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Gender Specific Vulnerabilities to Water Insecurity

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ABSTRACT

Water is an essential resource for both men and women. Despite the ample amount of water available in various forms, both men and women continue to experience unequal rights to water on the grounds of access, distribution, collection, and quality. This paper examines the particular vulnerabilities and burdens faced by women and girls in rural regions in Sub-Saharan Africa to conditions of water insecurity, taking a particular look at the disproportionate dangers and health risks associated with fetching water, sanitation, and hygiene (WASH) access, and water governance. Outcomes of the research indicated that water insecurity among rural women and girls in Sub-Saharan is attributable to inequitable responsibilities around water-related tasks that invite exposure to violence, opportunity cost, disease, and female disempowerment. To address these issues, water interventions and key pathways for positive change have been recommended for rural regions in Sub-Saharan Africa to progress towards achieving greater gender equity around water.

1. INTRODUCTION

According to Ritchie & Roser (2019), populations in the continent of Africa are among some of the most disadvantaged in terms of access to safe and sufficient supplies of drinking water. **Diagram 1** illustrates recent findings on this issue from 2015, with a depiction of the percentage of water access for

most urban and rural populations specifically in Sub-Saharan Africa as 50-60 % on average (Ritchie & Roser, 2019). This implies that a whole other half of most country populations in Sub-Saharan Africa do not have access to improved drinking water. With the scope of this water in-access issue being so large relative to other contents of the world, Sub-Saharan Africa is a desperate point of focus for research and development work on water insecurity.

To understand the different intensities of water insecurity among African Sub-Saharan populations, it is productive to disaggregate Ritchie & Roser's (2019) observation to look at rural and urban insecurity separately. By doing so, it was discovered that rural populations suffered far more from water insecurity than urban populations across Africa, with an average population coverage percentage of only 20-40% and a remaining 60-80% being severely water insecure (Ritchie & Roser's, 2019). This observation is strongly in line with a peer-reviewed research study completed by Roche Bain and Cumming (2017) on SDG access to water, sanitation and hygiene (WASH) in Sub-Saharan Africa. In their 2017 publication the authors explained that "combined SDG access was ... defined for the analysis as having both improved water with a collection time of under 30 minutes, plus sanitation and a hand washing facility with soap" (Roche, Bain, and Cumming, 2017, p. 3). In graphing their findings on SDG access in both rural and urban settings in Sub-Saharan Africa, depicted in **Diagram 2,** they found that SDG access among rural populations, in contrast with most urban populations, is less than 20% in all 25 countries studied (Roche, Bain, and Cumming, 2017).

Diagram 1

Adapted from Ritchie, H., & Roser, M. (2019). Water Use and Sanitation. Retrieved from https://ourworldindata.org/water-use-sanitation

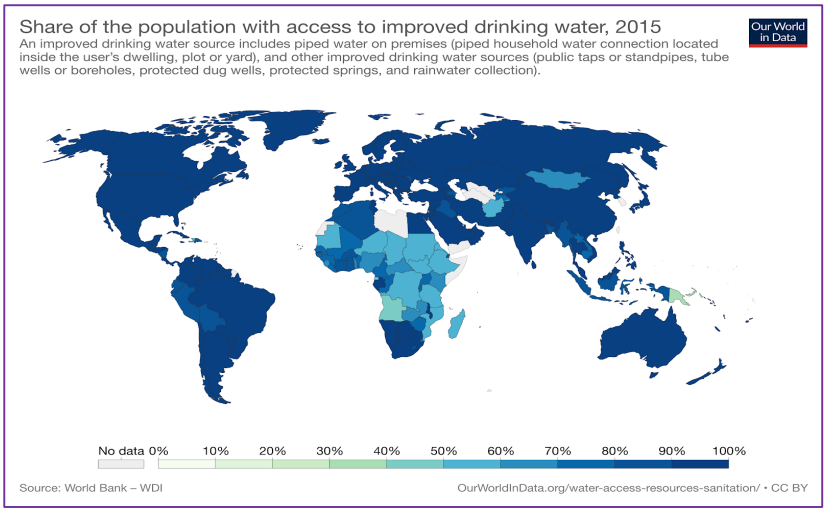

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Diagram 2

Adapted from Roche, R., Bain, R. and Cumming, O. (2017). A Long Way to Go – Estimates of Combined Water, Sanitation and Hygiene Coverage for 25 Sub-Saharan African Countries. PLOS ONE, 12(2), pp.1-24. doi: 10.1371/journal.pone.0171783 (p. 12)

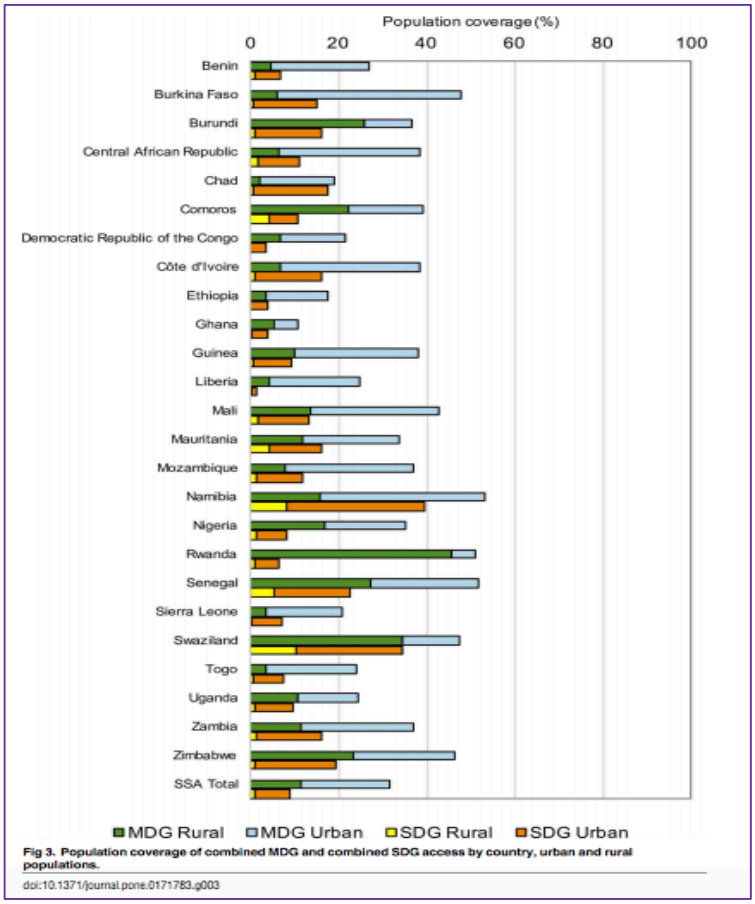

Fig 3. Population coverage of combined MDG and combined SDG access by country, urban and rural populations.

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While the burden of water insecurity in Sub-Saharan Africa weighs more on rural populations than urban ones, it also weighs disproportionately on the grounds of gender. Men and women living in rural spaces in Sub-Saharan Africa experience unequal rights to water and hold different roles, responsibilities and rights to its use. In our chosen geographical focus, women are at a more vulnerable and insecure position in water matters. From disproportionate dangers and health risks in fetching water to gender-unique water sanitation needs, women are at a disadvantage in meeting their basic water needs. For these reasons, this research will discuss the specific issues females in populations across rural Sub-Saharan Africa face on a daily basis, specifically discussing issues of access, sanitation and control. While these issues are similar across different female populations in rural Sub-Saharan Africa, it is important to acknowledge the unique challenges and differences that each local context holds. In light of this, case examples from a diverse selection of countries in Sub-Saharan Africa are referenced for a comprehensive understanding of women's vulnerabilities across different contexts. As a move forward on the discussed issues, key examples and fungible opportunities for positive change in water and gender equity across rural populations in Sub-

Saharan Africa have been introduced in the following sections. In looking at these issues and opportunities for change in relation to the sustainable development goals throughout, it becomes evident that improving water security and reducing gendered vulnerabilities around water will not only be a sustainable development accomplishment, but will also be a strong leverage point to tackling many other 2030 global goals.

2. WATER ACCESS, GENDER, AND THE SUSTAINABLE DEVELOPMENT GOALS (SDGs)

Target *6.1*

By 2030, achieve universal and equitable access to safe and affordable drinking water for all

(Sustainable Development Goals Knowledge Platform, n.d.).

Target 6.1, under SDG 6, reveals that one of today's many development challenges is the lack of equity in access to safe water. Populations that bear the burden of this inequity and thus lack access to water, specifically rural populations in the context of this research, are required to fetch it from distant and unsanitary water sources. The activity of fetching water, that still persists in places where water infrastructure is either absent or poor, is the activity that put gender at the forefront of the water access issue. Using the work of researchers Geere & Cortobius (2017) to understand this issue further, we see that men and women in different parts of the world mobilize differently around the responsibility of fetching water. For example, as **Figure 1** highlights, countries like Iraq, Ukraine or Mongolia hold men responsible for water fetching activities, while in most countries across Africa, women are the primary retrievers of water. The Joint Monitoring Programme (JMP) (UNICEF and WHO, 2012) (as cited in Geere & Cortobius, 2017) highlighted the magnitude of this burden on women in Africa by stating that "women and girls [are] bearing the main responsibility for collecting water in 71% of the households" (p. 514). Not only is the responsibility of water fetching disproportionately skewed toward women, but also, researchers Sorenson, Morssink, & Campos (2011) found that "there is a direct positive association between not having access to an improved water source and the

percent of water fetchers who were women" (p. 1523). Thus, since the responsibility of water collecting predominantly falls on women in Africa, especially on women belonging to rural populations whose water in-access is even greater than the urban, the gendered lens to water access in this paper will address the vulnerabilities and impacts of water fetching on rural women in Africa.

