AN EX-POST PROGRAM SUSTAINABILITY EVALUATION IN ZIMBABWE: ASSESSING IMPACT CONTINUITY OF CARE'S CHIVI WASH PROJECT FOUR YEARS AFTER IMPLEMENTATION

by

MARIA HINSON TOBIN

(Under the Director of M. Mahmud Khan)

ABSTRACT

According to the World Health Organization and United Nations Children Fund, 2 billion people live without access to safely managed drinking water services, 616 million utilize unimproved sanitation facilities, and 494 million practice open defecation (2021). Water and sanitation are inadequate in less developed nations like Zimbabwe, where 68% have improved sanitation, 29% drink from unimproved water sources, and national open defecation rates exceed 21% (ZIMSTAT & UNICEF, 2019). Consequently, between 2014 and 2017, CARE implemented a water, sanitation, and hygiene (WASH) program in Chivi District, Zimbabwe, leading to enhanced access to sanitation facilities and water service. However, WASH program impacts are often not sustained (Taylor, 2013). This evaluation aimed to assess Chivi WASH Project's (CWP) impact four years later, identify facilitators influencing sustainability, and provide recommendations for future programming and policy. Using a mixed-methods approach, 315 household surveys and 49 semi-structured stakeholder interviews were analyzed under these aims. Data were compared across baseline, endline, and ex-post to determine longitudinal changes in WASH outcomes. Multivariate logistic regression was used to discern factors

associated with latrine use, access to improved drinking water, and handwashing. In 2021, latrine ownership remained high, with 92.7% basic latrine coverage in sampled communities. Some Sanitation Action Groups became inactive, no longer supporting post-trigging activities. Significant determinants of latrine use included head of household gender, access to an improved water source, privacy and safety perceptions. Knowledge of handwashing increased, yet only 34.6% of respondents reported handwashing practice. Access to an improved water source, knowledge, and latrine type were significant handwashing predictors. Despite a decline from 94.0% to 79.4%, access to improved drinking water sources remained high compared to other ex-post evaluations. Most households (81.9%) reported having a Water Point Committee (WPC) managing their water source, while 74.6% are satisfied with their water management. Length and scope of programing, household income source, and presence of a WPC were significant determinants of improved drinking water access. CWP's impact is still significant to date; however, some factors are eroding WASH gains. Corrective action across community, government and NGO stakeholders can mitigate future WASH sustainability challenges using lessons learned from this evaluation.

INDEX WORDS: Sanitation, Water, Hygiene, Handwashing, WASH, Sustainability

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ACRONYMS

BMGF	Bill and Melinda Gates Foundation
BVIP	Blair Ventilated Improved Pit latrine
CWP	Chivi WASH Project
CHC	Community Health Club
DDC	District Development Coordinator
DDF	District Development Fund
DEHO	District Environmental Health Officer
DWSSC	District Water Supply and Sanitation Sub-committee
EHT	Environmental Health Technician
FGD	Focus Group Discussion
GoZ	Government of Zimbabwe
HH	Household
LM	Latrine Mason
NGO	Non-Governmental Organization
OD	Open Defecation
ODF	Open Defecation Free
PHHE	Participatory Health and Hygiene Education
SAG	Sanitation Action Group
SaFPHHE	Sanitation Focused Health and Hygiene Education
VHW	Village Health Worker

VPM	Village Pump Mechanic
WASH	Water, Sanitation, and Hygiene
WPC	WPC
WWSSC	Ward Water Supply and Sanitation Sub-Committee

CHAPTER 1

INTRODUCTION

Problem Statement

The lack of adequate WASH infrastructure and services perpetuates the spread of disease. This public health issue is deeply rooted in poverty and insufficient provisioning of water and sanitation by government institutions. Universal provision of transformational infrastructure like piped water and sewage collection networks is too costly in some areas, especially low and middle-income countries (Whittington et al., 2020). The resulting implications and disease burden present a significant challenge for government institutions and key stakeholders that seek to realize change. Given these challenges, innovative solutions have been adopted to expand water and sanitation systems coverage and eliminate open defecation (OD) and other harmful WASH behaviors using community-based approaches. However, there is a paucity of evidence on WASH interventions' impact continuity and sustainability.

WASH sustainability is complex and challenging to measure, with mixed evidence of impact after a program has concluded and external actors exit from beneficiary communities (Taylor, 2013). Until recently, ex-post evaluations were not often funded, making it difficult for WASH program and policy stakeholders to effectively learn, contextualize, and adapt interventions to ensure sustainability. Despite decades of evidence demonstrating WASH intervention effectiveness, some studies by development organizations, academic, and

government institutions highlight sustainability challenges over time, with program impacts and effects diminishing following program closure (Taylor, 2013).

More recently, the United States Agency for International Development (USAID) commissioned its WASH Ex-Post Evaluation Series, six ex-post-program evaluations across sizable integrated WASH projects supported by the agency spanning Madagascar, Indonesia, Ethiopia, India, Senegal, and Mozambique. The results of this evaluation series are consistent with the literature; regardless of significant WASH advancements and achievements during USAID programming, many impacts were not sustained in the long term. The series cites reductions in basic latrine ownership, discontinuation of handwashing practices, and communities engaging again in OD despite being triggered with CLTS and certified as open defecation free (ODF) (USAID, 2020).

Similarly, in Zimbabwe, where only 68% of the population has access to improved sanitation, OD rates exceed 21%, and nearly 29% of people drink from unimproved water sources, significant WASH investment and intervention have been led by the donor and international community (ZIMSTAT & UNICEF, 2019). However, after millions in investment and more than a decade of external support, evidence suggests the outcomes of these efforts are often not sustained over time. Some post-project sustainability research in Zimbabwe shows numerous water points falling into disrepair after stakeholders exit and handover maintenance and governance to community-managed structures (Hoko & Hertle, 2006; Madziyauswa, 2018). Evidence also points to attenuated adherence to sanitation and hygiene practices enshrined in WASH promotion activities (Hoko & Hertle, 2006; Madziyauswa, 2018).

This ex-post evaluation aims to build on WASH program sustainability literature by evaluating the state, functionality, reliability, and management of WASH infrastructure,

effectiveness of WASH governance structures, levels of sustained behavior change, and factors that influenced sustainability in CWP intervention areas four years after the program ended (Hoko & Hertle, 2006; Katsi et al., 2007; Taylor, 2013; Madziyauswa, 2018; Mosler et al., 2018; Abebe & Tucho, 2020; USAID, 2020; Whittington et al., 2020). It seeks to deepen CARE's understanding of the relationship between its integrated approach and post-project sustainability outcomes. This evaluation will add to the growing body of ex-post-program studies and illuminate practical lessons learned and recommendations, informing future WASH programming and policy while enhancing project outcome sustainability.

Background

The lack of proper infrastructure to control human waste and wastewater is a significant contributor to numerous outcomes of public health concern. WASH inadequacies and OD facilitate the spread of diarrheal disease, undernutrition, childhood stunting, and other water-borne illness unique to impoverished communities in the global south (Andersson et al., 2016; Bartram & Cairncross, 2010; Dickin et al., 2017; Prüss-Ustün et al., 2014; Walker et al., 2013). Nearly 700 children under five die daily from diarrheal disease due to inadequate WASH (UNICEF, n.d.). The public health implications of poor water and sanitation also disproportionately impact women and girls. For example, lack of access to safe and functional sanitation facilities in these environments increases the risk of violence and psychosocial stress among women and girls (Dickin et al., 2017; Kwiringira et al., 2014; Mara, 2017; Sahoo et al., 2015).

In Zimbabwe, economic crises between 2000-and 2009 profoundly impacted its capacity to address WASH challenges in-country. Lack of investment, in particular, limited advancement toward national goals pertaining to safe water and sanitation access (UNICEF, n.d.). According

to Ahmad et al. (2017), the economic downturn resulted in the limited capacity of government stakeholders to manage aging water and sanitation infrastructure and expand WASH services. Between the mid-1990s and 2015, water supply and sanitation infrastructure and services declined, negatively "affecting all parts of the country and all aspects of water supply and sanitation services provision, and water resources management and development. This has had a significant impact on the quality and reliability of services" (Ahmad et al., 2017, p. 1).

The ramifications of this economic crisis and the deterioration of WASH services had significant public health implications. The related 2008-2009 cholera outbreak in Zimbabwe resulted in over 4,200 lives lost and more than 98,000 cases (Ahmad et al., 2017). Substantial multi-million-dollar investments were allocated to the WASH sector by the NGO and broader donor community to address the mounting WASH challenges following the 2000s economic downturn. One of these projects was the CWP – the focus of this ex-post-program evaluation.

Chivi District Profile

Figure 1. Map of Chivi District within the Masvingo Province, Zimbabwe (Chitsika, 2016; Madziyauswa, 2018; Raphael, 2013).

Chivi District is a rural area of Zimbabwe situated within Masvingo province. Its harsh climate and terrain, characterized as semi-arid, mountainous, with poor soil quality, rocky and sandy soil types, is subject to unpredictable rainfall, drought, and lack of access to safe water (Chitsika, 2016; Madziyauswa, 2018; Raphael, 2013) (Figure 1). As a result, the population lives in a profound state of poverty, with many relying on communal farming as a primary livelihood (Madziyauswa, 2018; Mudzonga, 2002). Despite the unique needs of Chivi, it was the only district within Masvingo province not part of a $62 million four-year (2012-2016) Rural Wash Program led by the Government of the United Kingdom, the Swiss Agency for Development Cooperation, and UNICEF. Given this coverage gap and its WASH needs, CARE Zimbabwe and district stakeholders selected Chivi to implement what is now known as the CWP.

CARE's Chivi WASH Project (CWP) in Zimbabwe

In response to WASH inadequacies in Zimbabwe, CARE implemented a project across 230 villages in 10 wards (population size of 10,303 households, 51,923 people) located in Chivi North District between 2014 and 2017. The project's goal was to have sustainable and equitable access to water and sanitation service for all, specifically women and girls. It sought to increase equitable and sustainable access to and use of safe drinking water, improve sanitation, and increase the practice of hygienic behaviors among the rural population of Chivi. Interventions were community-based, with Sanitation Focused Participatory Health and Hygiene Education (SaFPHHE), WASH governance, systems strengthening, gender equality, and women's empowerment at the center of its overall approach (Table 1). CWP incorporated essential program components and stakeholder engagement required for maximizing WASH program outcomes and sustainability. The theoretical framework below outlines CWP's goals,

approaches, and the linkages between its interventions and expected outcomes (Figure 2). Chapter Two of this evaluation outlines additional details regarding the project's approaches.

