilities Mechanic

These different careers demonstrate the wide range of knowledge and skills that are present within the company

6. Values at IDEXX

6.1. Sustainability
6.2. Innovation
6.3. Responsive
6.4. Leadership
6.5. Passion
6.6. Quality
6.7. Partnerships
6.8. Accessibility
6.9. Open communication
6.10. Collaboration
6.11. Clear decision making
6.12. Accountability
6.13. Creativity
6.14. Informed risk taking
6.15. Honesty

6.16. IDEXX's Guiding Principles

6.16.1. Exceed the expectations of customers

6.16.2. Empower & reward employees

6.16.3. Cultivate entrepreneurial spirit

6.16.4. Contribute to our communities

Achieve & sustain market leadership

Appendix C: Maps

Figure 11: Map of Tanzania with Mlandizi indicated by pin

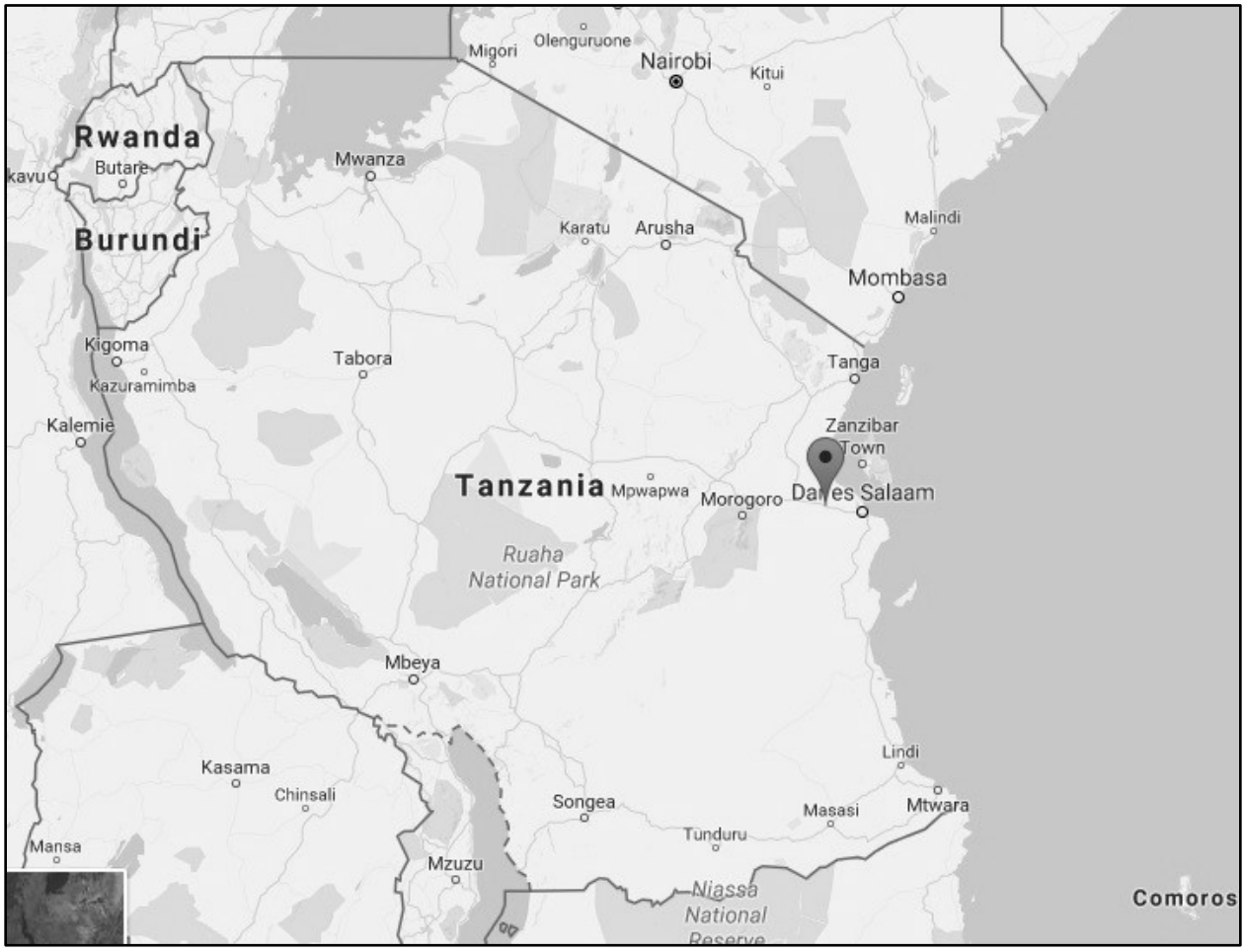
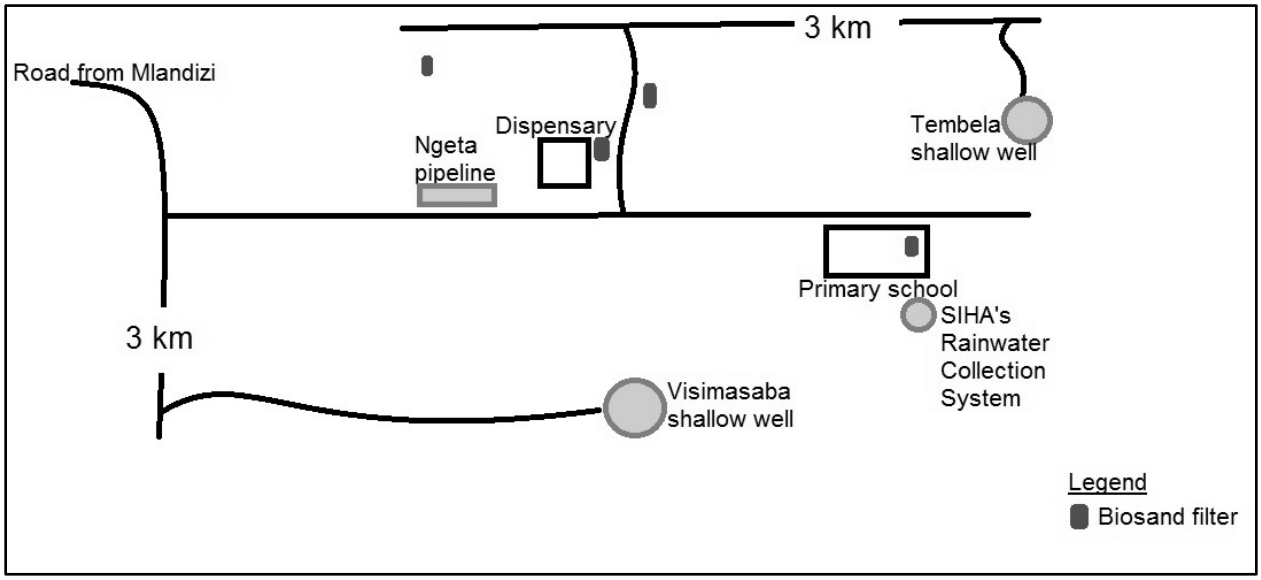