Figure 1

Adapted from Geere, J., & Cortobius, M. (2017). Who Carries the Weight of Water? Fetching Water in Rural and Urban Areas and the Implications for Water Security. Water Alternatives, 10(2), 513-540. Retrieved from http://www.water-alternatives.org/index.php/alldoc/articles/vol10/v10issue2/368-a10-2-18/file
(p. 520)

2.1. SECURITY THREATS AND VULNERABILITIES

On their daily journey to fetch water, rural women in Sub-Saharan Africa are particularly vulnerable to a number of dangers that threaten their physical security. Since the water sources they walk to are very distant and require trekking unsecured paths, lone, defenseless women

fetching water everyday often became targets of sexual violence and attacks. Pommells, Schuster-Wallace, Watt, & Mulawa (2018) found that "traveling long distances, exacerbated by the predictability of community women's water-fetching routines, afforded assailants the opportunity to attack women who were isolated, alone, and ultimately overtly vulnerable" (p. 1854). Thus, not only were these attacks happening, but they were planned and calculated in accordance with women and girls' journeys and schedules to fetch water, making them even more likely to occur. Researchers Geere & Cortobius (2017) added in their literature that above the physical threat these sexual attacks posed, this violence created great psychological fear and anxiety, exacerbating the feeling of insecurity among women fetching water. On these same routes, another form of physical violence was cited by Pommells, Schuster-Wallace, Watt, & Mulawa (2018) with respect to animal attacks. Sharing the water resource with dangerous animals and sharing the walking grounds with other threatening species put forth additional dimensions to physical insecurity.

Off route, women who fetch water are also vulnerable to domestic violence at home based on their ability to provide water in the household. According to Pommells, Schuster-Wallace, Watt, & Mulawa (2018) "when women are unable to provide water, or complete water-related tasks in the home, they are at risk of experiencing spousal abuse" (pp. 1855-1856). This form of violence has the greatest risk when women are physiologically unable to fetch water or when the sources they fetch from are unreliable, insufficient or financially difficult to access. Thus, both on and off route, women and girls are exposed to multiple forms of violence related to their ability to fetch and provide water. With no security structure to protect women on their commute and no legal action against domestic abusers, these threats will remain a detrimental reality of water fetching among these women.

2.2. HEALTH IMPACT OF JOURNEY

Women fetching large amounts of water multiple times a day have cited severe physiological health impacts attributed to the trip. It is important to note that these health impacts are independent of those associated with the quality of the water collected and later consumed. Here, women have spoken to the injuries they have endured while walking to water sources, carrying gallons of it at a time, and starting this process from a very early age where physical development is at a critical phase. Sorenson, Morssink, & Campos (2011) (cited in Pommells, Schuster-Wallace, Watt, & Mulawa, 2018) write that some of the adverse health impacts associated with collecting water from distant sources include fatigue, "long term back injuries, micronutrient deficiencies due to high caloric expenditure, and a lack of choice [which] continue to stunt the health and development of women and girls in communities where water fetching is commonly practiced" (p. 1852). Coupling health impacts with security threats, a wider range of health risks arise. For example, high incidence of sexual assault could not only injure the victim but also leave her with long-term sex related diseases such as HIV. Animal attacks also are a major health risk here, where inflicted wounds are either difficult to treat in rural settings, are susceptible to infection or cause death. The resulting health impacts seen from the dangers and realities of this activity not only impairs the physical development of women and girls but also hampers their ability to perform other daily activities including education, work, and care to thrive in their communities.

2.3. ENERGY AND TIME LOSS

While gathering water for hygiene, cooking, drinking, cleaning and other basic activities is not a waste of time, the manner in which millions of rural women in Sub-Saharan Africa gather and fetch the resource poses a great time loss. In some areas more than others, depending on the geographical location and extent of in-access to the water resource, women spend long hours making the journey to fetch water every day. Within the rural populations of Somalia for

instance, women devout 11.3 hours per week on average for the collection of water (Geere & Cortobius, 2017, p. 521). Since this is an average, fetching times can be even longer than this reported average. The issue with time lost as a result of water in-access is, as Sorenson, Morssink, & Campos (2011) write, the opportunity cost that accompanies it. Geere & Cortobius (2017) reference this opportunity cost as 'trade offs', stating that "time poverty due to the need for fetching water, firewood and other domestic chores cause trade-offs putting food security, child nutrition, health and education at risk (Kes and Swaminathan, 2006)" (p. 515). In relation to time, it is also important to note that the level of energy expelled to carry out water fetching on both long and short commutes leaves little energy for completing productive activities in the remaining daylight hours. Thus, improving access to water and eliminating the distant journey to fetch it allows women to spend little to no time collecting water and a lot more time, and energy, on productive activities.

2.4. SPECIAL VULNERABILITIES

In Sub-Saharan Africa, where rural women are solely responsible for the collection and provision of water in the household, special vulnerabilities women may have can put them at an even greater disadvantage in accessing water. In Geere & Cortobius's (2017) research, the authors found that "older adults, orphans, people living with long-term conditions, disability or facing social stigma may be less able to access and carry water, and therefore particularly vulnerable to household water insecurity (Wrisdale et al., in press)" (p. 514). Pommells, Schuster-Wallace, Watt, & Mulawa (2018) add to this list, based on their findings, that pregnant women are also highly vulnerable to water insecurity due to their physical limitations in carrying out the water fetching activity. While all these groups may have different physical or circumstantial limitations, their inability to pursue the journey of fetching water widens the issue of inequity in water access and either leaves them forced to take more threatening trips to water sources, make other costly arrangements, or forfeit much of their basic needs for water use if neither two alternatives can be satisfied.

Besides age, health status and family conditions, social and political status have also created special vulnerabilities to water access among women. According to Geere & Cortobius (2017), "since economic, political and social inequalities are reflected in the access to drinking water (UNICEF and WHO, 2015), it is likely that marginalized groups suffer disproportionately from the negative economic and health impacts of fetching water" (p. 515). In this instance, even after journeying to the water resource, power relations, financial status and social standings governing that resource can affect the quantity and quality of water women collect and the amount of human dignity shown in the process. Understanding these special vulnerabilities is as important as revealing gendered dimensions to water access because both entail situations of water insecurity and great need for more equitable access. Only through equity in water access can we eliminate the health and security threats posed to women and serve the special vulnerabilities experienced by other groups in the community around water.

2.5. A HOLISTIC SDG VIEW ON IMPROVING WATER ACCESS

The time, health and security impacts of water fetching on women and girls' sets back the achievement of a multitude of SDG targets beyond SDG 6.1. Ndikumana & Pickbourn (2017) support this argument by claiming that, "expanding access to water and sanitation is a goal that has far-reaching implications for the achievement of the other SDGs" (p. 104). On that note, it is important to proceed in this analysis to a holistic approach around inequity in water access and progress around the other seventeen SDGs. After getting a more comprehensive understanding of water access challenges with a gendered lens and thoroughly exploring multiple SDG targets, four SDG targets outside SDG 6 were found to progress if the strenuous activity of water fetching among rural women in Sub-Saharan African communities was eliminated. Both directly and indirectly related to water fetching, the following four SDG targets are argued to improve significantly with more equitable access to water resources: SDG target 1.2 on poverty

eradication, SDG target 3.D on health risk reduction, SDG target 4.5 on access to education and SDG target 5.2 on putting an end domestic and sexual violence against women.

SDG 1 & 6

Target *1.2*

By 2030, reduce at least by half the proportion of men, ***women*** *and children of all ages* ***living in poverty*** *in all its dimensions according to national definitions*
(Sustainable Development Goals Knowledge Platform, n.d.).

Improving access to water in rural Sub-Saharan African populations frees up substantial hours in the day for women, who would normally fetch water in these hours, to partake in income generating activities. By repurposing that time and energy to engage in paid labor, women would be improving the financial wellbeing of their families and expanding the income status of the household. SDG target 1.2 on poverty alleviation is relevant to this discussion. A second income brought in by females in the household plays a pivotal role in pushing families out of poverty and into a decent standard of living, thereby making progress in the area of poverty eradication and improved livelihoods. The scope of this income increase was highlighted in a case study in Tanzania, where "Tanzanian time use data suggest that water-related infrastructure investments could free up time spent on water collection to the equivalent of, if converted into paid employment, more than half a million new full-time jobs for women (Fontana and Natali, 2008)" (Geere & Cortobius, 2017, p. 515). On this note, women's involvement in economic activity not only contributes to poverty alleviation, but also makes progress in the broader areas of SDG 5 (gender equality) and SDG 8 (decent work and economic growth). A focus on poverty was chosen here primarily to highlight how overall family income can improve with women's economic participation, and how that lends itself to great water access and affordability once accessible infrastructure is put in place.

SDG 3 & 6

Target *3.D*

Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of ***national*** *and global* ***health risks***
(Sustainable Development Goals Knowledge Platform, n.d.).

The health risks that water fetching poses on women, as aforementioned, pays particular attention to SDG target 3.D. Since the physiological and psychosocial issues borne by these women can be considered a national health risk that must be managed and reduced, eliminating the harmful water fetching journey can prevent many physical development challenges from happening in the first place. Women, and particularly young girls in developing countries, can lead healthier lives, contingent on the fact that water that is more accessible to them now is also sanitary and safe. Not only would improved access no longer threaten the health and development of the average rural woman, but also, it would allow women with special vulnerabilities related to age, disability, or pregnancy to not compromise their health and exacerbate their physical vulnerabilities to obtain water. As such, improved accessibility to water would create healthier communities, specifically healthier female populations, guard the health vulnerabilities of special groups, and lead practitioners closer to realizing target 3.D in real terms.

SDG 4 & 6

Target *4.5*

By 2030, eliminate ***gender disparities in education*** *and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations* (Sustainable Development Goals Knowledge Platform, n.d.).

As Ndikumana & Pickbourn (2017) write, "efforts to narrow the gender gaps in education and paid employment, which tend to be significantly higher in rural areas, will continue to be hampered by the lack of access to potable water and improved sanitation" (p. 105). Ndikumana & Pickbourn's (2017) research here makes a clear connection between education, gender, and access to safe water. Since women are predominantly afforded the laborious, time consuming task of fetching water from an early age, young girls struggle to enroll and excel in educational settings. With SDG target 4.5 aimed at reducing gender disparities in access to education, revealing the causes behind these disparities could be the way to make progress on this target. Since water in-access is a major contributor to this disparity in rural populations, it not only should be considered a cause to eliminate, but also as an integral component in narrowing that disparity. Thus, improving access through safe water infrastructure and replacing the time and energy given to fetching water with getting an education, will allow girls both equal access to education as well as access to the necessary supplies of water and sanitation needed to perform there.

SDG 5 & 6

Target *5.2*

Eliminate all forms of violence against all women and girls *in the public and private spheres, including trafficking and sexual and other types of exploitation.*

(Sustainable Development Goals Knowledge Platform, n.d.).