While the project was implemented by CARE via field officers and CWP management, interventions were also delivered in partnership with the District Water Supply and Sanitation Sub-Committee (DWSCC), comprised of government ministries with a stake in WASH. At the ward level, government extension workers and CWP staff comprising the Ward Water Supply and Sanitation Sub-Committee (WWSSC) brought the project interventions to the 230 villages (CARE, 2017). Different community groups led the various WASH services and project interventions. The triggering process whereby community-based methods are employed to support community members understand the level of OD in their environment, and its harmful impact on their health, was led by the WWSSC. However, the follow-up awareness-raising activities were charged to the Sanitation Action Groups (SAGs), comprised of volunteers or community members nominated by the community (Whittington et al., 2020).

The SAGs then led supervision and oversight of sanitation activities within their respective communities. It is important to note that community members trained on latrine construction implemented sanitation hardware, a key element of the SaFPHHE approach (CARE, 2017). Regarding water service management, Water Point Committees (WPCs), also comprising community members, played a leading role in overseeing and facilitating borehole maintenance and repairs. Repairs were performed under the technical expertise of project-trained entrepreneurs/artisans called Village Pump Mechanics (VPMs) (CARE, 2017). Major repairs and other needs were addressed in coordination with the local authority, the District Development Fund (DDF). Water service management employed a systems approach, linking the WPC to service providers, government authorities, and a tariff system.

It is important to note that the initial project launch and activities only included five wards (2,4,5,6 and 7). More funding eventually became available, and the project was expanded to support an additional five wards (1,3,8,10 and 15) (CARE, 2017). While the thematic areas supported across these "old" and "new" wards were the same, the scope of water-related activities did vary slightly. Notably, drilling of new boreholes was only performed in the initial five "old" wards due to limited funding. The later introduced "new" wards did not receive this intervention, however, some existing boreholes in these localities were rehabilitated and repaired (CARE, 2017)

Table 1. Chivi WASH Project detailed interventions and outputs.

Objective	Intervention	Output
Sanitation & Hygiene: 1) Increase sanitation coverage in schools and communities 2) Motivate communities to achieve ODF status	• Community-led Total Sanitation • Train extension workers and ward-level project facilitators on Sanitation Focused Participatory Health and Hygiene Education. These extension workers were responsible for implementing the Community-led Total Sanitation approach and triggering all 230 villages. • After triggering, formation and training of Sanitation Action Groups to facilitate sanitation and hygiene awareness/promotion activities at the village level and create Community Health Clubs. These clubs constituted volunteers who further provided WASH information to community members and pooled resources to assist with the establishment of household sanitation infrastructure.	• Triggered all 230 project villages across 10 Wards. • 133 villages achieved open defecation status certified by the district by the project endline evaluation. • Trained 66 extension workers and ward-level facilitators on Sanitation Focused Participatory Health and Hygiene Education (39 men, 27 women). • 230 Sanitation Action Groups formed and strengthened through CARE technical support and training (483 men, 1,127 women). • Sanitation Action Groups supported the establishment of 65 Community Health Clubs (72 men, 1,758 women). • Provided 1,650 community members with technical assistance and/or subsidies (cement and wire) for self-built latrines[1]. • Healthy hand hygiene and basic sanitation promotion activities

[1] Subsidies were only given to a few vulnerable households, selected by the villages, with the rest expected to use own resources for latrine construction.

		reached 46,227 people (8,783 men, 9,708 women, 14,330 girls, and 13,406 boys).
Water Service: Increase access to safe water services for schools and communities	• Construction and rehabilitation of boreholes in 10 wards of Chivi District. • Test water quality on both new and rehabilitated/repaired water points.	• Drilled 21 new boreholes. • Rehabilitated/repaired 161 water points. • Tested water quality on all 21 new boreholes and 161 rehabilitated/repaired water points. • Provided access to safe water for 50,377 people (7,978 men, 10,668 women, 16,693 girls, and 15,038 boys).
WASH Capacity & Governance	• Establish WASH committees to ensure communities and institutions are responsive to WASH needs, especially those of women and girls. • Establish and/or support Water Point Committees responsible for maintaining community water points. • Capacity building of local artisans, like Village Pump Mechanics and Latrine Masons. These artisans were trained to provide privatized construction and maintenance services for boreholes and latrines to communities.	• Established/strengthened 475 WASH committees (998 men, 2,327 women). • Established 22 new Water Point Committees and supported 184 existing Water Point Committees. • Trained 29 Village Pump Mechanics (13 men, 16 women). • Trained 80 latrine builders (33 men, 47 women).
Gender Equality/Women's Empowerment: 1. Create space for women to participate fully on community Water Point Committees and Sanitation Action Groups. 2. Increase capacity of local government committees in understanding the importance of gender considerations and intentional inclusion in WASH interventions.	• Train and empower women to repair water pumps and build latrines. • Led discussions and activities which highlight and challenge inequitable power dynamics existing between men and women.	• 70% of Sanitation Action Groups were constituted by women. • 96% of Community Health Clubs members were women. • At least 70% of Water Point Committees consisted of women. • 55% of VPMs and 58% of latrine builders trained were women.

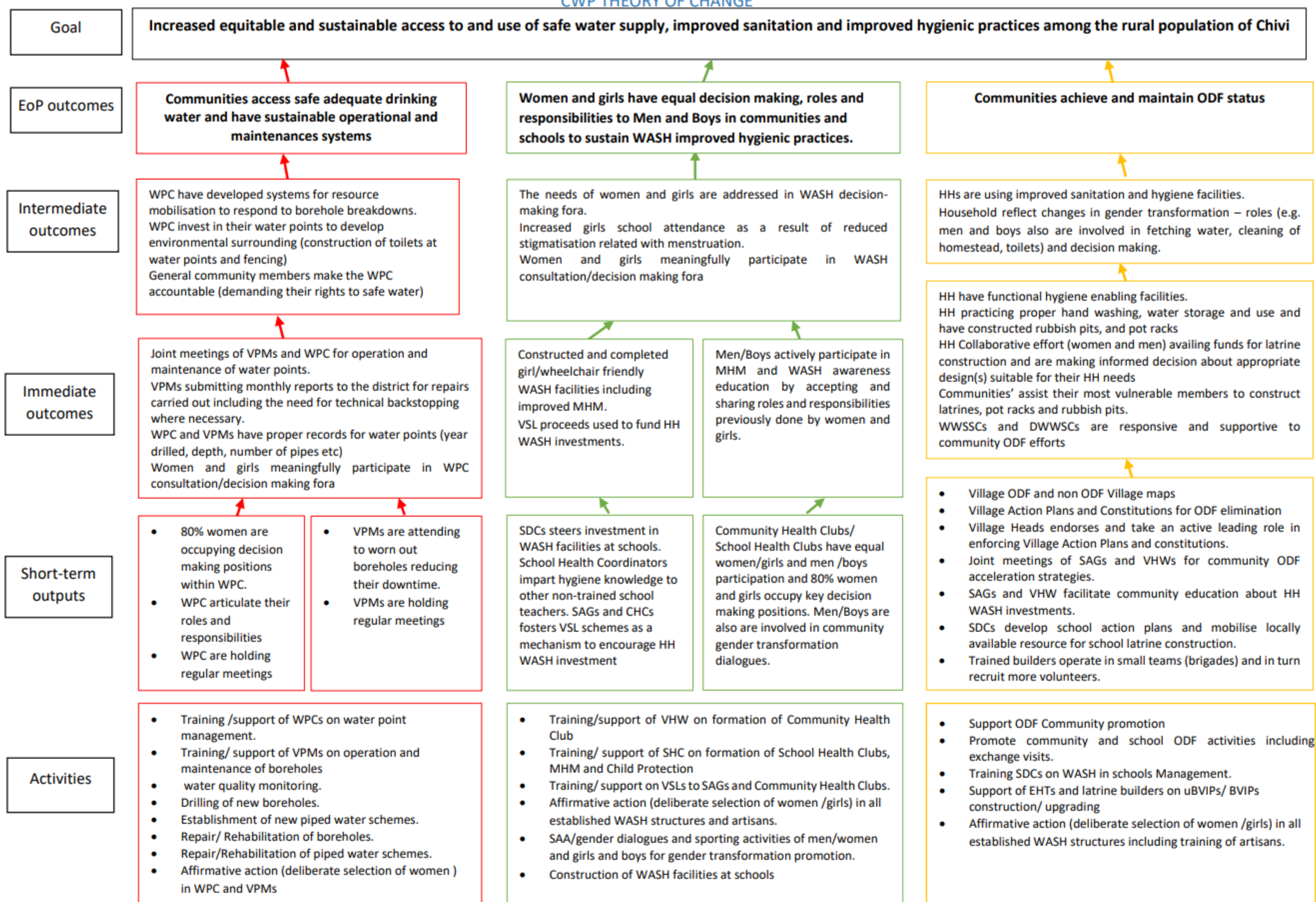


Figure 2. Chivi WASH Project theoretical framework (CARE, 2014).

CWP Impact Evaluation (2017)

CWP (2014-2017) successfully achieved or exceeded the project's objectives and targets. First, CWP created a significant impact across the water and sanitation domains. As a result of the triggered process via SaFPHHE, there was about a 40% decrease in households (HHs) reporting OD and almost a 48% increase in HHs reporting having a toilet. In 2017, the CWP final impact evaluation found that 133 villages supported by the project had been ODF certified (58% of the total villages triggered), while a follow-up assessment by government officials later that year cited 170 project villages as ODF certified (74% of the total villages triggered) (CARE, 2017).

In addition, the evaluation found about a 25% increase in HHs reporting access to drinking water from an improved source. The evaluation also showed more than 40,000 people were provided access to sanitation facilities, both self-built and subsidized facilities, as a part of the project. While the project provided subsidies in the form of construction materials like cement, only a few of the most vulnerable HHs received this intervention, with most expected to construct the latrines using their own resources. The final program evaluation also cited women making up 70% of SAGs which facilitated the implementation of sanitation and hygiene programs in their villages – an indication that the program's gender equality approaches successfully drove greater representation of women in community-led WASH efforts (CARE, 2017).

Lastly, the project facilitated behavior change across the population, with nearly 77% increase in survey respondents demonstrating correct handwashing methods during the five critical handwashing times promoted by the project. These times include after using the toilet, after attending to a child who has defecated, before preparing food, before feeding a child, and

before eating (Table 2). There were also improvements in water storage, with an 83% increase in HHs reporting safe water storage methods like using lids or covers to create physical barriers to water contamination. These combined results ultimately led to outstanding health outcomes, including a 22% reduction in point-prevalence of diarrhea reported by HHs over the last seven days (CARE, 2017).