Figure 12: Map of WASH sources in Kikongo, Tanzania



Appendix D: Documents used for Knowledge Translation

Figure 13: Research dissemination provided to the Tanzanian Regional Government, Coastal Region

UNIVERSITY OF ALBERTA

SCHOOL OF PUBLIC HEALTH

Knowledge Translation for the Tanzanian Regional Government, Coastal Region

Study Title: Developing a framework for meaningful, ethical and sustainable corporate engagement in water, sanitation, and hygiene initiatives

Research Investigator:
Jacqueline Noga
jnoga@ualberta.ca

Supervisor:
Norman Neumann
nfneuman@ualberta.ca

Research Assistant:
Pastone Madeha
pastonemadeha@yahoo.com

Project Summary: This research started May 27, 2016 with the first interview, and the last interview was held June 28, 2016. The goal of the research was to understand the barriers to accessing safe water according to the local community members, and the ideas for solutions to these barriers.

Research Findings: This research identified two major needs: a need for a consistent source of safe water, and a need for assistance from government and from sponsors to make this happen.

Four main barriers were identified: scarcity, distance, money/resources, and cooperation. Scarcity of water was related to the lack of sources in Kikongo, a lack of rain and seasonal inconsistency, a growing population straining the current sources, and the unreliability of the Ngeta pipeline. Distance, specifically the far distance to the wells, means considerable time and energy are spent getting water, and there is a lack of other means of transportation. Money is lacking for resources such as safe storage containers, and the closer water sources are considered expensive. Cooperation amongst community members and community leaders needs to be increased, as well as local government cooperation with the regional government. These four aspects (scarcity, distance, money/resources, and cooperation) were discussed as challenges that need to be addressed in order to improve access to water.