Ending violence against women and girls, a core element in achieving SDG target 5.2, comes hand in hand with improving access to safe water. On route to fetching water, women are susceptible to a wide range of security threats from animals and men, and their greatest vulnerabilities come from being alone and unprotected. Given these vulnerabilities, the incidence of sexual and physical violence against women is greatly magnified. In addition to on route violence, abuse in the home around water provision and sexual exploitation of women in water

access points (Pommells, Schuster-Wallace, Watt, & Mulawa, 2018) expand the forms of violence that women are exposed to and reverses any progress intended towards achieving SDG target 5.2. To move forward on this target instead, implementing a close, fairly managed water supply that does not require trekking isolated routes, exchanging sex for water and falling short on household water levels is needed to keep women from these threatening situations, dissolve the exploitive power relations in access to water, and ensure a more reliable supply of water that keep household conflicts at bay.

3. WATER, SANITATION, HYGIENE, GENDER, AND THE SUSTAINABLE DEVELOPMENT GOALS (SDGs)

Target *6.2*

By 2030, achieve access to ***adequate and equitable*** *sanitation and hygiene for all and end open defecation, paying special attention to the* ***needs of women and girls*** *and those in vulnerable situations*
(Sustainable Development Goals Knowledge Platform, n.d.).

Target 6.2 brings emphasis to another key development challenge with respect to water accessibility – a lack of sanitation and hygiene. In this section, adequate and equitable sanitation and hygiene will be referred to as *basic* sanitation and hygiene (explained in detail below). Populations across the continent of Africa bear the negative health impacts of limited or no access to basic sanitation and hygiene facilities, which then affects their daily life through direct and indirect means. Water, sanitation, and hygiene will be referred to using the acronym WASH throughout this paper. Using data collected by the United Nations, international and local NGOs, and individual studies, we examine the health implications on both men and women through a lack of WASH facilities, with a specific focus on the needs of women and girls.

3.1. SANITATION

According to the United Nations, basic sanitation is improved sanitation, defined as the separation of human excreta from human contact through hygienic means ("Water, Sanitation and Hygiene", 2019). This includes access to and appropriate quality of sanitation facilities such as septic system connections, pour-flush latrines, ventilated improved pit latrines, pit latrines with a slab or covered pit, and facilities with sewer connections ("Water, Sanitation and Hygiene", 2019). As defined by the Joint Monitoring Programme (JMP), **Figure 2** provides the five service levels for adequate sanitation facilities, outlining the specific characteristics for each to provide a more in-depth understanding.

Figure 2

These five different sanitation service levels. Adapted from Joint Monitoring Programme for Water Supply, Sanitation and Hygiene. (2017). Progress on Drinking Water, Sanitation and Hygiene (pp. 8-9). Retrieved from https://washdata.org/sites/default/files/documents/reports/2018-01/JMP-2017-report-final.pdf

SERVICE LEVEL	DEFINITION
SAFELY MANAGED	Use of improved facilities that are not shared with other households and where excreta are safely disposed of in situ or transported and treated offsite
BASIC	Use of improved facilities that are not shared with other households
LIMITED	Use of improved facilities shared between two or more households
UNIMPROVED	Use of pit latrines without a slab or platform, hanging latrines or bucket latrines
OPEN DEFECATION	Disposal of human faeces in fields, forests, bushes, open bodies of water, beaches or other open spaces, or with solid waste

Note: improved facilities include flush/pour flush to piped sewer systems, septic tanks or pit latrines; ventilated improved pit latrines, composting toilets or pit latrines with slabs.

In 2015, in the region of Africa, there were 736 million people who lacked basic access to sanitation facilities, 234 million of those people practicing open and public defecation (Joint Monitoring Programme for Water Supply, Sanitation and Hygiene, 2015). Specifically, across rural regions within Africa, both men and women faced an increased lack of access to sanitation facilities with only 27.9% of residents having utilized a basic sanitation facility, opposed to 52.7% of urban residents (Joint Monitoring Programme for Water Supply, Sanitation and Hygiene,

2015). The following four graphs showcase the level of disparity of basic sanitation facilities and open defecation, between both urban and rural regions from the years 2000 to 2015, respectively. It is evident that rural populations have been and continue to be more disadvantaged, experiencing a higher amount of limitations and barriers to safe sanitation practices.

Figure 3

These graphs showcase the disparity between urban and rural residents living in areas with and without basic sanitation facilities between the years of 2005-2015. Adapted from Joint Monitoring Programme for Water Supply, Sanitation and Hygiene. (2015). A snapshot of Drinking Water, Sanitation and Hygiene in Africa (pp. 2-6). Retrieved from https://washdata.org/sites/default/files/documents/reports/2018-01/JMP-2017-Regional-snapshot-Africa.pdf

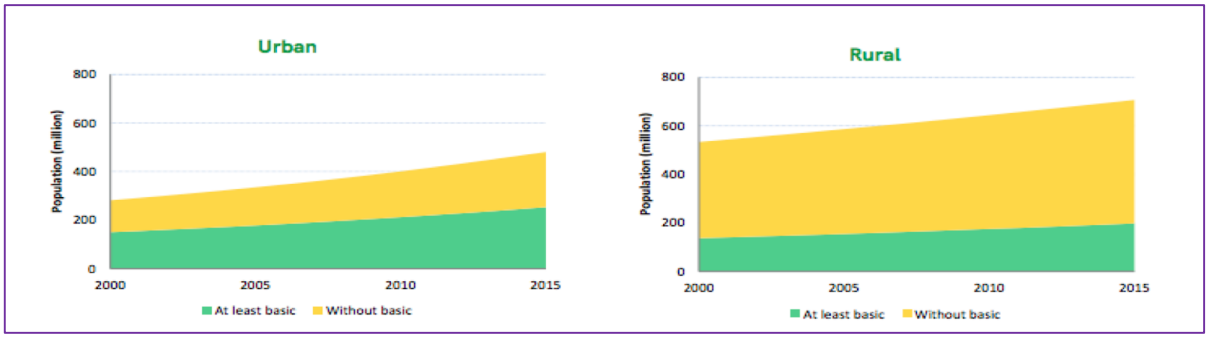
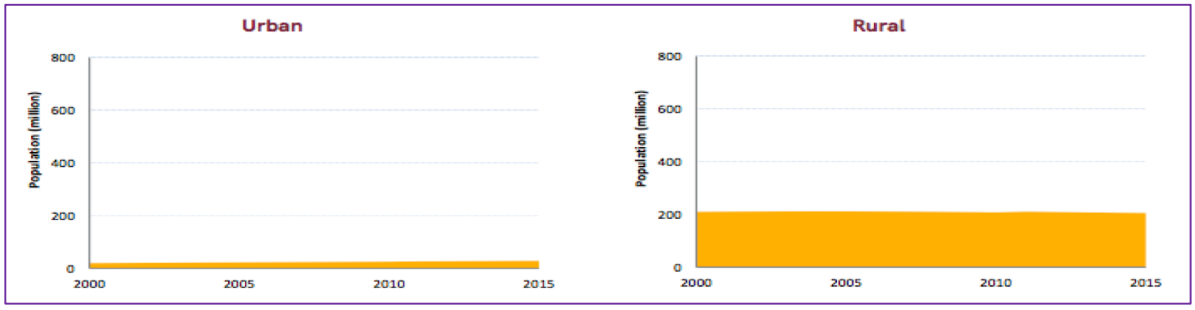


Figure 4

These graphs showcase the disparity between urban and rural residents practicing open defection between the years of 2000-2015. Adapted from Joint Monitoring Programme for Water Supply, Sanitation and Hygiene. (2015). A snapshot of Drinking Water, Sanitation and Hygiene in Africa (pp. 2-6). Retrieved from https://washdata.org/sites/default/files/documents/reports/2018-01/JMP-2017-Regional-snapshot-Africa.pdf



3.2. HYGIENE

According to the United Nations, basic hygiene consists of having access to hygiene facilities which allow for the minimization of diseases and other negative health conditions spreading through human contact and dirtiness ("Water, Sanitation and Hygiene", 2019). This includes both the knowledge of hygiene practices and a clean and safe space to implement those practices. Particularly, there is a big focus on hand-washing facilities (including access to soap and water) which has been proven to limit the transmission of diseases in the most time-saving and cost effective manner, relative to other available methods. As defined by the Joint Monitoring Programme, **Figure 5** provides the three service levels for adequate hygiene facilities, outlining the specific characteristics of each for a more in-depth understanding.

Figure 5

These five different hygiene service levels. Adapted from Joint Monitoring Programme for Water Supply, Sanitation and Hygiene. (2017). Progress on Drinking Water, Sanitation and Hygiene (pp. 8-9). Retrieved from https://washdata.org/sites/default/files/documents/reports/2018-01/JMP-2017-report-final.pdf

SERVICE LEVEL	DEFINITION
BASIC	Availability of a handwashing facility on premises with soap and water
LIMITED	Availability of a handwashing facility on premises without soap and water
NO FACILITY	No handwashing facility on premises