Evaluation Purpose, Rationale, & Significance

As demonstrated by the results of the final impact evaluation, CWP contributed to substantial WASH-related impacts and behavior changes within Chivi District. According to project documents, government stakeholders from all levels—including national, ward, district, and village—were actively involved in the project, from intervention design to implementation, monitoring, and evaluation. CARE (2017) cites the participation of community members from all backgrounds and resource levels as vital to increasing project understanding, acceptance, and awareness of the individual and communal benefits of improving WASH practices and infrastructure. However, despite these notable project impacts, one of the recommendations stemming from the final impact evaluation report is the need for ex-post evaluation to understand better what structures, interventions, processes, and behaviors are sustained in the long term.

For instance, while the CLTS method (a significant part of SaFPHHE in Zimbabwe) and broader WASH efforts have demonstrated success in some contexts, several reports indicate a tendency for villages to revert to OD, with slippage rates in Africa between 9-31% (Abebe & Tucho, 2020). At the same time, infrastructure such as latrines and water points sometime fall into disrepair. The literature cites several challenges to latrine maintenance and continued use, including quality of latrine construction, flooding and sandy soil, accessibility and affordability

of materials and labor, availability of water, and limited capacity, resources, and knowledge on latrine repair and maintenance (Mosler et al., 2018; Whittington et al., 2020).

For water points, sustainability research shows that communities and respective community-based water management bodies often do not entirely understand the level of efforts, finances, and other requirements necessary to ensure water service sustainability (Harvey & Reed, 2003). Furthermore, affordability and procurement of spare parts for handpumps also influence water service sustainability (Harvey & Reed, 2003). These combined factors play a significant role in shaping water service sustainability. As a result, community-managed water supply facilities often fall into disrepair after external stakeholders have exited the community and once the pumps require maintenance or repair (Harvey & Reed, 2003).

This evaluation assesses the sustainability of CWP's impacts more than four years after the program's end. It aims to understand to what extent behavior change, WASH infrastructure, gender, and governance structures, have been sustained. These evaluation findings are essential for advancing understanding of WASH program sustainability and increasing the quality of WASH programs. The evaluation scope and questions align with UNICEF's WASH sustainability framework. This evaluation uses this as a guiding framework across its design and analysis due to its comprehensive guidance on sustainability assessment and measurement across integrated WASH programing.

Evaluation Objectives

This evaluation assesses two overarching objectives: understanding the sustainability of sanitation coverage and improved water service in CWP villages more than four years after the program's end. It evaluates the sustainability of these interventions at three levels:

- Users/consumers at the village or community level (water); HH facilities (sanitation); family/HHpractices (hygiene).
- Operation and management level (water); village-level artisans/entrepreneurs and institutions (sanitation); village-level culture, institutions, and water system (hygiene).
- Governing and contracting level also referred to as the Water Service Authority (water); district support (sanitation); district advocacy, and support institutions (hygiene)[2].

The CWP sustainability evaluation aims to answer evaluation questions spanning three pillars: 1) sanitation and hygiene, 2) water, and 3) WASH capacity, integration, COVID-19, and gender. Beyond its objectives of assessing sustained project impacts, this evaluation seeks to understand the effectiveness of CWP approaches as drivers of sustainability. It aims to identify 1) the level of sustained water point and sanitation infrastructure functionality, reliability, and use and 2) the factors that influence WASH sustainability.

Definition of Terms

Sustainability in this evaluation concerns ex-post program outcomes and "whether the effects of the program continue beyond the period of donor input… [it concerns] the adaptive capacity of a given WASH system to cater for the needs of its target beneficiaries" (Taylor, 2013, p. 4). Regarding WASH infrastructure specifically, including latrines, boreholes, and other hardware, this evaluation looks at social sustainability; this is defined as the social systems and

[2] CWP worked closely with the District Development Fund and other district stakeholders to ensure continued support for project supported infrastructure and needs post-project. The evaluation assessed the extent to which these government supports provided needed services, resources, and support necessary to ensure WASH sustainability.

supports that facilitate the continued maintenance and use of WASH infrastructure (Kaminsky, 2014). This evaluation examines the reliability and functionality of WASH infrastructure as well. For water points, reliability is defined as continuity of water supply – the extent to which facilities consistently provide water without interruption, regardless of seasonal effects and other impacts. In this evaluation, functionality for both HH latrines and water points refers to technical/operational functionality. Regarding water points, functionality is often defined as "working and protected" instead of being "completely broken or abandoned." However, it is not consistently defined nor measured using common metrics in the literature (Tincani et al., 2015, p. 47). Concerning latrines, functionality is defined as hygienically safe sanitation facilities, maintaining effective separation of human excreta from human contact (Jenkins et al., 2014).

CHAPTER 2

LITERATURE REVIEW

Brief History of WASH & Public Health

Infectious disease has presented notables obstacles for humans globally. Despite addressing WASH challenges for millennia, a significant turning point in human understanding of waterborne disease and public health occurred in 19th century London. At the time, widespread industrialization, and rapid population growth, coupled with inadequate housing conditions, overcrowding, and a lack of proper public water and sanitation systems, led to numerous public health challenges (Tulchinsky, 2018). For instance, limited understanding of safe waste-water disposal led to sewage being flushed and drained directly into the Thames River (Tulchinsky, 2018). The Thames ultimately became one giant sewer, leading to the spread of water-borne diseases, including "cholera, dysentery, tuberculosis, typhoid fever, influenza, yellow fever, and malaria, and other infectious diseases" (Tulchinsky, 2018, p. 79).

By the mid-1800s, numerous cholera outbreaks swept through London, leading to increasing theoretical research surroundings the cause. Louis Pasteur's infamous Germ Theory rose to the forefront of science in 1857. Eventually, it became the basis of explanation for infectious disease, recognizing the effect of "germs" or pathogens in spreading infectious disease (Berch, 2012). In contrast, the Miasma Theory postulated that the cause of cholera was airborne, specifically the "transmission of poisonous vapors from foil smells due to poor sanitation," was more widely accepted at the time (Tulchinsky, 2018, p. 80). It was only until Robert Koch's

research on bacteria as a cause for disease was scientifically proven; while the Germ Theory preceded this research, Koch's 1876 publication on anthrax bacillus was arguably the first to demonstrate a linkage between specific a bacterium and disease (Blevins & Bronze, 2010).

Now commonly regarded as the "founding father of modern epidemiology," an English physician named John Snow began investigating the cause of the London outbreaks. Tulchinsky (2018) cited Snow's skepticism of the then prevailing Miasma Theory and theorized that contaminated water was the primary pathway of cholera transmission – a theory inspired by the widely argued and then unproven Germ Theory. After an outbreak in Soho, London, a district mainly characterized by severe overcrowding, poor housing conditions, and improper sanitation systems, Snow began working with Soho residents to map out cholera-related deaths in the areas (Begum, 2016).

After Snow's mapping exercise, he found a trend in the mortality data that would have lasting effects on public health and WASH. Most of the reported cholera deaths in Soho were clustered around a water pump on Broad Street, supporting his theory that the cause of cholera was water-borne (Begum, 2016). Snow presented the reported pattern of disease to local authorities and ultimately convinced council members to remove the water pump handle to mitigate further spread of disease (Begum, 2016). This moment in public health history is significant as it was influential in shaping epidemiology and knowledge surrounding the construction of improved sanitation facilities, water-borne disease, and waste-water disposal and management.

Following Snow's monumental epidemiological breakthrough was the roll-out of improved water supply systems in England in 1897, followed by Chicago, New Jersey, and Jersey City in 1915, with other cities following suit thereafter (Tulchinsky, 2018). These water

systems were some of the first to utilize chlorination as a water treatment in their water supply (Tulchinsky, 2018). Sanitation practices and policies were also transformed during the late nineteenth and early twentieth century. Once fecal contamination of water was found to cause disease, developing nations began investing in more advanced public sewer lines that separated sewage from the water supply. These systems more effectively disposed of sewage, thus significantly reducing the spread and death from water-borne diseases (Troesken, 2004).

This transformation had enormous impacts on public health outcomes, with broad declines in waterborne disease mortality. Tulchinsky (2018) quantified the impact of clean water provision in the early to mid-twentieth century, suggesting that "clean water was responsible for nearly half the total mortality reduction in major cities, three-quarters of the infant mortality reduction, and nearly two-thirds of child mortality reduction" (p. 83). While significant public health advancements were achieved in water quality, supply, and public sanitation systems in more affluent parts of Europe and the United States, improvements were not implemented consistently across populations. Today, there remain jarring disparities in WASH service and infrastructure across rural and developing geographies worldwide.

2021 Global WASH Landscape & Progress Against the Sustainable Development Goals

To address WASH inequities spanning the globe, world leaders coalesced around joint commitments articulated as the Sustainable Development Goals (SDGs). Of the seventeen goals established, goal six aims to ensure access to water and sanitation for all by 2030. Targets under goal six include but are not limited to 1) "universal and equitable access to safe and affordable drinking water for all," 2) "access to adequate and equitable sanitation and hygiene for all and end OD, paying special attention to the needs of women and girls and those in vulnerable

situations," and 3) "support and strengthen the participation of local communities in improving water and sanitation management" (United Nations, n.d., Goal 6 targets, para. 1-8). Despite ambitious goals and progress around safe drinking water and access to basic sanitation enshrined within the 2030 SDGs, challenges in the sector continue to limit advancement.

A jointly commissioned report by the UNICEF and WHO (2021) shows a substantial proportion of the global population continues to live without access to safely managed drinking water services, nearly 2 billion people. Of those, 122 million access their drinking water from surface water like ponds, streams, and lakes. According to the report, "eight out of ten people who still lacked even basic services lived in rural areas. Around half of them in least developed countries" (UNICEF & WHO, 2021, p. 8). At the same time, about half of the global population – 3.6 billion people – lack safely managed sanitation services, with 616 million utilizing unimproved sanitation facilities and 494 million continuing to practice OD (UNICEF & WHO, 2021, p. 9). Like water supply, sanitation access disparities are particularly stark across rural populations. For instance, two-thirds of the estimated individuals without safely managed sanitation services reside in rural areas, and nearly half live in sub-Saharan Africa (UNICEF & WHO, p. 9). Similarly, the literature suggests that most OD is attributed to populations living in rural areas. According to the report, "92% of the population practicing open defecation lived in rural areas" (p. 9)

Hand hygiene also remains a public health issue, with about one in three individuals – 2.3 billion people – lacking basic handwashing facilities with water and soap in their homes (UNICEF & WHO, 2021). Of those, nearly 670 million have no handwashing facilities at all (UNICEF & WHO, 2021, p. 10). Regarding menstrual health and WASH, the report cites that "a significant proportion of women and girls do not have the services they need for menstrual

health. There are often substantial disparities between population sub-groups, particularly between sub-national regions and for women and girls with and without disabilities" (UNICEF & WHO, 2021, p. 11).