Three solutions to these challenges were identified. Firstly, getting improved water sources, meaning getting new closer sources, covering the current wells, and making the current sources more affordable. With these improved sources there is also a need for more safe storage containers, including larger cement tanks and smaller containers. The most common solution discussed was to have a pipeline that worked consistently, either by improving the Ngeta pipeline to run on electricity, or have a new pipeline built, either a pipeline connected to the Dawasco pipeline at Disunyara or a pipeline from the Ruvu river.

Implications for Kikongo: These findings suggest that while there are several barriers to accessing safe in Kikongo, there are also possible solutions. We hope that these findings help provide direction for future action.

Research dissemination: The findings from this research will be presented to other stakeholders in different ways. The Government of Kikongo has been provided with a similar document explaining the project summary, research findings and implications, and is aware that the Coastal Region Government is also receiving the information. Students Invested in Health Association (SIHA), our non-profit partner, will also be provided with this information, along with a report explaining the implications for SIHA. In Canada, these findings will be presented at academic conferences and will be published in an academic journal. The findings will also be presented to IDEXX, the company supporting the project, explaining how IDEXX can be involved in development of international water projects.

You are welcome to contact us any time, thank-you for your support with this research.

Sincerely,

Jacqueline Noga
Researcher

Pastone Madeha
Research Assistant

Figure 14: Research dissemination provided to the Government of Kikongo

UNIVERSITY OF ALBERTA

SCHOOL OF PUBLIC HEALTH

Knowledge Translation for Government of Kikongo

Study Title: Developing a framework for meaningful, ethical and sustainable corporate engagement in water, sanitation, and hygiene initiatives

Research Investigator:
Jacqueline Noga
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Supervisor:
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Research Assistant:
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SIHA Representative
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Project Summary: This research started May 27, 2016 with the first interview, and the last interview was held June 28, 2016. The goal of the research was to understand the barriers to accessing safe water according to the local community members, and the ideas for solutions to these barriers.

Research Findings: This research identified two major needs: a need for a consistent source of safe water, and a need for assistance from government and from sponsors to make this happen.

Four main barriers were identified: scarcity, distance, money/resources, and cooperation. Scarcity of water was related to the lack of sources in Kikongo, a lack of rain and seasonal inconsistency, a growing population straining the current sources, and the unreliability of the Ngeta pipeline. Distance, specifically the far distance to the wells, means considerable time and energy are spent getting water, and there is a lack of other means of transportation. Money is lacking for resources such as safe storage containers, and the closer water sources are considered expensive. Cooperation amongst community members and community leaders needs to be increased, as well as local government cooperation with the regional government. These four aspects (scarcity, distance, money/resources, and cooperation) were discussed as challenges that need to be addressed in order to improve access to water.

Three solutions to these challenges were identified. Firstly, getting improved water sources, meaning getting new closer sources, covering the current wells, and making the current sources more affordable. With these improved sources there is also a need for more safe storage containers, including larger cement tanks and smaller containers. The most common solution discussed was to have a pipeline that worked consistently, either by improving the Ngeta pipeline to run on electricity, or have a new pipeline built, either a pipeline connected to the Dawasco pipeline at Disunyara or a pipeline from the Ruvu river.

Implications for Kikongo: These findings suggest that while there are several barriers to accessing safe in Kikongo, there are also possible solutions. We hope that these findings help provide direction for future action.

Research dissemination: The findings from this research will be presented to other stakeholders in different ways. The Tanzanian Regional Government for the Coastal Region will be provided with a similar document explaining the project summary, research findings and implications, and will be informed that you, the Government of Kikongo, have also received the information. SIHA will also be provided with this information, along with a report explaining the implications for SIHA; as well, the research findings will be presented to the new SIHA team planning to work in Kikongo next summer. In Canada, these findings will be presented at academic conferences and will be published in an academic journal. The findings will also be presented to IDEXX, the company supporting the project, explaining how IDEXX can be involved in development of international water projects.

Thank-you so much for welcoming us into your village and allowing us to do our research. We greatly appreciate your support, and we hope that you find benefit in the research. If you are willing to provide a letter of support for this research we would greatly appreciate it. The letter can be sent to Melkiory, SIHA's In-Country Representative.