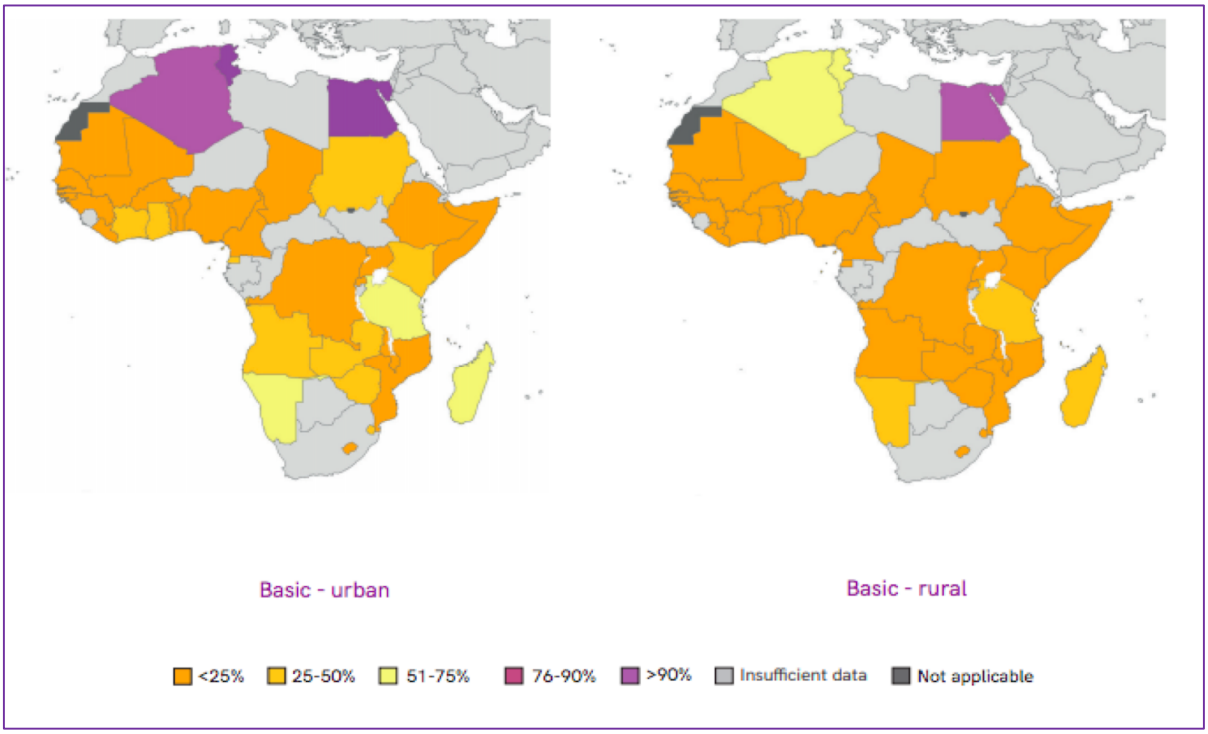
Note: Handwashing facilities may be fixed or mobile and include a sink with tap water, buckets with taps, tippy-taps, and jugs or basins designated for handwashing. Soap includes bar soap, liquid soap, powder detergent, and soapy water but does not include ash, soil, sand or other handwashing agents.

Unfortunately, the continent of Africa poses serious concerns with 810 million people who lack a basic hand washing facility and 600 million who have access to no facility at all (Joint Monitoring Programme for Water Supply, Sanitation and Hygiene, 2015). Like sanitation, the type of society residents live in plays a big role on the hygienic condition for individuals. In fact, it was founded that within rural populations in Africa, basic hand washing facilities only exceeded over 50% for a total of 3 countries, where it exceeded a total of 6 countries for urban regions (Joint Monitoring Programme for Water Supply, Sanitation and Hygiene, 2015). **Figure 6** provides a more in-depth and comparative understanding with respect to the amount of

accessibility to basic hand-washing facilities coverage across both urban and rural regions in Africa.

Figure 6

This figure shows coverage across both urban and rural Africa in respect to basic hand washing facilities, in 2015. Adapted from Joint Monitoring Programme for Water Supply, Sanitation and Hygiene. (2015). A snapshot of Drinking Water, Sanitation and Hygiene in Africa (pp. 2-6). Retrieved from https://washdata.org/sites/default/files/documents/reports/2018-01/JMP-2017-Regional-snapshot-Africa.pdf



3.3. HEALTH IMPLICATIONS

The lack of adequate sanitation and hygiene facilities do not discriminate against individuals of any social or economic background – they hurt the health of all people. In fact, the leading cause for death at a global scale arises from a lack of improper access to sanitation and hygiene (Water and Sanitation | U.S. Agency for International Development, 2018). **Figure 7** showcases the list of water-related infections, first developed by David Bradley (Jamison, 2006).

Figure 7

This chart showcases the different types of water related infections, their descriptions, disease group, and real-life examples. Adapted from Jamison, D. (2006). Disease control priorities in developing countries (2nd ed.). New York, NY: Oxford University Press.

Transmission route	Description	Disease group	Examples
Waterborne	The pathogen is in water that is ingested	Feco-oral	Diarrheas, dysenteries, typhoid fever
Water-washed (or water-scarce)	Person-to-person transmission because of a lack of water for hygiene	Skin and eye infections	Scabies, trachoma
Water-based	Transmission via an aquatic intermediate host (for example, a snail)	Water-based	Schistosomiasis, guinea worm
Water-related insect vector	Transmission by insects that breed in water or bite near water	Water-related insect vector	Dengue, malaria, trypanosomiasis

Both men and women can experience these types of water-related infections. **Table 1** paints a more detailed picture of the various types of infections prevalent throughout rural regions in the continent of Africa.

Table 1

A variety of diseases spread through the lack of equitable and adequate sanitation and hygiene practices and facilities.

Health Implications	Key Facts	Cause
Diarrhoeal Diseases	• Second leading cause of death amongst children under the age of 5	• Infections caused by a host of bacterial, viral, and parasitic organisms, spread

	• Leaves body without appropriate water and salt necessary for survival • Threats of hydration, resulting in malnourished children who are more likely to fall ill (creates a vicious cycle)	through faeces-contaminated water
Schistosomiasis	• In 2016, 206.4 million people globally required preventative treatment • Can include symptoms of haematuria, kidney damage, genital lesions, and infertility • Can be infected through a variety aspects of life including agricultural, domestic, occupational, and recreational activities	• Infections caused through transmissions from infected freshwater sources
Trachoma	• Public health issue in over 37 countries and responsible for causing blindness and visual impairment for over 1.5 million people • It is the leading preventable cause of blindness which cannot be reversed once an individual suffers visual impairment	• Infection caused through human contact with discharge from eyes or nose from either people or flies • Inadequate latrines, water shortage, and poor hygiene
Soil-transmitted helminths	• Approximately 1.5 billion people are infected • Can cause diarrhoea, malnutrition, general malaise, impaired growth, and abdominal pain	• Transmitted through eggs in human faeces, contaminating soil in areas of weak sanitation • Spread through practices of open defecation

Note. Adapted from Fact sheets. (2019). Retrieved from https://www.who.int/news-room/fact-sheets

These health implications collectively lower the quality of life for people through economic and social means. Without regular sanitation and hygiene care, there are creations of physical environments where individuals lack safety, dignity, and self-esteem ("Poor sanitation threatens public health", 2008). Unfortunately, this affects a variety of aspects of an individual's life including economic institutions such as school and work and health-care institutions such as the hospitals and clinics. The following sections will explore some of these topics in more detail.

From a gendered perspective, in rural regions within Africa, women disproportionality experience harsher negative effects of inadequate sanitation and hygiene. This is due to a variety of reasons, some of which are listed below:

1. Multiple diseases transmitted to children at a young age are more likely to infect women as they are the primary household caretaker of youth within the domestic environment. Some examples of these diseases include trachoma, which are up to four times more likely to be infectious to women than men due to their close contact with infected children on a regular basis ("Trachoma", 2018).

2. Due to cultural norms within various rural regions in Africa which dictate that women manually fetch water (as discussed in section 2 of this paper), women are exposed to direct contact with water at a higher rate than men (Geere & Cortobius, 2017) . This, therefore, increases the likeliness of women contracting water-related diseases.

3. Along with their male counterparts, women are expected to practice open defecation due to the absent of basic toilets within households. However, relative to men, women experience higher risks of sexual and physical violence (from both humans and animals) which can lead to both short-term and long-term health implications (Saleem, Burdett & Heaslip, 2019). For instance, in multiple rural areas of Africa, women must avoid daylight hours and instead practice open defecation once the sun sets (to avoid cultural

or societal backlash) which puts them in a more dangerous position due to the increased risk of physical or sexual assault during the night time hours – both during their walk to the area of defecation and during the process of defecation ("Ensuring women's access to safe toilets is 'moral' imperative, says Ban marking World Day", 2014).

4. The practice of open defecation also disproportionately puts women at a higher risk of long-term psychological health implications relative to men (Saleem, Burdett & Heaslip, 2019). This stems from the increased physical, financial, and social stressors women experience with respect to water, such as reduced financial capital or a lack of privacy (Bisung & Elliott, 2016). In their research, Salem, Burdett & Heaslip reveal that such stressors leave women victim to multiple psychosocial impacts such as feelings of indignity, fear, shame, and sense of powerlessness (2019).

5. Even within the category of women, there are special vulnerabilities that place certain women at a higher risk to exposure of threats that lead to negative health implications. Specifically, pregnant and disabled women are more vulnerable as they experience a higher level of health risks when denied access to basic sanitation and hygiene – both in terms of diseases and physical threats. For example, pregnant women are more likely to get soil-transmitted helminth infections, especially during their second or third trimester or when in the stage of breastfeeding ("Soil-transmitted helminth infections", 2019). In fact, it was founded that approximately 20-30% of pregnant women in Sub-Saharan Africa were infected by hookworms in 2008 due to direct contact with contaminated water, which put them at risk for hookworm-related anemia, which than increased their risk of death during pregnancy (Brooker, Hotez & Bundy, 2008).

6. With respect to the requirement of water for personal health, women have higher demands relative to men due to the periodic cycle of menstruation. Menstrual hygiene management (MHM) is crucial in order to ensure women do not experience additional negative health implications such as infections and reproductive device diseases. However, due to a lack of separate and adequate toilets and latrine space, women face monthly challenges to maintain a clean and safe body in various institutions such as schools and households.

3.4. EXTERNAL IMPLICATIONS OF A LACK OF WASH FACILITIES

The lack of adequate and equitable WASH facilities in rural communities across Africa affects women in a variety of manners, specifically impacting their education and health-care opportunities. Therefore, in this section, there will be a specific focus on the limitations girls and women experience in schools and health-care facilities.

3.4.1. EDUCATION

Menstrual cycles last approximately 25-30 days, with 4-6 days allocated towards menstrual bleeding (Kuhlmann, Henry & Wall, 2017). This results in girls experiencing menstrual bleeding during the school year, on a monthly basis. Kuhlman, Henry, & Wall explain that, unfortunately, the majority of girls throughout the rural regions of Africa prefer to stay home during the menstrual bleeding period, and therefore are absent from crucial educational lessons (2017). This is a result of failed and ineffective menstrual hygiene management (MHM) influenced by a lack of sanitation facilities and supplies, absence of hygiene practices, and gender insensitivity on school properties (Kuhlmann, Henry & Wall, 2017). In fact, a study conducted in Zambia founded that both female students and teachers abstained from school attendance during their menstrual cycle, which led to high rates of absenteeism and low teacher-students ratio (USAID, 2016). A lack of WASH facilities also resulted in decreased teacher-student contact time, collectively leading to a lower quality of education for both boys and girls, but disproportionately affecting girls through lowered educational opportunities (USAID, 2016).