After five years of progress against the SDGs, the COVID-19 pandemic has disrupted decades of momentum toward ensuring equitable and universal access to drinking water, improved sanitation facilities, and services. In addition to the consequences of the ongoing economic recession, government actions to curtail the pandemic have resulted in WASH service provision and financing disruptions (UNICEF & WHO, 2021). Global pandemic response efforts, including those by international NGOs and institutions, have focused on hand hygiene promotion and infection prevention and control, providing additional emergency financial support to maintain the continuity of WASH services to at-risk communities (UNICEF & WHO, 2021). However, the effect of these initiatives and investments has yet to be quantified broadly (UNICEF & WHO, 2021).

The State of WASH in Zimbabwe

Water

According to the latest Zimbabwe MICS report commissioned by the Zimbabwe National Statistics Agency (ZIMSTAT) and UNICEF (2019), approximately 29.1% of the population is using unimproved sources of drinking water (e.g., unprotected wells, unprotected springs, and surface water), 2.8% in urban areas and 32.1% in rural areas. The percentage of HHs in Zimbabwe reporting improved drinking water is positively associated with wealth. The lowest wealth quintile reports the smallest percentage (50.7%), and the highest wealth quintile reporting the largest percentage (99.2%). Quality of drinking water is also problematic, with 83.7% of HHs having E. coli in their drinking water; this figure reaches as high as 93.8% in rural populations.

Water treatment is low across the board, with only 9.9% of HH using an appropriate water treatment method (6.8% in rural areas). Lastly, only 10.2% of HHs have safely managed drinking water services, with only 2.5% in rural areas. These services are defined as "drinking water free from faecal contamination, available when needed, and accessible on premises, for users of improved drinking water sources" (ZIMSTAT & UNICEF, 2019).

Hand & Menstrual Hygiene

The Zimbabwe MICS report cites disparities in access to basic handwashing facilities with available water and soap. Observational data shows that 64.2% of HH members had a handwashing facility where water and soap were present (ZIMSTAT & UNICEF, 2019). However, there was a nearly 25% difference between urban and rural populations, 74% compared to 59.8%. Similarly, there was a positive correlation between the education of the HH head and the presence of handwashing facilities with soap and water on-premises. The percentage of HHs with a handwashing facility equipped with water and soap increased as the education level of HH heads increased, 47.4% among the least educated heads of HH compared to 82.6% among the highest educated heads of HH. There was a similar correlation across wealth indices; handwashing facilities with soap and water on premises were reported in higher proportions as wealth increased, 47.6% among the poorest health quintile and 78.5% among the richest (ZIMSTAT & UNICEF, 2019).

Menstrual hygiene management and harmful social norms continue to present challenges in Zimbabwe as well. While the Zimbabwe MICS report shows a majority of respondents (women aged 15-49) using appropriate menstrual hygiene materials and having a private place to wash and change while at home, social norms may continue to prevent women of reproductive age from participating in social activities, going to school, and generating income during their

menstrual cycles. About one in six women and girls (16.3%) reported not being able to participate in social activities, school or work due to their last menstruation in the previous 12 months (ZIMSTAT & UNICEF, 2019). Among adolescent girls ages 15-19, the percentage was even higher – one in five or 21.8%. Women and girls from the poorest wealth index quintile and with the lowest educational attainment also reported the highest levels of social exclusion, 18.1% and 26.1%, respectively (ZIMSTAT & UNICEF, 2019).

Sanitation

The use of improved sanitation facilities that effectively separate human excreta from human contact (e.g., piped sewer systems, septic tanks, pit latrines, and composting toilets) remains low, especially in rural areas. The Zimbabwe MICS report shows 68.8% of HHs use improved sanitation, 98.4% in urban areas, and 55.2% in rural areas (ZIMSTAT & UNICEF, 2019). This stark difference between urban and rural use of improved sanitation is one of the motivators behind external WASH interventions like the CWP. In fact, the province where Chivi District is located, Masvingo, has the second-lowest reported use of improved sanitation across all of Zimbabwe (55.9%). Like other metrics captured in the report, there was a positive correlation between improved sanitation, education of head of HH, and wealth, with improved sanitation increasing with higher educational attainment and wealth (ZIMSTAT & UNICEF, 2019).

The report cites 21.7% of HHs engaging in OD, 0.7% in urban areas, and 31.3% in rural areas (ZIMSTAT & UNICEF, 2019). In Masvingo province, levels of OD were the second highest across the country, with more than one in three HHs practicing OD (37.0%). There was a negative correlation between OD, education of head of HH, and wealth, with the percentage of HHs practicing OD decreasing with higher educational attainment and wealth. For instance, zero

HHs in the richest wealth index reported practicing OD, compared to 64.7% in the poorest wealth index. Similarly, only 2.6% of HHs with the highest educated heads reported practicing OD, compared to 41.7% of HHs with the least educated heads (ZIMSTAT & UNICEF, 2019).

WASH Interventions, Approaches, & Sustainability

To address the growing WASH challenges following the Zimbabwean 2000s economic crisis, significant investments were made across the WASH sector, including in CWP. In rural settings such as Chivi, hygiene promotion, provision, rehabilitation, promotion of low-cost WASH technologies, and systems strengthening are critical approaches for improving WASH and reducing water-borne disease in resource-poor areas (Dreibelbis et al., 2013, p. 2). Based on the district's needs, CWP employed an integrated approach, including numerous traditional and evidence-based interventions. Program interventions and principles central to CWP included:

- SaFPHHE (in which CLTS methodology was incorporated)
    - Establishment and training of SAGs and CHCs
- Construction and rehabilitation of boreholes
    - Establishment and training of WASH committees and WPCs
- Capacity building and entrepreneurship training around borehole/latrine maintenance and repair
    - Training of Village Pump Mechanics (VPMs) and Latrine Masons (LMs)

Women's empowerment and gender equality were cross-cutting principles throughout CWP implementation, consistent with CARE's mission and program framework.

Community-Led Total Sanitation (CLTS), SaFPHHE, & SAGs

While government institutions and intervention can deliver robust solutions to collective action problems, evidence suggests that institutional intervention (e.g., the provision of water and

sanitation infrastructure or latrine subsidies) is not always an effective solution to OD. Research shows that the availability and accessibility of toilets and sanitation infrastructure do not guarantee use (Devine, 2009; Dickin et al., 2017). For example, historical intervention by governments and NGOs, including the provision of free or subsidized latrines for individual HHs, yielded unsatisfactory outcomes broadly, including low usage of those facilities and lack of sustained behavior change, with OD and the cycle of fecal-oral contamination continuing to spread (Dickin et al., 2017). Based on this learning, public health practitioners in the WASH sector and government institutions have increasingly focused their efforts on behavior change strategies and interventions, including education campaigns, awareness building, and low-cost community-led approaches to address the issue of OD (Dickin et al., 2017). Practitioners developed a participatory approach, CLTS, that engages communities to act and lead the process to eliminate OD in their respective communities.

CLTS is a community-led approach to eliminating OD in underserved rural communities (Kar & Chambers, 2008). Developed in 1999 by Dr. Kamal Kar, CLTS has been adopted and implemented by local, national, and international NGOs for decades (Kar & Chambers, 2008). Implemented in three unique stages, designated CLTS facilitators from within and outside the community work alongside community members to assess their sanitation practices via participatory methodologies like community mapping and transect walks (Kar & Chambers, 2008). During community-led appraisal and analysis processes, communities come to realize and understand fecal-oral pathways within the community – that through OD and lack of separation of human excreta from water systems and human contact, community members are exposed to and consuming human feces (Kar & Chambers, 2008). These community-based methods strive to "stimulate collective behavior change, using triggers such as disgust and shame, with the aim

of ending unhealthy open defecation practices at a community-scale" (Dickin et al., 2017, p. 119; Kamal & Chambers, 2008). This process sparks motivation to find local solutions, such as building latrines with locally available materials, toward eliminating OD at a community level while also changing social norms in a way that stigmatizes OD (Whittington et al., 2020).

Despite its widespread adoption across the WASH sector, there is mixed evidence regarding its impact on health outcomes and effectiveness broadly. For example, a 2020 evaluation of a CLTS program implemented in Uganda shows positive effects of CLTS on improving sanitation and hygiene knowledge which has been linked to increased adoption of recommended sanitation and hygiene practices (Okolimong et al., 2020). In this Okolimong et al. (2020) study, a multivariate analysis underlined an association between the achievement of ODF status in some communities and the implementation of the CLTS approach. Furthermore, a systematic review of CLTS randomized controlled trials (RCT) found that CLTS effectively triggered community-led latrine construction in communities receiving the intervention (Whittington et al., 2020). However, while Whittington et al. (2020) noted a causal link between community-led latrine construction and CLTS implementation published across the CLTS RCT literature, OD was widely reported as modestly reduced rather than eliminated – the target outcome of the approach.

Lastly, while a few studies report statistically significant improvements in health outcomes, including decreases in childhood diarrhea, published CLTS impacts on other health outcomes like anemia and helminthic infections show no significant results (Whittington et al., 2020). Explanations for its limited impact on health outcomes include 1) implementation challenges like lack of participation in community triggering activities, 2) inconsistent coverage of the intervention across villages/communities, 3) quality of latrine construction led by

community members due to lack of capacity and financial resources, and 4) continued exposure to pathogens due to continued OD, despite small or moderate reductions (Whittington et al., 2020).

With that said, current research suggests CLTS can enhance communities' ability to self-organize and drive collective action to improve sanitation by facilitating latrine construction and increasing the adoption of practices supportive of OD elimination (Institute of Development Studies, 2015; Okolimong et al., 2020; Pickering et al., 2015). This demonstrates some level of effectiveness in facilitating behavior change and community mobilization around a public good. However, latrine infrastructure and use are often not sustained, with many CLTS-triggered localities sliding back into OD once external stakeholders like NGOs exit. According to Mosler et al. (2018), "It is not uncommon for people who were using latrines to abandon damaged, collapsed, and full pit latrines and return to open defecation" following years of CLTS and program implementation (para. 4). For instance, a sustainability study commissioned by UK Aid and Australian Aid found that 92% of 4,960 HHs sampled had reverted to practicing OD after the conclusion of WASH interventions implemented by Plan International (Tyndale-Biscoe et al., 2013). Reported motivators of maintaining ODF status included health, shame, disgust, pride, privacy, security, convenience, and comfort. In contrast, demotivators included financial constraints, no more support, inconvenience, discomfort, maintenance, repairs, and sharing with others (Tyndale-Biscoe et al., 2013). Other research cites environmental conditions like flooding, sandy soil, level of education, lack of social cohesion, availability of land, materials, and labor, affordability, availability of water, quality of initial construction, and limited capacity, resources, or knowledge on latrine repair and maintenance as key factors linked to discontinued use of latrines (Mosler et al., 2018). A Lancet publication by Humphrey (2019) cites the "requirement

for high user adherence to consistent sustained behavior change" as a limiting factor for rural WASH intervention efficacy. Like the evaluations above, Humphrey discusses WASH intervention impacts during implementation and lack of adherence to behavior change promoted by WASH promotion projects after the projects ended. The author suggests that behavior change is often not sustained because of the high levels of user effort, time, and compromise required.