Sincerely,

Jacqueline Noga
Researcher

Pastone Madeha
Research Assistant

Figure 15: Research dissemination provided to SIHA

UNIVERSITY OF ALBERTA

SCHOOL OF PUBLIC HEALTH

Knowledge Translation for SIHA

MSc Thesis Study Title: Developing a framework for meaningful, ethical and sustainable corporate engagement in water, sanitation, and hygiene initiatives

Research Investigator:
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SIHA Representative
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Project Summary: As a part of a MSc thesis on corporate engagement in water initiatives, a qualitative research study was conducted with people living in Kikongo. The interviews were conducted from May 27-June 28, 2016. The goal was to understand the barriers to accessing safe water according to the local community members, and the ideas for solutions to these barriers.

Research Findings: This research identified two major needs: a need for a consistent source of safe water, and a need for assistance from government and from sponsors to make this happen. For SIHA, it is important to note that there was tension when it came to discussing issues with leadership. Some participants openly stated their frustration with the local government and the lack of leadership in working for a better source, however when we followed up with other participants many were not willing to provide an opinion on the government. Those who brought up the lack of leadership as a barrier tended to be wealthier people, village leaders and/or those who moved to Kikongo as adults. Lesson #1 for SIHA: avoid asking questions about leadership, but listen to those who are willing to speak up about it.

The barriers identified were broken down into four main categories: scarcity, distance, money/resources, and cooperation (note that I chose 'cooperation' instead of 'leadership'). Scarcity of water was related to the lack of sources in Kikongo, a lack of rain and seasonal inconsistency, a growing population straining the current sources, and the unreliability of the Ngeta pipeline. Distance, specifically the far distance to the wells, means considerable time and energy are spent getting water, and there is a lack of other means of transportation. Money is lacking for resources such as safe storage containers, and the closer water sources are considered expensive. Cooperation amongst community members and community leaders needs to be increased, as well as local government cooperation with the regional government. These four aspects (scarcity, distance, money/resources, and cooperation) were discussed as challenges that need to be addressed in order to improve access to water. Lesson #2 for SIHA: the water challenges in Kikongo are incredibly complex, and they often lead to frustration within the community.

The solutions discussed by the participants were resource intensive. Firstly, getting improved water sources, meaning getting new closer sources, covering the current wells, and making the current sources more affordable. With these improved sources there is also a need for more safe storage containers, including larger cement tanks and smaller containers. The most common solution discussed was to have a pipeline that worked consistently, either by improving the Ngeta pipeline to run on electricity, or have a new pipeline built, either a pipeline connected to the Dawasco pipeline at Disunyara or a pipeline from the Ruvu river. Lesson #3 for SIHA: water is a resource intensive field.

Implications for SIHA: Kikongo is a severely water-challenged community. Participants stated that they often would not bathe because there was not enough water for it, or they would bathe at the wells. Although water quality is a major concern, that was not the topic of discussion during the interviews: the crucial issue is the lack of accessible water. This is a tense, complex, and resource-intensive challenge that requires expert facilitation amongst the stakeholders. I strongly discourage SIHA's involvement in any water project.

There is one exception for a water-related project could still be within SIHA's scope: helping teachers improve WASH (water, sanitation, and hygiene) education and capacity in the school setting. In my research participants indicated that education on water safety would be beneficial. If the proper resources were made available (soap, running water, etc.) WASH could be improved in the Kikongo Primary School. Considering the direction that SIHA is moving in, this would require a local partner looking to tackle this challenge for SIHA to work with. Strong justification would be necessary prior to any action.

In general, I would encourage future collaborations with the community be open and transparent. From my experience, this requires allowing the community members to lead the conversation, as many of the participants were willing to discuss their opinions when provided the space to do so on their own terms. Moreover, although it is difficult, it is critical that SIHA is honest with what the organization can and cannot provide. During the interviews we were frequently asked to personally help the community, and we made it very clear that our way of helping was providing the information to the local government but beyond that we could not make any promises. The experience taught me that people living in Kikongo already have ideas and solutions, it just a matter of listening.

I would like to thank SIHA for the support I was provided during this research, and I hope that this document is useful for future team members. Any questions can be directed to me (jnoga@ualberta.ca), regardless of the year and location SIHA is at, I am always happy to talk about global water challenges.