Table 2 displays inadequate sanitation and hygiene practices and their characteristics within school properties in various rural regions in Africa, with a specific focus on Malawi and Ethiopia. All the listed characteristics come together to create physical barriers and limitations for girls, often leading to feelings of discomfort, anxiety, and shame, which then discourage girls from attending and participating in school.

Table 2

Inadequate Sanitation/Hygiene Practices	Characteristics	Statistics

Lack of sufficient latrines	• Lack of privacy
	  ○ Absence of doors on latrines
	  ○ Non-functioning locks on doors
	  ○ Lack of adequate toilets
	• Lack of adequate washing space (too small or constricted physical space)
	• Improper lighting
		• In Malawi, without access to toilets, girls skipped school twice as much as those with latrine privacy

Lack of clean water supplies	• No water supply in latrine • Absence of toilet paper • Ineffective or no soap • Lack of sanitary pads • Absence of disposal tools for sanitary materials	• In Ethiopia, over 50% of girls both in secondary and preparatory schools skip school during menstruation cycles • In Ethiopia, girls who lack access to sanitary pads are more than 5 times likely then others to skip school

Unsupportive education environment	• No knowledge of menstruation until menarche
	• Absence of MHM education
	  ○ Abdominal cramping
	• Social Harassment
	  ○ Fear of leakage and stains
	  ○ Taunting/teasing of girls	

Note. Adapted from Kuhlmann, A., Henry, K., & Wall, L. (2017). Menstrual Hygiene Management in Resource-Poor Countries. Obstetrical & Gynecological Survey, 72(6), 356-376. doi: 10.1097/ogx.0000000000000443

If girls do attend school, there are multiple studies which showcase that girls undergo feelings of mental distraction and discomfort, inability to concentrate, and lower willingness to participate in class discussions (Kuhlmann, Henry & Wall, 2017). For example, if a female student is required to physically move towards the front blackboard in the class in order to write the answer to a question, she will refrain to do so due in fear of exposing a menstrual stain, leakage, or odor (Kuhlmann, Henry & Wall, 2017). Overall, WASH facilities do not implement and integrate MHM facilities which leads to higher absenteeism, decreased in-class participation, and negative social environments for girls – which limits their education opportunities (Chinyama et al., 2019). Therefore, failure of WASH facilities within school institutions, disproportionately affects women relative to men in areas outside of personal hygiene.

3.4.2. HEALTH CARE FACILITIES

The availability of WASH facilities within health care institutions such as hospitals, health posts, health centers, and clinics is essential in decreasing the spread of diseases amongst patients and health-care staff. A cross-sectional study conducted in rural regions within Ethiopia, Kenya, Mozambique, Rwanda, Uganda, and Zambia founded that over 74% of water in health facilities came from unimproved water sources (Guo, Kayser, Bartram & Bowling, 2017). In fact, in Ethiopia and Mozambique, only 16% and 59% of rural healthcare facilities had access to improved water sources on their premises, respectively (Guo, Kayser, Bartram & Bowling, 2017). This then limited the amount of water accessible as water had to be manually carried into the facility, increasing the risk of contaminants through the spread of germs as healthcare officials commonly engaged in scoping water from containers using un-hygienic tools such as bowls or their hands (Guo, Kayser, Bartram & Bowling, 2017).

With respect to clean and safe condition of healthcare staff, it is important to note that hygienic practices primarily include washing hands with soap and having the availability of tools such as towels to dry hands. "Numerous studies document the importance of washing with soap, to bind with dirt and grime; clean running water, to effectively rinse the hands without contaminating them; and drying materials, such as paper towels, to reduce germ transfer from wet hands" (Guo, Kayser, Bartram & Bowling, 2017). However, due to a lack of WASH supplies,

hand-washing is not being practiced in 75% of the rural regions within the countries of Ethiopia, Kenya, Mozambique, Rwanda, Uganda, and Zambia (Guo, Kayser, Bartram & Bowling, 2017).

This is particularly dangerous for women as the lack of inadequate, safe, and clean water has a direct impact on the maternal and child health services provided to women. Adequate WASH facilities and practices in this situation include clean operating hands that have been washed with water and soap by all birth attendants, sterile equipment, and a clean physical environment (such as the bed and room) (Hodin, 2017). Without such facilities, the risk of infections, sepsis, and death for mothers and their children is high during birth delivery (PMNCH, 2014). In fact, unwashed and unsafe hands may increase the risk of sepsis while unsanitary birth delivery equipment may increase the odds of cord site infections (PMNCH, 2014). Therefore, adequate WASH facilities are required during antenatal care, delivery, and postpartum in order for the safety and good health of women in health-care facilities (PMNCH, 2014). However, Kruk et al, in their research, founded that in Kenya, Namibia, Rwanda, Tanzania, and Uganda, only have 60% of healthcare facilities that perform cesarean services have adequate safe water (2016).

Additionally, a study conducted in rural healthcare facilities in Rwanda founded that poor and inadequate sanitation amongst healthcare facilities led to major dissatisfaction amongst female patients and encouraged women to give birth in informal settings, avoiding institutional delivery due to a lack of toilets (Huttinger et al., 2017). With a lack of WASH facilities within rural households and communities, by avoiding institutional health-care during pregnancy, women are placed at any even more disadvantaged position. Overall, relative to men, women experience larger negative risks and health implication in health-care settings due to their special needs of giving birth.

3.5. CAUSES OF A LACK OF WASH FACILITIES

In order to combat the issue of limited WASH facilities, it is important to first understand the reasons for the lack of WASH facilities and practices amongst rural communities in Africa. Although within the various rural regions there were a variety of challenges and

limitations, this section focuses on two main issues that have been studied and have directly impacted the creation of WASH facilities.

3.5.1. FINANCIAL BARRIERS – SYSTEM BLINDNESS

Due to the fact that financial investments into water management will be discussed in section 5, and because water governance will be discussed in section 4, there will only be a brief focus on financial barriers with respect to WASH facilities. Rural regions within the continent of Africa experience limited intuitional, financial, and human capacities due to heavy competition for public spending between a variety of governmental sectors (Collaborative Africa Budget Reform Initiative, 2019). This is despite the fact that investments in rural services provide a higher return than urban services through improved productivity and time saved (Collaborative Africa Budget Reform Initiative, 2019). For example, as seen in **Figure 8,** a study conducted in 11 African countries founded that although 70% of unserved populations reside in rural areas, they only benefit from 19% of the expenditures invested in sanitation and drinking-water (World Health Organization, 2015).

Figure 8

This figure showcases the trend of majority WASH investments being targeted for urban regions versus rural regions in the continent of Africa. Adapted from World Health Organization. (2015). Investing In Water And Sanitation: Increasing Access, Reducing Inequalities. Geneva. Retrieved from https://www.who.int/water_sanitation_health/glaas/glaas2014-africa-region.pdf

Currently, in order to accomplish SDG target 6.1 and 6.2 by 2030, there has to be an investment of US$15.8 billion in all rural regions across the continent of Africa (Collaborative Africa Budget Reform Initiative, 2019). However, there are huge financial gaps across the continent. For instance, in 2016, South Africa founded that there was a large finance gap with respect to accomplishing WASH initiatives, having only 56% of capital needs funded (Collaborative Africa Budget Reform Initiative, 2019). Additionally, there was a lack of investment into the operations and maintenance (O&M) of WASH initiatives which led to increased projects not operating appropriately (Collaborative Africa Budget Reform Initiative, 2019). In fact, there was an estimated US$3.4 billion shortfall of O&M funding, which makes other capital investments into South Africa pointless - if a project is unable to be maintained, all initial investments into that project are wasted (Collaborative Africa Budget Reform Initiative, 2019).

This is especially important to note as most financial investments in the WASH sector are made within physical infrastructure, with a lack of focus on other supportive functions and institutions (Fonseca & Pories, 2017). This phenomenon has been defined as system blindness (Fonseca & Pories, 2017). Other supportive functions include regulations, policies, monitoring mechanisms, institutions, and human capital at regional, district, and municipal levels (Fonseca & Pories, 2017). Without the adequate financial support for service authorities and service providers, WASH project implementations have ineffective results, poor services, stagnation in coverage, and non-functionality (Fonseca & Pories, 2017). The next section provides a more in-depth understanding of project management failures using a case study.

3.5.2. PROJECT MANAGEMENT/IMPLEMENTATION BARRIERS

The Case of Tanzania

Challenges of improving WASH in Rural Tanzania *(Kamara et al, 2017)*

Despite having adequate WASH government policies, only 46% of water systems and 8% of the population in rural Tanzania have access to improved water and sanitation respectively (Kamara, et al 2017). In fact, there was only a 12% increase in the accessibility to improved water and sanitation between the years of 1990 and 2015 (Kamara et al, 2017). There have been multiple efforts by both government and non-governmental organizations to improve WASH access within rural areas of Tanzania, however, due to project implementation challenges, results have been limited. A prime example of such a situation can be seen by an intervention conducted in the Busangi community located in the northern region of rural Tanzania by World Vision Tanzania (Kamara et al, 2017). This intervention was intended to reduce the rate of waterborne diseases, particularly diarrhea amongst children under the age of 5. This was to be done through improved accessibility and quality of water and sanitation facilities and practices (Kamara et al, 2017). However, after the end of the project, there was an increase in the number of diarrhea cases amongst children under the age of 5 (Kamara et al, 2017). With respect to the scope of this paper, there will only be an analyses of the elements which were not implemented effectively during the project's life span to identify common challenges which limit WASH project successes.

Throughout the life of the project, one main issue was the absence of localized research and understanding (Kamara et al, 2017). Due to a lack of adequate research within the intervention design phase, the outlined steps to achieve project goals were misaligned for this project. Additionally, without actively leveraging the available cultural and structural systems within the community to encourage participation, there were limited results (Kamara et al, 2017).

Overall, there was inadequate research during the preliminary stages of the project which limited the opportunity for success through the following means:

1. Insufficient research was conducted on the geographic characteristics of the physical environment of the Busangi community. This created barriers in the successful operation of boreholes which were drilled to increase access to water (Kamara et al, 2017). For example, various boreholes failed due to reasons such as running dry and containing iron content (Kamara et al, 2017).

2. Ineffective and inefficient educational campaigns were implemented with the aim to encourage behavioral changes within the community. These campaigns were limited in their reach due to limitations in their scope and target, which arose from choosing to implement inefficient strategies (Kamara et al, 2017). For example, with a project team of only two full time staff, there was not enough human and physical capital allocated towards informing and educating people about the appropriate use of sanitation and hygiene facilities. This led to many people within the community not engaging in hygiene practices such as hand washing despite the availability of clean water sources (Kamara et al, 2017).