Using evidence across community-based approaches, including CLTS, Zimbabwe developed a unique demand-led rural sanitation approach based on principles of CLTS, Participatory Health and Hygiene Education, and existing sanitation technology: Sanitation Focused Participatory Health and Hygiene Education (SaFPHHE) (Ahmad et al., 2016). Through this approach, hygiene promotion is a critical component that occurs in parallel with the triggering process that facilitates the construction of improved HH sanitation facilities. One other important distinction between SaFPHHE and traditional CLTS is the type of latrine construction promoted. In CLTS, communities can choose their HH sanitation technology. In contrast, SaFPHHE promotes two options in compliance with national standards: upgradable Blair Ventilated Pit (uBVIP) Latrines and full versions of BVIP latrines (Ahmad et al., 2016). These latrines are promoted to ensure longer-term sustainability, mitigating collapse resulting from environmental conditions, including flooding (Ahmad et al., 2016).

In addition, community-established structures like SAGs and CHCs are developed, trained, and tasked with developing, implementing, and monitoring sanitation and hygiene action plans. These structures also support sanitation and hygiene promotion activities at the community level and report to institutional stakeholders at the district, ward, and provincial levels (Ahmad et al., 2016). Based on the evidence surrounding latrine subsidies, SaFPHHE employs a strict zero-subsidy approach, with only the most vulnerable populations receiving HH

latrine subsidies, mainly cement and labor – consistent with the CWP (Ahmad et al., 2016). While this approach was rolled out as part of the national Rural Wash Project and CARE's CWP, among other WASH programs in-country, few studies have examined its effect on sustainability outcomes post-program implementation.

Improving Water Supply

Across Africa, the provision of improved water supply and the water sector more broadly depend on external donor support with significant involvement of implementing NGOs (Harvey & Reed, 2003). In Zimbabwe, like many other parts of the African continent, groundwater is the most common water source, especially among rural populations and communal areas (Hoko & Hertle, 2006). Given the groundwater resources available, wells and boreholes equipped with handpumps have been promoted and established since the 1980s; this water supply technology is a viable option for rural water supply due to its low cost and ease of operation and maintenance (Harvey & Reed, 2003, p. 115). However, despite their widespread promotion and installation, nearly half of more than 250,000 handpumps established in Africa are not operational (Harvey & Reed, 2003). Once NGO-led WASH projects end, the onus of maintaining and managing boreholes and handpumps is transitioned to communities. Yet, lack of adequate ongoing management and institutional support often creates barriers to effective community-led maintenance and sustainability of water supply post-project (Harvey & Reed, 2003).

A literature review by Taylor (2013) cites some examples of WASH programming targeting water infrastructure leading to dysfunctional or inadequate outcomes over time. These programs spanned developing regions, including Swaziland, Ghana, Tanzania, the Democratic Republic of Congo, Kenya, Iraq, Pakistan, and Nepal. For instance, a development organization installed water points across rural communities in Sierra Leonne as part of a broader WASH

initiative. Five years following the program's end, a study found 17% of those water points were not functional, with 88% providing inconsistent water supply during the year (Ministry of Energy and Water Resources, 2012; Taylor 2013).

The NGO and donor community promote community-based water service management through governance structures like WPCs and WASH Committees. These community-based structures are established and trained "based on the well-intentioned principle of encouraging ownership and empowering communities… community 'sensitisation' or 'mobilisation' is designed to instill a sense of ownership and responsibility" (Harvey & Reed, 2003, p. 116). Yet, sustainability research shows that communities and these groups often do not entirely understand the level of efforts, finances, and other requirements necessary to ensure water service sustainability, and many water points fall into disrepair (Harvey & Reed, 2003).

In 2009, a local Zimbabwean NGO performed an ex-post-program evaluation one year after a rural water point rehabilitation project in Masvingo Province and Matabeleland South Province. Hoko and Hertle (2006) assessed water-related sustainability indicators like water system reliability (i.e., functionality and state of the water points, water availability, breakdown history), management (i.e., maintenance personnel availability, WPC existence and functionality, water point financing), and impact continuity of the project. The evaluation found several water points rehabilitated by the project had fallen into disrepair (14%), with WPCs existing and functional for 50-83% of water points. Personnel trained on water point repairs were only available in upwards of 50% of cases, while water point financing only occurred during instances requiring water point repair (Hoko & Hertle, 2006). The evaluation called for programs to strengthen WPCs, lengthen training-based interventions, and further enhance community involvement in water system management (Hoko & Hertle, 2006).

Another study in Chivi District, Zimbabwe found that WPCs were the primary governance structure of community water supply and service, with little to no direct involvement from central government in WASH services across Chivi (Madziyauswa, 2018). In fact, zero government-installed water supply facilities were cited in the area at the time of Madziyauswa's research, demonstrating a lack of government support (2018). Nearly 78% of the water supply facilities were deemed not functional – many due to neglected breakdowns and repairs, lack of technical expertise and water point repair financing, and lack of water supply due to the dry season and drought. WPCs also noted challenges surrounding procurement and availability of spare parts for water point repairs.

Boreholes & Latrines: Maintenance & Repair Capacity Building

Pump and latrine maintenance and technical repair capacity at a community level are vital to ensuring reliable and sustainable boreholes and HH latrine facilities. In Zimbabwe, these entrepreneurs, including VPMs and LMs, are often trained by NGOs and the District Development Fund (DDF) to build local capacity to respond to borehole, pump, and latrine needs as part of a broader community-based WASH management approach. A study by Katsi et al. (2007) assessing factors affecting HH use of water sources in rural Zimbabwe found "the existence of active village pump minders was also a pointer to sustainability of communal water sources" (p. 1164). However, some studies cite the limited availability of VPMs as a challenge in repairing borehole pumps. Katsi et al. (2007) cited death and migration of most project-trained pump minders across all villages sampled as another challenge. VPMs were only available for repairs in 28% of study villages, and in some cases, required repairs required technical capacity beyond the capacity of VPMs.

Madziyauswa (2018) assessed the sustainability of community-managed rural WASH services in Zimbabwe. This study was performed in Chivi District; however, it is important to note the sample included three wards not part of the CWP, and the results should not be extrapolated beyond these wards. The study employed a qualitative methodology, surveying Chivi HHs, WPCs, schools, local government officials, and area health clinics. The study evaluated sustainability across NGO-installed boreholes and shallow wells. It found that while NGOs provided training on water point repair with plans to hand over governance and maintenance of water points to community members, trained repair personnel often are unavailable and/or leave the area "for greener pastures due to the dire socioeconomic situation prevailing in the rural areas of Zimbabwe" (Madziyauswa, 2018). This study finding is consistent with the sustainability literature.

Women's Empowerment, Gender-Transformative Principles & Approaches

Beyond these interventions that address practical and institutional needs, CWP also employed a gender-transformative approach that challenged harmful gender norms surrounding women and promoted greater inclusion of women in decision-making spaces and governance structures. The literature underlines the importance of gender-transformative approach integration across WASH programming, research, and policy. Decades of literature show the many gendered aspects of WASH. Women and girls have unique WASH challenges related to menstrual hygiene and menstruation management, inequitable social and structural roles, and responsibilities at the HH level (MacArthur et al., 2020).

Traditional roles and norms in rural settings often dictate that women and girls manage HH WASH responsibilities spanning cooking, cleaning, water collection, and child-rearing (Fisher et al., 2017, MacArthur et al., 2020; White et al., 1972). As a result, women and girls

have an integral role in WASH and are key stakeholders to engage in WASH efforts broadly. Emerging feminist and social philosophies surrounding the role women and girls play within WASH denote an ideological imperative that addresses practical needs women and girls face (Fisher et al., 2017, MacArthur et al., 2020; White et al., 1972). Programs should also further integrate gender-transformative concepts like agency, structures, and relations embedded within CARE's gender equality program framework informed by gender equality and feminist theory literature (Figure 3). Despite significant gains made regarding the WASH-gender nexus, few studies to date "engaged with transformational aspects of gender equality" (MacArthur, 2020, p. 818).

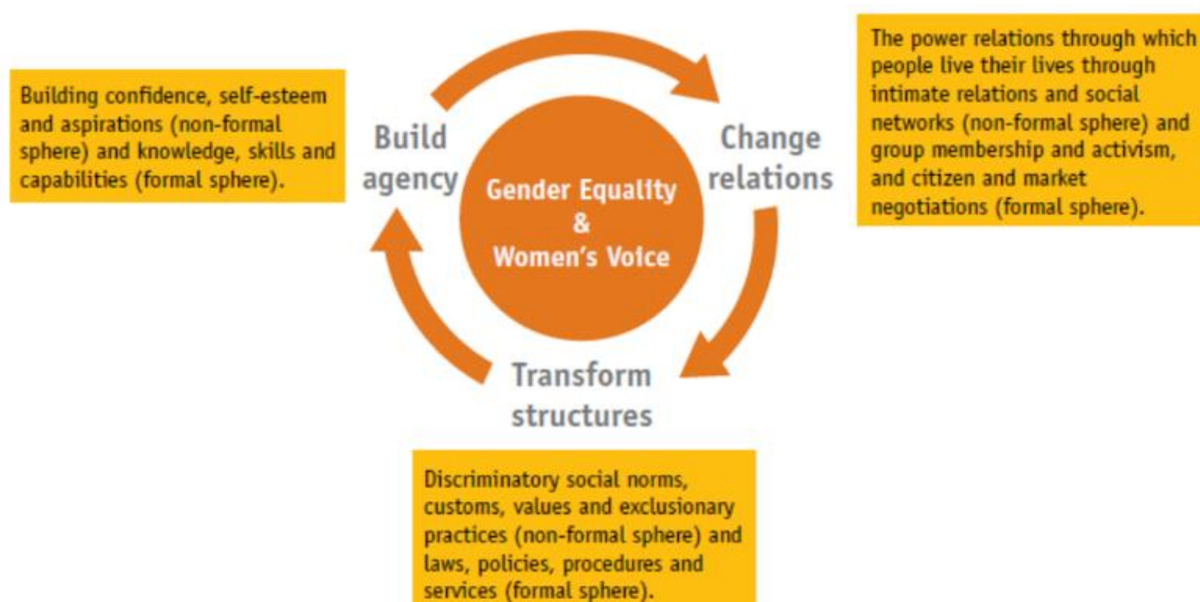


Figure 3. CARE's gender equality framework.

Evidence Synthesis

While WASH sustainability research is growing, few studies have examined the effects of fully integrated programming on sustained WASH outcomes. Most studies to date have focused primarily on sanitation, water service, or hygiene as separate fields of study, with limited

evaluation literature on the sustainability of integrated programming in Zimbabwe. Furthermore, most evaluation literature excludes approaches unique to the Zimbabwean context, like SaFPHHE, with gender-transformative impacts on sustainability also not often assessed. This evaluation seeks to contribute to the body of ex-post WASH sustainability literature by exploring how CWP's unique set of integrated approaches contributed to sustained WASH outcomes in Chivi District.

CHAPTER 3

METHODOLOGY

Overview & Sustainability Framework

This ex-post evaluation assesses 1) how WASH outcomes achieved through CWP have been sustained four years after the project and 2) how CARE's integrated program approaches/interventions influenced WASH sustainability across CWP villages. This study design draws on UNICEF's WASH sustainability framework (2018) (Figure 4). This comprehensive framework outlines the pathways to sustainable WASH services, detailing the factors that influence sustainability and how to program for sustainability. The complete framework document also includes a list of metrics and sustainability factors to include as part of sustainability assessments. These metrics span 1) rural water supply at community/water point, local government, and service provider levels and 2) sanitation at community and support levels (Figure 4).

The UNICEF sustainability framework is commonly used in the rural development sphere, along with other WASH sustainability frameworks like the Agenda for Change *Strong WASH Systems* "building blocks" and corresponding roadmaps, as well as USAID's water governance frameworks (Agenda for Change, n.d.; USAID, 2020b). The former was used for this evaluation because the technical pillars, and metrics within its toolkit, are most aligned with the CWP program design; the other frameworks did not fully exist when CWP was conceptualized. Therefore, the methodology proposed for measuring WASH sustainability as part of this

evaluation was informed by the UNICEF framework and its proposed metrics for assessing sustainability (UNICEF, 2018, p. 40-48).

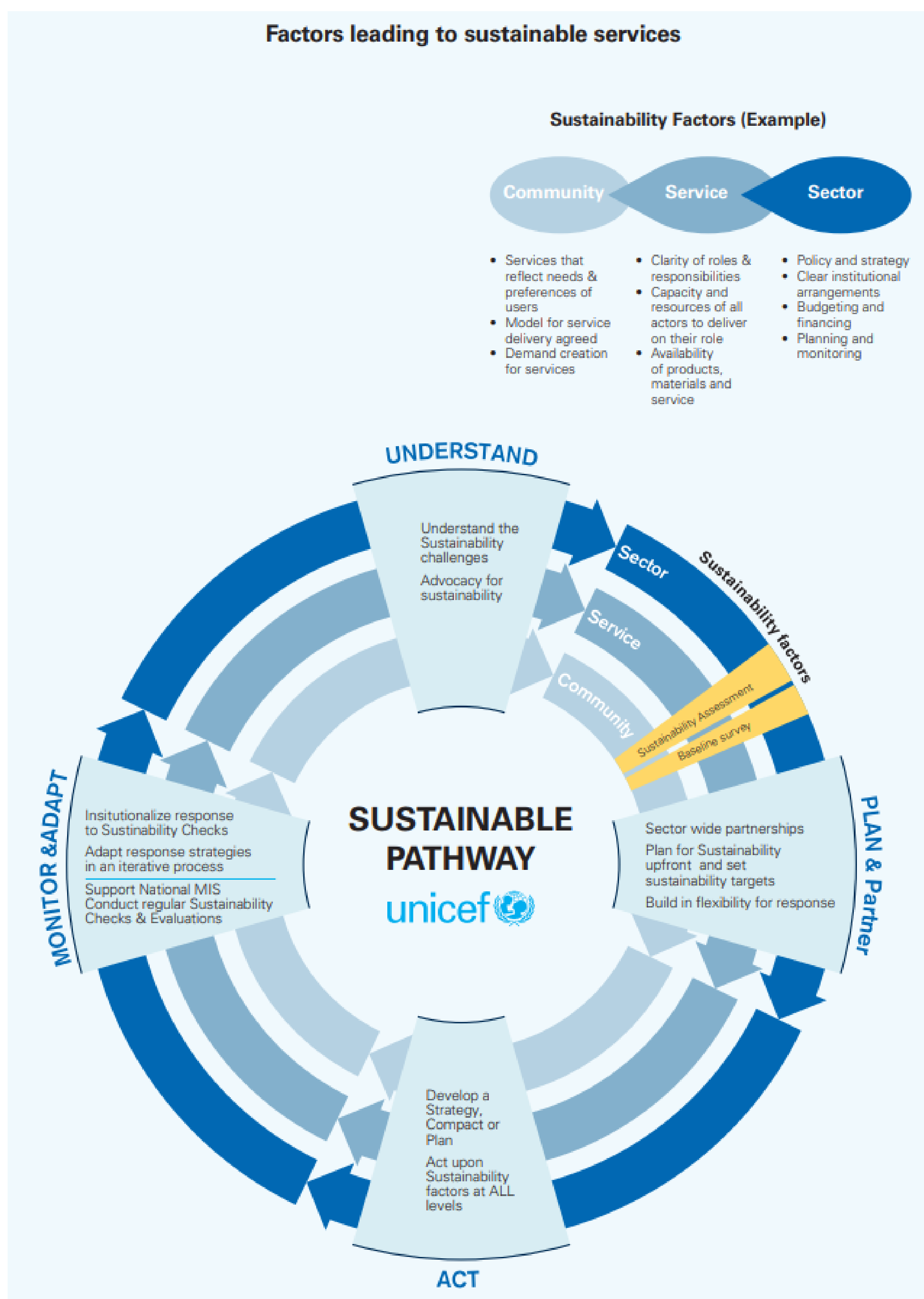


Figure 4. UNICEF WASH sustainability framework (2018).

In alignment with the evaluation objectives and the UNICEF WASH sustainability framework, eight evaluation questions were developed to deepen understanding of how integrated WASH interventions, gender transformative approaches, community-based management and governance structures, and institutional support have impacted WASH sustainability in Chivi District. These evaluation questions were also inspired by the USAID Ex-post WASH sustainability series (USAID, 2017; USAID 2019; USAID 2020). The evaluation addresses these questions using a **mixed-methods approach**, employing HH surveys, semi-structured interviews, and a formal desk review of project documents and secondary data. These evaluation questions include:

Sanitation & Hygiene

1. To what extent did CWP villages triggered with SaFPHHE sustain ODF status and latrine use after the end of the program?
    a. What factors influenced sustained ODF status and latrine use?
    b. To what extent did community-based structures like SAGs contribute to sustained sanitation outcomes?
    c. Have people maintained or upgraded their toilets/latrines in the last four years? Why or why not? What were their motivations/barriers for doing so?
2. To what extent are CWP beneficiaries still practicing hygiene behaviors (i.e., handwashing, safe water storage, water treatment, and proper human waste disposal) promoted by CWP?
    a. What factors influenced sustained behavior change?

Water Service

3. What is the current state of water service across CWP villages regarding functionality, accessibility, reliability, water quantity, and quality?
    a. What factors influenced the sustainability of water service?
    b. To what extent have community-based structures and governance bodies (i.e., WPCs) effectively managed water service?

WASH Capacity, Integration, COVID-19 & Gender

4. To what extent did CWP efforts to build local capacity for water point and latrine repair (via VPMs and LMs) lead to sustained construction, maintenance, and repair of water and sanitation facilities?
    a. Are WASH entrepreneurs still in business and supporting community needs?
5. How is local and central government contributing to the functionality, reliability, and sustainability of WASH services post-project?
6. To what extent were the gender impacts achieved by CWP sustained?
    a. Are women continuing to participate and lead across the management and governance structures established by CWP?
    b. Do CWP communities express perspectives of gender equity?
7. How have WASH services in CWP villages been impacted by COVID-19?
8. To what extent did CWP's integrated approach impact the sustainability of WASH interventions and outcomes?

Factors Influencing WASH Sustainability

Factors in the UNICEF framework have been linked to sustainable WASH outcomes, serving as a guide for this proposed evaluation design. The three overarching sustainability levels – community, service, and sector – and related factors speak to the complexity of WASH and how the system components are interrelated (Figure 4). The framework disaggregates sustainability factors by sanitation and rural water supply. For sanitation, factors that influence sustainability can be further categorized by community, individual, support, environmental, structural, and financial factors. The figure below outlines the sanitation sustainability factors as part of the UNICEF framework. Some examples include 1) presence of water to build, repair latrines, and clean, 2) resilient construction of latrines, 3) quality triggering process, and 4) availability, accessibility, and appropriateness, of sanitation materials, products, and services for maintaining and repairing latrines (Figure 5) (UNICEF, 2018).

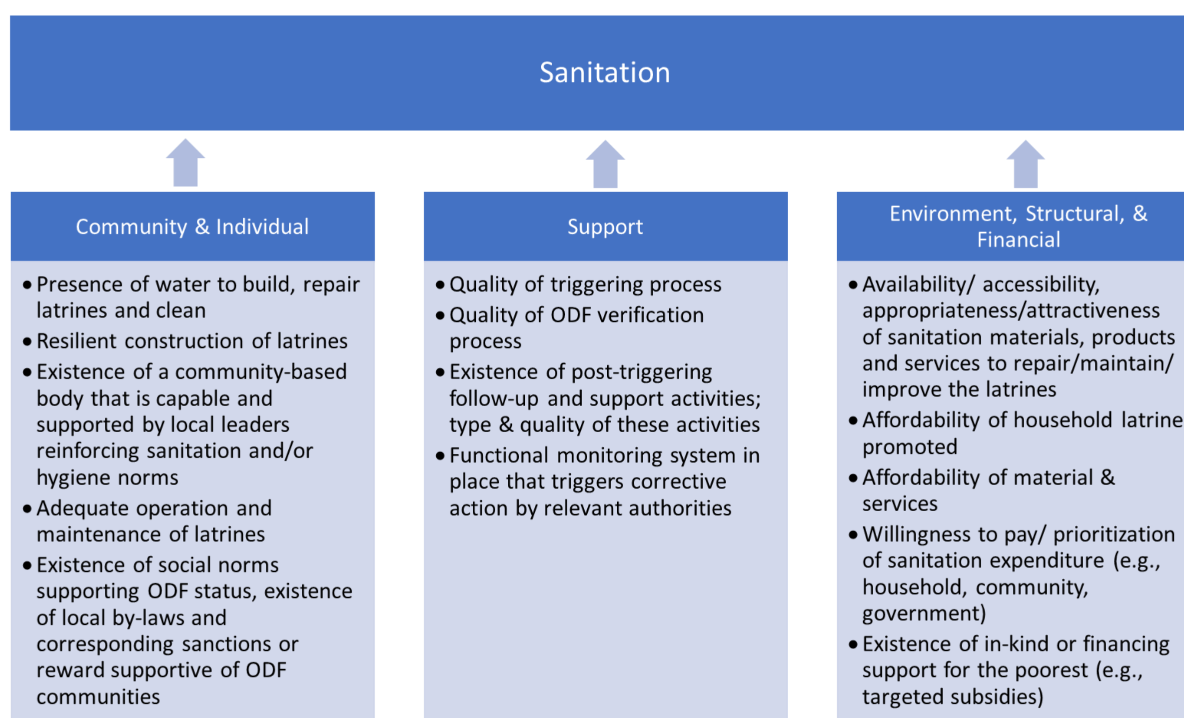


Figure 5. Sanitation sustainability factors identified in the UNICEF framework (2018, p. 45-48)