3. There was a lack of controlling and monitoring initiatives by World Vision Tanzania. For instance, after the drilling of boreholes, there was no long-term plan put forth for maintenance which resulted in operational issues (Kamara et al, 2017).

4. The quality and quantity of training was insufficient and did not encourage self-sufficiency amongst water user groups (WUG) (Kamara et al, 2017). Although 18 WUGs were created and trained, they were still unable to solve mechanical issues in boreholes along with having no access to the adequate resources required to solve mechanical issues (Kamara et al, 2017).

5. Active participation with the local communities was limited throughout the implementation of the project which led to a failure in changing cultural beliefs about water usage (Kamara et al, 2017).

The above five points identify key project management and implementation issues that have been recognized in multiple WASH programs, hindering government and non-governmental organizations from increasing access to improved WASH facilities and practices.

A HOLISTIC SDG VIEW ON IMPROVING WASH FACILITIES/INITIATIVES

As described previously, Ndikumana & Pickbourn have studied and explained that improving water and sanitation facilities will have positive implications for other SDG goals as well (2017). The following three SDG targets are believed to have both direct and indirect positive correlations as improved WASH facilities are made accessible to communities: SDG target 3.2 on reduction in child mortality, SDG 4.A on improved education accessibility and quality for girls, and SDG 5.1 on reduction of gender-based discrimination.

SDG 3 & 6

Target *3.2*

By 2030, end preventable deaths of newborns and ***children under 5 years of age****, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births*
(Sustainable Development Goals Knowledge Platform, n.d.).

Unfortunately, as mentioned in section 3 of this paper, the second leading cause of death for children under the age of 5 arises from diarrheal diseases – one common water-related

infection. Multiple determinants of diarrheal diseases have been identified to have both direct and indirect causing effects. However, poor water quality has been proven to be a crucial determinant, with studies finding that as the level of contamination within water sources increases, the risk of getting diarrhea amongst children increases as well (Levy, 2015). It is important to note that contaminated water may be in the form of drinking water or food (Levy, 2015). Irrespective to the source of the contaminated water, multiple water quality and accessibility interventions have proved to decrease incidences of diarrhea amongst children (Levy, 2015). Therefore, by improving WASH facilities, SDG target 3.2 progresses through reduction in preventable deaths amongst children under the age of 5.

It is also important to note that as children get sick through contaminated-water, human capital formation and productivity of adults is decreased – due to the extra time and effort required by adults to care for their sick children (Ndikumana & Pickbourn, 2017). Therefore, a reduction in children with diarrheal diseases will also result in more productivity for an entire society (Ndikumana & Pickbourn, 2017).

SDG 4 & 6

Target 4.A

Build and ***upgrade education facilities*** *that are child, disability and* ***gender sensitive*** *and provide safe, non-violent****, inclusive and effective learning environments for all***

(Sustainable Development Goals Knowledge Platform, n.d.).

With respect to SDG target 6.2, in this paper, the focus is on achieving adequate and equitable access to sanitation and hygiene for *all*, which includes girls and women. In fact, there is a special focus on the needs of women and girls. Due to the fact that girls are disproportionately affected by the lack of WASH facilities in educational institutions across rural

areas in Africa, there is a direct positive correlation between the accomplishment of SDG target 6.2 and SDG target 4A.

The lack of adequate and equitable WASH facilities within school institutions create learning barriers which limit girls' quality of education on a periodic basis. This is a form of gender insensitive education facilities which create exclusive learning environments for girls. For example, without proper lighting in latrines, girls are unable to practice adequate MHM (unable to use sanitary materials to clean any leakages or stains on clothes) which negatively affects their ability to maintain appropriate personal hygiene, which in results limits both the quantity and quality of in-class participation (Chinyama et al., 2019). By investing resources in creating adequate latrines which include appropriate lighting and toilets, girls will be more able to maintain their personal hygiene and therefore, be more inclined to participate in class without a sense of embarrassment or fear of social harassment from male classmates (Chinyama et al., 2019). A more comfortable in-class environment indicates an inclusive and effective learning environment where girls are abler to focus on educational lessons. This, therefore, highlights that by increasing access to adequate and equitable sanitation and hygiene for girls (as stated in SDG target 6.2), SDG target 4.A is also positively one step closer to be achieved.

SDG 5 & 6

Target *5.1*

End all forms of ***discrimination against all women and girls everywhere***

(Sustainable Development Goals Knowledge Platform, n.d.).

Currently, women and girls experience discrimination through a gendered division of labor with respect to water collection, increased physical and sexual violence during travels to open defecation locations, and absence of menstrual hygiene management. In multiple rural regions in countries in Africa, women are culturally restricted to travel when menstruating

(Ndikumana & Pickbourn, 2017). Therefore, without the ability to freely travel to normal water sources, women are made dependent on others to bring them water for hygienic purposes (Ndikumana & Pickbourn, 2017). However, through an increase in basic WASH facilities, women can safely and privately maintain their bodies, decreasing discrimination posed on them by society. Additionally, improved WASH facilities in institutions such as schools will decrease structural discrimination against young girls (as discussed in the SDG target 4.A section). Therefore, by increasing WASH facilities – while also ensuring women and girls have equitable access to those facilities – there will be a reduction in the discrimination that occurs against women in a variety of manners.

4. WATER GOVERNANCE, USE, AND THE SUSTAINABLE DEVELOPMENT GOALS (SDGS)

Target *6.B*

Support and strengthen the ***participation of local communities***
in improving water and sanitation management
(Sustainable Development Goals Knowledge Platform, n.d.).

Sustainable Development Goal target 6.B was designed to increase the participation of local communities in their water management. An inclusive and participatory approach is necessary in order to create water solutions that work for each specific community or region, realizing that different communities and geographic regions have differing needs. In order for local water governance solutions to be effective, it is crucial that a gendered approach is utilized to empower women to actively participate. In most rural households, the burden of ensuring enough water is available primarily falls on the women. Research by Yerian et al (2014) outlines that it is very common for marginalized groups such as women and the poor to be excluded from community water management which reinforces social inequalities of water

access. Baguma et al (2013) highlight that a sustainable and safe water supply requires improvement as it relates to the "gender relationships between women and men and in physical, natural, human and social capital." In order to achieve these positive changes, the focus needs to be on the roles of men and women on control, access and use of water resources.

4.1. WATER CONTROL AND ACCESS

Around the world, control and access to water differs drastically depending on the development level of the country and the respected social and cultural norms of that society. In rural communities in Africa, water governance is typically managed by men at both the local and household level. According to Pommells et al (2018), "the socially bestowed roles and responsibilities that are forced upon women from birth revolve around accessing and having water in the home." This traditional household responsibility falling to the women of the home is not uncommon, specifically in rural African regions where women are expected to excel at domestic tasks. As indicated in section 2 of this paper, the amount of time and effort it takes to secure water in rural communities is extensive, indicating that gathering water is both a primary and a time-consuming task of women's' daily responsibilities. In these societies, accessing water is an important way that women contribute to their culture.

As previously discussed, women experience extreme vulnerability during fetching water and the same is true as it relates to household water control. Men see the inability to obtain water as their wives not doing their part to provide for their home and family. The literature by Pommell et al (2018) also stresses how worsening dry seasons and poor water infrastructure, specifically in rural Africa, it limiting water access, ultimately leading to increased risk of domestic violence for women. In an effort to achieve SDG 6 and ensure everyone has access to safe water, we can not ignore SDG target 5.2 which focuses on the elimination of domestic violence. Given that the burden to secure water is often held by the women of the household, these targets have to be approached together.

Water conflict at a local level is also a challenge that many women face when trying to access water. Women are particularly vulnerable in poor countries and are often faced with male dominated and controlled water vendors. According to Pommells et al (2018), these male water vendors charge a fee per can, and can create stressful social situations where women are pressured to perform sexual favors in order to gain access to water, if unable to pay through monetary means. In such a situation, the relationship between the vendor and the women is a form of exploitation that emphasizes one of the major challenges with the gendered divide in household responsibilities -- yet again emphasizing the importance of viewing water challenges from a gendered lens.

Given the levels of household pressure for women to secure water each day, it is no surprise that when water shortages exist, violence can occur between women themselves. No woman wants to return home empty handed without the necessary and required amount of water. Therefore, with limited water, there is the creation of competitiveness within water access points amongst recipients. Pommells et al (2018) indicate that "survival" mode occurs when there are long queues or when those in higher social standing jump the queue. The inequity that occurs due to this social status gives those in a better financial situation an advantage when attempting to access water that is controlled by a system that is susceptible to bribery. Local water conflict over priority access to a tap or favoritism is also identified as a major challenge in the literature by Yerian et al (2014). This highlights the ongoing inequity associated with water, not only based on gender, but also social status.

4.2. WATER USE

Water is necessary for household use on a daily basis and almost all domestic-related tasks in the home require access to water, including cooking, cleaning, and caring for children (Pommells et al, 2018). According to Sorenson et al (2011), prioritization of water is important, with drinking and cooking typically the first priorities, followed by water consumption for

personal hygiene. Unfortunately, sanitation and women's water usage is often the last priority and if water is scarce, there may be no water left for them to use. As mentioned earlier, while women are responsible for gathering water and ensuring domestic chores are completed, they are not often the decision makers for ultimate water use in the family. The governance over water use at a household level is primarily done by men due to their higher social and cultural status within society. Sorenson et al (2011) highlight a study in Ghana where it was founded that status within the household affected water allocation, and therefore men were prioritized over women in a variety of water-related activities. This led to negative health, poor dignity and self-worth of the women. In a study by Yerian et al (2014), women were found to be frustrated by the fact that men and children did not understand the hardships they endured to collect water and did not respect their intended use and rationing of that water. While access to more water would certainly help these issues, it would not address the underlying gender issues that are still being experienced by women in developing countries. In fact, in order to achieve SDG target 5.1 which ends discrimination against women, equitable access and use of water needs to be addressed.

A HOLISTIC SDG VIEW ON IMPROVING WATER GOVERNANCE

In order to improve water governance and achieve participatory water management as outlined in SDG target 6.B, men and women need to work openly and collaboratively. As outlined in the section above, some of the major barriers to successful water governance are control, access and use of household water. In order to resolve these issues, an integrated SDG approach needs to be utilized.