Regarding rural water supply, some key sustainability factors include community engagement and inclusion in water point decision-making and management (i.e., siting, planning, budgeting, and monitoring), reliability and affordability of services (i.e., consistent provision of water), the existence of financial mechanisms for water point operation and maintenance (i.e., tariffs), accessibility of inputs and technicians for water point repair (i.e., VPMs), and effectiveness and capacity of WPCs in overseeing operations and maintenance (Figure 6). Handwashing is a cross-cutting theme throughout the framework. While these metrics are not exhaustive, the UNICEF framework serves as a toolkit for WASH practitioners and evaluations to assess program sustainability and develop strategies for enhancing sustainability. This evaluation primarily captured data at the HH and community levels, with some qualitative data spanning other levels in the UNICEF framework.

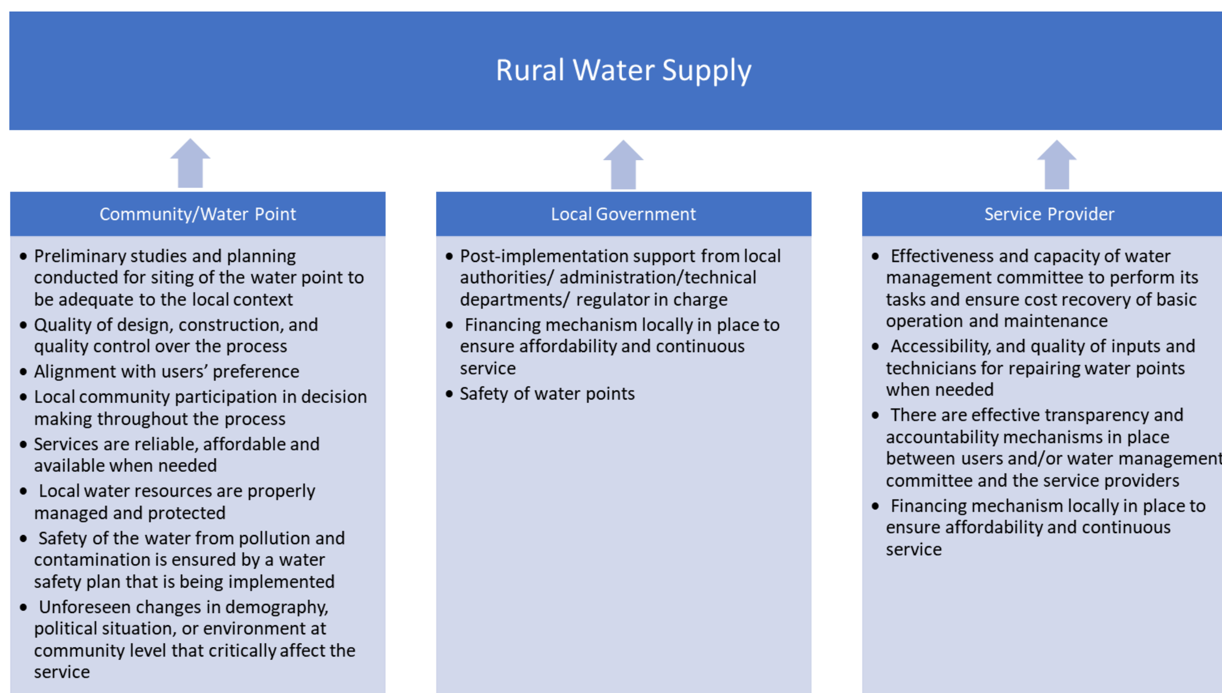


Figure 6. Water supply sustainability factors identified in the UNICEF framework (2018, p. 40-44)

Study Design

As part of this **ex-post program evaluation**, CARE collected quantitative and qualitative data across 29 villages in Chivi district. The evaluation used CWP baseline, endline, and ex-post data, performing **non-experimental longitudinal research** to determine the overall effect of CARE's interventions on WASH outcomes. It compared pre-intervention (2013) and post-intervention data (2017 and 2021) to understand the extent to which the project influenced sustained WASH outcomes over time. While similar to the difference-in-difference research design, there was no inclusion of a control group for comparison. The **study population** included HHs within CWP project villages. The number of villages sampled was determined based on the available budget while also ensuring the broadest representation of CWP villages across project wards (1-2 villages per day over 16 days).

The main **inclusion criteria** for this evaluation were: 1) HHs in villages that benefited from CWP's WASH interventions and 2) HHs in villages that achieved ODF by the end of the project in 2017. Using electronic data collection, surveys were administered across 315 HH representatives in project villages. Through tablets and smartphones, the HH survey was uploaded to KoboCollect and included open-ended questions as well as standard multiple-choice and yes/no questions (Appendix A). Only one survey respondent was included for each HH, with the preference being head of HH. If the head of HH was not available, another HH member was surveyed, providing key demographic information about the head of HH in their absence. The study also held 49 semi-structured interviews with key stakeholders, including 22 village heads/leaders, 12 WPC members, 6 SAG members, 6 VPMs, and 3 district/ward government officials (Table 3).

Conceptual Methodology

Regard **quantitative methods**, HH surveys assessed demographic information, including sex, education, age, gender, religion, ethnicity, and source of income. Demographic data were included to determine whether there were statistically significant differences in ex-post WASH outcomes between demographic variables. This could inform how WASH programs identify target beneficiaries as well as the scope of program delivery for future interventions. The HH survey also explored water service level indicators surrounding HH water sources, uses of water, water collection, "functionality, quality, quantity, accessibility, reliability, source switching/mixing, challenges, and other related questions," in alignment with the literature (USAID, 2020, p. 10).

User experiences, satisfaction, and perceptions regarding water point management, maintenance, fees, affordability, community engagement, and accountability were also collected. These data respond directly to evaluation question three, providing insight into the use, state, reliability, and management of water service in CWP villages post-project and the facilitators and barriers to water service management and sustainability. This data also allowed for direct comparison against the CWP endline data, where applicable, to define the level of change between the endline and ex-post evaluation. Also, as part of the water-specific survey component, the survey assessed behaviors regarding water treatment and safe water storage to understand the extent to which these practices continued beyond the end of CWP (Table 2). This survey component illuminated whether HH behaviors around maintaining safe water, a CWP project messaging core component, were sustained.

Sanitation and hygiene level data were also collected as part of the HH survey, including 1) latrine use and sharing, 2) history of latrine construction, maintenance, upgrades, and

financing, 3) user perceptions of latrine safety, 4) human waste disposal practices, and 5) knowledge of critical times for handwashing and other recommended hand hygiene practices. These data enabled assessment of critical sanitation sustainability indicators, comparison against CWP endline data to determine whether there were significant changes four years later, and identification of the facilitators and barriers to sanitation sustainability. This HH survey component was complemented by **secondary data** collection acquired by district officials regarding village-level ODF certification status to determine the proportion of CWP villages that sustained ODF certification after the project endline. **Observational data** were also collected in the HH survey to assess the availability, usage, and functionality of latrines and handwashing stations. For instance, handwashing facilities were observed for the presence of water and soap (Table 2). These components are aligned with evaluation question one.

To evaluate the level of sustained gender impacts, the survey also explored perceptions of gender roles, rights, and norms surrounding women and girls' education, menstruation, employment outside the home, leadership, mobility, and decision-making. Lastly, given this ex-post-program evaluation was performed during the COVID-19 pandemic, the study included questions regarding HH and community-level impact of COVID-19 to understand how the pandemic has impacted WASH outcomes and their sustainability. Access to water and repair parts for water points and latrines was captured, as well as the impact of COVID-19 on gender dynamics, including women's ability to participate in community-level activities (Tables 2). The inclusion of this gender component goes beyond the scope of many published ex-post evaluations in the WASH sector and will further inform CARE's gender transformation strategies. These components are aligned with and facilitate responses to evaluation questions six and seven.

Table 2. Ex-post evaluation tools and scope of data collection.

Desk Review	Household Surveys	Semi-Structured Interviews
• Project documents (baseline, endline, reports) • Official district ODF assessment (2017/ 2021)	• Demographic information (sex, education, age, gender, religion, ethnicity, source of income, socioeconomic status) • Income, wealth, and asset ownership • Water source, treatment, quality, storage, collection, and reliability • Latrine use, construction, maintenance/repair/upgrades, safety, excreta disposal, self-reported hand hygiene knowledge, and behavior • Water point management, WPC satisfaction, financing, reporting, accountability, and community engagement • Perceptions of HH gender roles, women, and WASH • COVID-19 impacts on WASH • Level of participation in CWP and perceptions of project impacts • ***Observational data*: the** presence of handwashing facilities and latrines	***WPCs*** • Functionality of WPCs, election processes, and meeting frequency • Leadership composition • Functionality of WPs (types, age, financing, construction, state/quality of WP, and institutional support history) • Reliability of WPs (protection status, daily management of WPs, water allocation and availability, monitoring, financing) • Financing, community/institutional contributions, and roles ***SAGs*** • Roles, training, triggering process, ODF certification and current status, post-triggering follow-up, lessons learned, and recommendations for maintaining ODF communities ***WASH Entrepreneurs*** • Roles, income generation, training, feedback on the training process, and challenges ***Village Heads*** • Roles, training, ODF certification and current status, community engagement, feedback on OD mitigation, challenges, gender equality, water service, and COVID-19 impacts ***District/Ward WASH Government Representatives*** • Roles, government financial/technical support for water service and sanitation, WASH government strategies, challenges, perceptions of OD recidivism and related factors, and COVID-19 impacts

Qualitative methods were also employed with various stakeholders within the community and district/ward government to explain further, and provide a complete understanding of, the quantitative data collected from the HH surveys. Forty-nine (49) semi-structured interviews with WPC members, SAG members, WASH entrepreneurs, village heads,

and district/ward WASH representatives were employed to deepen the evaluation (Table 3). The data were triangulated to ensure data validity and verify the results across multiple methods. Data from the semi-structured interviews responded to all eight evaluation questions.