SDG 5 & 6

Target *5.1*

End ***all forms of discrimination*** *against all women and girls everywhere*

(Sustainable Development Goals Knowledge Platform, n.d.).

Target *5.2*

Eliminate ***all forms of violence against all women and girls*** *in the public and private spheres, including trafficking and sexual and other types of exploitation*

(Sustainable Development Goals Knowledge Platform, n.d.).

Target *5.5*

Ensure women's full and effective participation *and equal opportunities for leadership at all levels of decision-making in political, economic and public life*

(Sustainable Development Goals Knowledge Platform, n.d.).

Women are currently at a disadvantage when it comes to water governance in rural communities in Africa as they lack participation in the decisions around water access, control and use. In order to make progress on SDG 6.B, a gendered lens and focus on SDG 5.1, 5.2, and 5.5 needs to be considered. Having their voice acknowledged, heard, and included in local water management would help women reduce discrimination and end violence relating to water. The struggles that women currently face could be addressed if there was increased female ownership and decreased power dynamic of men controlling major components in relation to water management and allocation. Ensuring women have equal opportunity allows them to be empowered through adding valuable insights into systems and processes such as water management that they are intimately connected to.

SDG 6 & 10

Target *10.3*

Ensure ***equal opportunity*** *and reduce inequalities of outcome, including by eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and action in this regard*

(Sustainable Development Goals Knowledge Platform, n.d.).

While SDG 5 is focused on gender equality, it also important to connect SDG 6.B with SDG 10.3 to ensure that equal opportunity is created by eliminating all discriminatory laws, policies and practices prohibiting women from fairly and equitably participating within water management. Having men and women work together to achieve water security through joint responsibility is a key way to achieve that.

5. SUCCESSES AND OPPORTUNITIES

In order to combat the lack of equitable water collection, access, distribution, and quality within rural regions in Sub-Saharan Africa, targeted aid, locally-tailored WASH programs, and equitable governance systems must be introduced. This section will take a closer look at all three interventions and introduce key characteristics and pathways for positive change in order to reduce gender-specific vulnerabilities to water security.

5.1. ACTIONS TO IMPROVE WATER ACCESS

5.1.1. INCREASING TARGETTED TOWARD LOCAL WATER INFASTRUCTURE

Difficulty in reaching water resources is a core theme to water in-access that makes its collection all the more tedious and dangerous a task for women in rural Africa. In looking to resolve this issue of reach, the importance of building local water infrastructure is brought up significantly across both academic scholarship and on-the-ground development projects. Piping systems, rainwater collection systems, sustainable groundwater pumping systems are some of many local infrastructure options. Since all options require material, human and managerial investments, a look at targeted aid and financial assistance is helpful in revealing one opportunity for greater equity in water access. Ndikumana & Pickbourn's (2017) research particularly focused on understanding the distribution of aid across world sectors. As shown in **Figure 9**, their

findings revealed that aid targeted toward water sectors was not only one of the lowest sectors receiving aid, but was also decreasing between the time frame of 1981 - 2010.

Figure 9

Adapted from Ndikumana, L. and Pickbourn, L. (2017). The Impact of Foreign Aid Allocation on Access to Social Services in sub-Saharan Africa: The Case of Water and Sanitation. World Development, 90, pp.104-114. doi: https://doi.org/10.1016/j.worlddev.2016.09.001 (p. 108)

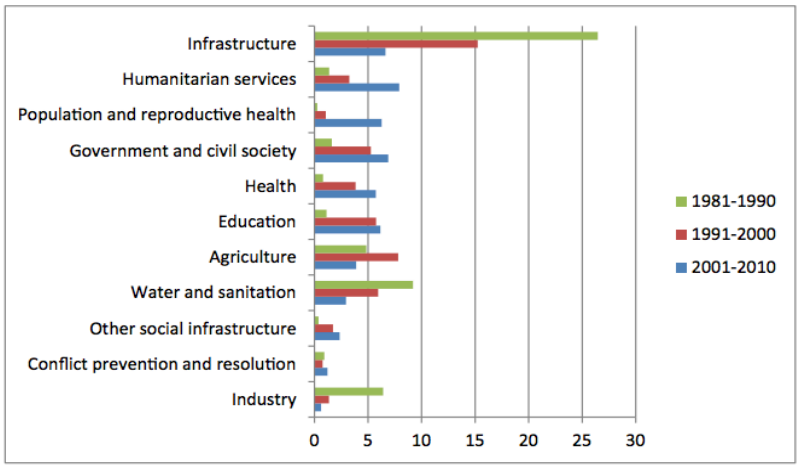


Figure 2. *Changes in sectoral aid allocation, 1981–2010.*

Figure 11, adapted from the United Nations (2019) reveals more recent statistics and progress regarding aid toward the water sector, with most recent data shown as early as 2016. Between 2011 and 2014, disbursements and commitments to the water sector have increased significantly relative to the years prior to 2010. Despite this increase however, it is important to note the large gap between commitments and disbursements, with actual disbursements being much lower despite heightened commitments. With that acknowledged, increased commitments still indicate a positive move forward toward filling the infrastructure and access gaps existing in water insecure areas and populations. Further, understanding where that aid is targeted geographically will tell if it is going to the populations that need it most, specifically Sub-Saharan Africa. To investigate this, a report published by United Nations Water and the World Health Organization (2014) wrote about the geographic targets where aid commitments were aimed in the years between 2010 and 2012 when aid started to increase. The reports finding are displayed visually in **Figure 10** of aid commitments per capita, showing that Sub-Saharan Africa was one

of the highest commitment areas of targeted aid in this sector (United Nations Water and the World Health Organization, 2014, p. 44). To make this an opportunity for progress in the sector, a next step in aid agendas should be to compliment these commitments with actual disbursements, so tangible contributions to solving water insecurity can begin to materialize.

Figure 10

Adapted from United Nations Water and World Health Organization. (2014). Investing in Water and Sanitation: Increasing Access, Reducing Inequalities. Retrieved from https://apps.who.int/iris/bitstream/handle/10665/139735/9789241508087_eng.pdf (p. 44)

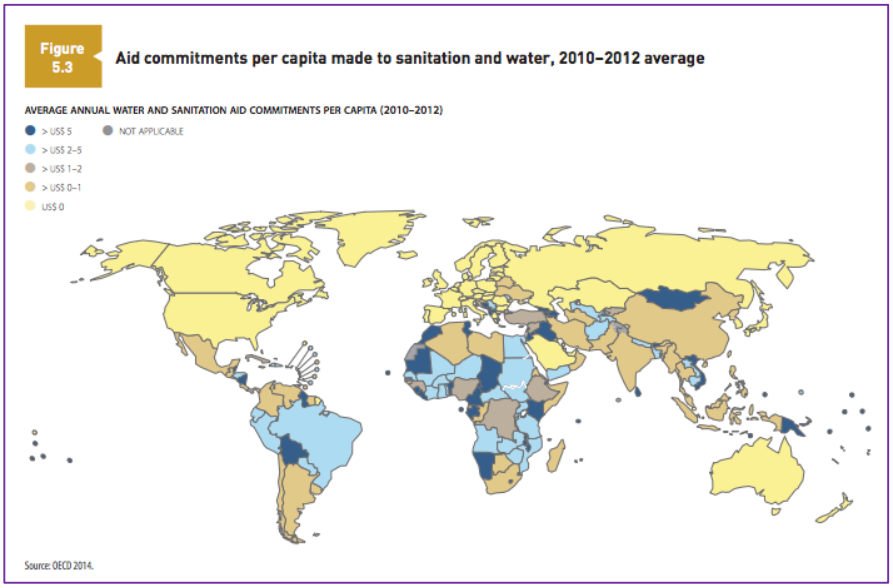
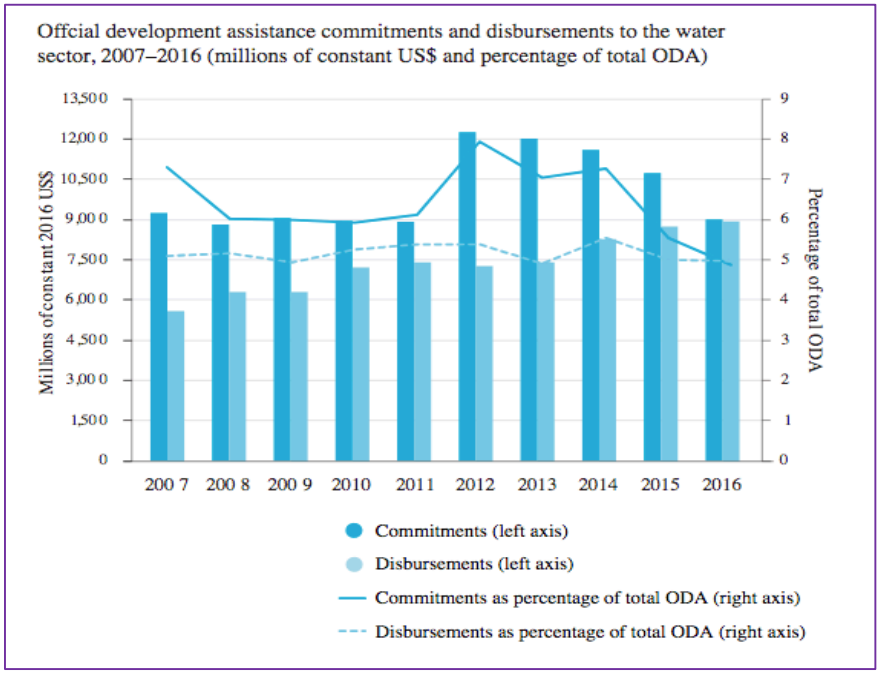


Figure 11

Adapted from United Nations. (2019). High-Level Political Forum Goals in Focus Goal 6: Ensure Availability and Sustainable Management of Water and Sanitation for All. Retrieved from https://unstats.un.org/sdgs/report/2018/goal-06/



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Past 2014, United Nations (2019) data suggests that commitments and disbursements in the water sector are slowly decreasing. While disbursements in recent years are closer to commitment levels than in previous years, this significant decrease in financial assistance will make inequity in water access and security persist and worsen. To avoid moving backward, targeted aid should not only resume to its high levels like in 2011, but should also show equalization between commitments and actual monetary disbursements. In doing this, it is important to keep in mind that not all rural communities in Africa will purpose water aid finances towards the same infrastructure. As such, thorough geographic, communal and water assessments are essential to determine the technologies, human power, maintenance schemes, monitoring systems and supportive functions needed to supply clean, more accessible water to rural African populations. When practitioners couple financing with governance, ongoing water management and responsible, equitable use of this more accessible water resource, not only would they have triggered progress on SDG target 6.1, but they would have also eliminated the development challenge that placed women in the gender discourse at a place of greatest insecurity around water.

5.2. ACTIONS TO IMPROVE ACCESS AND QUALITY OF WASH FACILITIES AND PRACTICES

5.2.1. COMMUNITY LED FOCUS PROGRAMS

Before implementing any program with the intention to improve WASH facilities in a given region, there must be a focus on localization. Every community in the rural regions of Africa has its own culture, societal norms, beliefs, and values ("Five Pressing Global Water & Sanitation Challenges", 2019). In order to implement a positive change within a given community, there must first be research conducted into the strengths, weaknesses, and behavioral patterns of that community. Only after thoroughly understanding the societal culture

can an on-the-ground development project be created, tailored specifically to the needs and requirements of that community. Custom WASH programs that capitalize on existing local knowledge, technology, and strengths of a given community have more capability of success and respond more effectively to changing conditions ("Five Pressing Global Water & Sanitation Challenges", 2019). It is also important to treat every community as its own (because every community *is* its own) in order to encourage ownership and self-sufficiency ("Five Pressing Global Water & Sanitation Challenges", 2019). The case study below provides a real-life successful example of implementing the above elements.

The Case of Zambia

Increasing Sanitation Through the Introduction of Household Latrines *(Soap stories and toilet tales, 2019)*

Throughout the geographic regions of the Tonga people in Southern Zambia, open defecation was a common and regular practice (Soap stories and toilet tales, 2019). However, with the goal to improve personal hygiene and reduce rates of water-related diseases, UNICEF introduced a WASH campaign with the intent to introduce adequate latrines across the region (Soap stories and toilet tales, 2019). This campaign utilized the community-led total sanitation (CLTS) methodology and valued community knowledge, participation, and ownership (Soap stories and toilet tales, 2019). During the initial research design phase, UNICEF recognized the history of the Tonga people, which taught them that forced or strict regulations would not be an effective strategy in increasing usage of latrines due to a history of colonialism and oppression. Similarly, UNICEF also recognized the value and respect placed on local community leaders by community members. Therefore, instead of imposing strict policies, UNICEF worked with local community leaders to educate and spread awareness of the disadvantages of open defecation and benefits of good quality, private latrines (Soap stories and toilet tales, 2019).

In order to encourage community ownership, the responsibility to create the latrines was placed on individual households (Soap stories and toilet tales, 2019). Studies have shown that without personal conviction, public latrines are not utilized effectively by any community but rather wasted (Soap stories and toilet tales, 2019). Therefore, by encouraging households to build their own latrines, the goal was for communities to own their problem and solve it themselves too. Regular participatory meetings were held with community members and leaders which provided education about financial, health, and social costs-benefits; this assisted in generating constant enthusiasm for social change (Soap stories and toilet tales, 2019). Simultaneously, Sanitation Action Groups (SAG) for each village were created in order to assist households with the technical expertise with respect to toilet building, financial support, and monitoring responsibilities (Soap stories and toilet tales, 2019). Overall, this collective community-led total sanitation methodology led to a 65% increase in adequate latrines amongst households and three quarters of the targeted villages were officially recognized as defecation-free in a period of just 2 months (Soap stories and toilet tales, 2019). Moreover, over the span of the next few years, there was a reduction in diarrheal diseases and lower school absenteeism amongst both boys and girls (Soap stories and toilet tales, 2019). Therefore, it is evident that localized and tailored solutions are effective in achieving higher sanitation amongst communities.

5.2.2. SUPPORTING FUNCTIONS

As seen in multiple on-the-ground development projects, the introduction of WASH facilities is crucial in order to provide more adequate water quality in respect to drinking water, sanitation, and hygiene. These WASH facilities are normally in the form of physical capital such as hand pumps, soap and water, and toilets ("Five Pressing Global Water & Sanitation Challenges", 2019). However, physical infrastructure is only the first step towards more long-term positive change. The presence of supporting functions and institutions is necessary in order to ensure that the targeted community is utilizing the WASH facility in the appropriate manner. Some examples of supporting functions (also mentioned in section 3 of this paper), are

regulations, monitoring mechanisms, and human capital. One key message to understand is the importance and diversity of supporting functions and institutions. The research conducted in the initial design phase of the on-the-ground development project should indicate the type of supporting function implemented.

5.2.3. MAINTENANCE AND CONTROL

In addition to supporting functions, the physical capital that is created within a given community must also be such that its maintenance is easily controlled for. For example, if a hand pump or bore hole is introduced, there must be local individuals within the society who are able to manage, operate, and maintain the physical infrastructure. Without adequate local technical expertise, the long-term positive effects of the WASH facility are limited ("Five Pressing Global Water & Sanitation Challenges", 2019). For example, it was founded that within 20 countries in Africa, 35-40% pumps which were installed to increase water quality and accessibility are currently not in operation due to non-functionality ("Five Pressing Global Water & Sanitation Challenges", 2019). Another long-term study conducted in 4 sub-Saharan countries founded that the functionality of hand-pumps decreases to 75% after just one year of operation ("Five Pressing Global Water & Sanitation Challenges", 2019). Therefore, the given community should be trained with respect to the required knowledge and skills using the appropriate mediums to enhance long-term effects of WASH initiatives.

5.3. ACTIONS TO IMPROVE WATER GOVERNANCE

There are many methods that may be used to address the issues related to water control, access and use in the household. In order for sustainable progress to be made, an integrated SDG approach to water governance is necessary to bring together local community participation in water management (SDG 6.B), women's equal opportunity to participate (SDG 5.5) and the elimination of discrimination (SDG 10.3).

One approach as outlined by Pommells et al (2018) is to work towards "a social shift that ultimately realigns the domestic burden from women, transforming it into a shared responsibility." Culturally, this could be a challenging endeavor since it would alter the entire household system as it is today. The literature by Sorenson et al (2011) highlights that increases in participation of women in planning and decision-making may benefit the health of the community but it could also threaten established structures and roles within the community and household.

Another approach could be to improve accessibility of water within communities using recommendations from section 2 and 3 - this would assist in closing the gender gap in water gathering. According to Baguma et al (2013), access to water in rural regions of Africa has been improved through sources such as boreholes, protected springs, public tap systems and rainwater harvesting. If the water was locally accessible in the community, it would be less of a burden for women and men to participate in gathering. Sharing this responsibility would help to break down the gender barriers related to water access and control which would open up opportunities for women to be more active participants in water management.

An important change would be to empower women in water decision making at a household level and encouraging empowerment and participation for water management within their communities as well. According to Sorenson et al (2011), "women's lack of political representation in many countries in the developing world may be a major obstacle to bringing water infrastructure to the forefront of public expenditure." Since women are intimately familiar with the household water needs, they can bring valuable insights to water management in their local communities. This critical knowledge can be used when planning and implementing new water infrastructure. A study by Pommells et al (2018) outlines that water points "must be developed in a consistent and reliable way; water must be affordable and water points must be local, well regulated, and have clear, community-managed pathways that provide women and

girls with safe passage." Keeping these aspects in mind, sustainable water infrastructure should be designed to meet the social, cultural, economic, and domestic needs of women and girls. If women had a more visible presence in local government or policy creation, then effective policies could be created and practiced. For example, Sorenson et al (2011), highlight an example in India where the gender of the local chief (cultural, social, and political community leader) was associated with the allocation of public goods, and therefore, an investment in drinking water and in roads is higher when women are chiefs.

While it sounds easy enough to integrate women into water governance, it is important to note that there is often hesitation as women are concerned about social stigma and social risks of their participation (Yerian et al, 2014). Therefore, it is important to understand the various social and cultural aspects of the local community to best enhance the ability for women to actively contribute. The study outlined by Yerian et al (2014) highlights the effective use of water management committees to help reduce conflict through mitigation and resolution efforts. Allowing women to participate or be members of the committee helped to increase the voice of women in the committee overall. The involvement of women also led to improved water management efforts. As an example, "projects by women's groups, such as building domestic water tanks and rock catchments systems, enhanced access to domestic water, mitigated conflict between livestock and domestic users, and were viewed favorable, culturally appropriate examples where women could become engaged in water management" (Yerian et al, 2014). Increasing women's involvement helped to reduce conflicts and increase domestic water access. The use of women's groups as a compliment to water management committees was found to be an effective way to engage women in water governance in a culturally acceptable way.

The Case of Uganda

Safe-water shortages, gender perspectives, and related challenges in developing countries (Baguma et al, 2013)

Access to clean water continues to be a challenge for many communities in rural Uganda. Water management is an important factor in water shortages and therefore, this study specifically looks at the influence of gender on this issue in two districts in Uganda. The research was designed to look at the relationship between households that harvest rainwater and dependent variables such as water management performed as female-dominated practices, and independent variables, such as years of water harvesting, family size, tank operation and maintenance, and the presence of local associations.

While access to water in the study regions was found to be inadequate due to insufficient income, water shortages were shown to be reduced by the introduction of water sources such as boreholes, springs, taps and rainwater harvesting (Baguma et al, 2013). The results of the study founded that the role of women in water management increased access to safe water supplies. Successful actions to increase women's participation included "increasing awareness, involving women in advocacy activities and targeting women for water-related peer education activities" (Baguma et al, 2013). The presence of local associations was beneficial as information was more easily shared with groups than individuals and women were encouraged to join water associations to improve their knowledge about water resource management during water shortages. Overall, this study demonstrated important observations about the water management carried out by women with respect to underlying safe-water shortages, gender perspectives, and related challenges in Uganda that can be of great importance to developing countries.

CONCLUSIONS

Water is an essential resource for both men and women. Despite the ample amount of water available in various forms, men and women continue to experience unequal rights to water in the form of access, distribution, collection, and quality. From disproportionate dangers and health risks in fetching water to gender-unique water sanitation needs, women are at a disadvantage in meeting their basic water needs. Although there continues to be investment for improving access and quality of water, specifically in rural communities in sub-Saharan Africa, progress in this area continues to be a challenge. Some studies have shown that improvements to policy reform and local initiatives can lead to positive change as it relates to water and gender equity.

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