Table 3. Distribution of semi-structured interviews across stakeholders including gender disaggregates.

No. KIIs	Village Heads	WPCs	District Government	VPMs	SAGs
Total: 49	22	12	3	6	6
Women: 18	1	8	0	3	6
Men: 31	21	4	3	3	0

Data Collection & Sampling Methodology

A multi-stage cluster methodology was employed during sampling. The first stage cluster included the selection of project wards for evaluation inclusion. Nine CWP-supported wards were selected for inclusion in the study, including wards 1,2,3,4,5,7,8,10, and 15. Only one project ward (6) out of the ten was excluded from the study because it only has one CWP village. The second stage cluster involved the selection of villages from the nine selected wards. The third stage cluster employed a selection of HHs from the village HH registry using a systematic random sampling method, with around 12 HHs in each village. The target sample size totaled 365 HHs calculated based on a population size of approximately 7,009 HHs spanning the nine selected wards - a 95% confidence interval and 5% margin of error. However, the target number of HHs in each village was not reached consistently across all study villages during data collection due to community meetings and funerals that coincided with data collection dates in a subset of villages. As a result, 315 HH surveys were administered. For the qualitative component, purposive sampling was employed for budgetary and convenience purposes within the quantitative sampling frame.

Before the data collection process, respective stakeholders, including the District Administrator (DA), the President's Office, and community leaders, were informed of the study to facilitate understanding, buy-in, and broader support for the evaluation. The data collection team consisted of six enumerators and one research supervisor. The team was first trained on the electronic data collection tool and then participated in piloting the questionnaire. The HH questionnaire was then translated to local languages to accommodate those not fluent in English. After training, the team deployed into selected wards and villages in Chivi District to administer the survey questionnaire using tablets configured with KoBo toolkit. Surveys were conducted between April 6 – 22, 2021, with data cleaning and preparation performed through May 2021.

Data Analysis

To determine whether CWP's WASH outcomes were sustained, a multi-level analysis was performed across the quantitative and qualitative data. Sustainability was measured by assessing the extent to which the WASH outcomes achieved by CWP were sustained between 2017 and 2021. In alignment with the sustainability definition outlined on page 13, sustainability of CWP's WASH outcomes was determined by evaluating the degree to which the program's impacts and outcomes (i.e., improved sanitation coverage and access to safe drinking water) continued after CARE exited intervention villages. Some primary WASH outcomes measured for sustainability include:

1) Community-level ODF status and HH-level OD
2) Latrine coverage
3) Proportion of respondents demonstrating proper handwashing
4) Knowledge of critical times for handwashing
5) Access to an improved water source for drinking

6) Safe HH water storage practices

Other metrics included in this study are detailed in the evaluation matrix (Table 7). The level of continued functionality across the systems and governance structures put in place or supported by the project was assessed primarily through semi-structured interviews. This provided a deeper understanding of the broader enabling environment and how the surrounding community, local service authority, service provider, and financial factors influenced the sustainability of these WASH outcomes.

HH survey data were analyzed using IBM SPSS Statistics version 28. Most captured data are categorical and analyzed using descriptive statistics, including frequencies and proportions. This evaluation report includes standard WASH indicators such as the use of improved latrines, access to an improved water source for drinking, and access to a functional handwashing facility (Table 7). The evaluation also includes data analysis pertaining to the impact of COVID-19 on water access, access to repair parts for latrines, improved water points, and the differential pandemic impacts on women in these communities. These data shed light on the effects of COVID-19 on WASH in CWP villages. Given the gender transformative approach led by CARE, key gender indicators regarding women's decision-making, leadership, and participation in community structures were also analyzed.

Where appropriate and data were available, key indicators between CWP baseline, endline, and ex-post were compared to assess the extent to which CWP outcomes were maintained, diminished, or improved over time. This level of analysis provided insight into whether CWP's impacts were sustained or changed after the project ended**.** This analysis occurred across data collected and calculated using methodologically similar approaches. These data were compared at an aggregate level without statistical application due to a lack of available

raw data across previous studies. As a result, figures comparing baseline, endline, and ex-post data include proportions without confidence internals and p-value values. This is a significant limitation of the study, assuming that the aggregate data at baseline and endline can be compared accurately against those collected ex-post.

To further understand the interaction between variables and sustainability predictors, multiple logistic regression was performed across three primary **dependent variables**: HH latrine use, handwashing with soap at critical times, and access to an improved drinking water source (all self-reported). These variables were selected based on the evaluation questions and in alignment with expected outcomes of the CWP approach identified in the project theoretical model (Figure 2). These variables were transformed into binary variables as follows:

- HH latrine use: coded as 1 if HH reported using a latrine (any latrine, improved or unimproved) and 0 if they reported not using a latrine
- Access to an improved drinking water source: coded as 1 if respondent reported an improved water source as their main HH drinking water source and 0 if they reported an unimproved source
- Handwashing with soap at critical times: coded as 1 if respondent reported yes to "always handwashing with soap at critical times" and 0 if they reported "sometimes" or "no"

Independent variables vary by dependent variable, spanning demographic, socio-economic, access, programmatic, financial, governance, and management factors. This study chose these variables based on data availability in the HH survey, the evaluation questions and objectives, and WASH sustainability literature. Tests for multicollinearity were applied, and significantly correlated variables were excluded from the model. Additional details regarding the

regression analysis, dependent, independent variables, and references to the literature can be found in Tables 4-6. For the qualitative data, MAXQDA was used to identify common themes across transcribed data from the semi-structured interviews for triangulation and integration of the results. These analyses were used to identify critical factors that influence WASH sustainability. This level of analysis provided more profound insight into some of the factors influencing sustained WASH outcomes.

Table 4. Variables for measuring predictors of HH latrine use.

Dependent Variable	**Independent Variables**	**Available Data**	**Data Source**	**UNICEF Sustainability Factor (Sanitation)/ Reference**
HH latrine use	Gender	• Gender of HH head	HH survey	Stuart et al. (2021)
	HH Size	• HH Size	HH survey	Sinha et al. (2017)
	Population size/HH Size	• Number of people per community • HH	CWP program documents	Crocker et al. (2017) Stuart et al. (2021)
	Length of exposure to programming	• Categorization of “old” and “new” CWP villages	CWP program documents	Stuart et al. (2021)
	Education	• Education level of HH head	HH survey	Crocker et al. (2017)
	Socio-economic status	• HH income source	HH Survey	Stuart et al. (2021)
	Safety	• Respondent feels safe toileting at night	HH Survey	USAID (2020)
	Privacy	• HH has a gender-separate toileting area	HH Survey	USAID (2020)
	Water Accessibility	• Water collection time: Time spent fetching water from improved drinking sources (in minutes) (disaggregate by 30 min round trip and over)	HH Survey	UNICEF (2018) Area of Focus #3 Stuart et al. (2021)
	Water access	• HHs having access to an improved water source • COVID-19 impact on water access	HH Survey	UNICEF (2018) Sustainability Factor A1 Crocker et al. (2017) Stuart et al. (2021)

Table 5. Variables for measuring predictors of HH access to an improved drinking water source.

Dependent Variable	Independent Variables	Available Data	Data Source	UNICEF Sustainability Factor (Water Supply)/ Reference
Access to improved drinking water source	Gender	• Gender of HH head	HH survey	Mulenga et al. (2017) Simelane et al. (2020) Adualem et al. (2021) Tankoua (2021)
	HH Size	• HH Size	HH survey	Adualem et al. (2021)
	Length of exposure to programming	• Categorization of “old” and “new” CWP villages	CWP program documents	Stuart et al. (2021)
	Education	• Educational attainment of HH head	HH survey	Tankoua (2021)
	Socio-economic status	• HH income source	HH survey	Mulenga et al. (2017) Simelane et al. (2020) Tankoua (2021)
	Accessibility	• Water collection time: Time spent fetching water from improved drinking sources (in minutes) (disaggregate by 30 min round trip and over)	HH survey	UNICEF (2018) – Area of Focus #2 (Accessibility) Simelane et al. (2020) Adualem et al. (2021) Tankoua (2021)
	Management	• WPC management of water point	HH survey	UNICEF (2018) Sustainability Factors A4 and A6 Fisher et al. (2015)
	Financing mechanism/ Cost recovery for O&M	• HH pays a water point maintenance fee	HH survey	UNICEF (2018) Sustainability Factors A5, B10, and C12 Mason & Savin (2015)

Table 6. Variables for measuring predictors of individual handwashing with soap at critical times.

Dependent Variable	Independent Variables	Available Data	Data Source	UNICEF Sustainability Factor (Sanitation)/ Reference
"Always" handwashing with soap at critical times	Gender	• Gender of HH head	HH survey	Pradhan & Mondal (2020)
	Length of exposure to programming	• Categorization of "old" and "new" CWP villages	CWP program documents	Stuart et al. (2021)
	Education	• Educational attainment of HH head	HH survey	Seimetz et al. (2016) Pradhan & Mondal (2020)
	Socio-economic status	• HH income source	HH survey	Seimetz et al. (2016) Pradhan & Mondal (2020)
	Presence of a functional handwashing facility (with soap and water and evidence of usage)	• Presence of a hand washing facility within 10-15m of toilet facility	Observational data	UNICEF (2018) – Area of Focus #7
	Knowledge of handwashing at critical times	• What are the "critical" times for one to wash their hands?	HH Survey	UNICEF (2018) – Area of Focus #8
	Water access	• HHs having access to an improved water source	HH Survey	UNICEF (2018) Sustainability Factor A1 Seimetz et al. (2016)
	Water accessibility	• Water collection time: Time spent fetching water from improved sources (in minutes) (disaggregate by 30 min round trip and over)		
	COVID impacts	• Has COVID-19 impacted your HHs access to water?	HH survey	USAID (2021) Stoler et al., 2020
	Type of latrine used	• Improved or unimproved HH latrine	HH survey	Schmidt et al. (2009)

Metrics

The evaluation included standard WASH metrics spanning several technical pillars. These metrics informed the overall sustainability analysis and formulation of responses to the defined evaluation questions, and were developed based on the 2018 UNICEF WASH sustainability framework (Table 7).

Table 7. Chivi WASH Project ex-post program sustainability evaluation matrix.

Evaluation Question	Indicator	Data Source
To what extent did CWP villages triggered with SaFPHHE sustain ODF status and latrine use after the end of the program?	# and % villages that were ODF at endline (in 2017) and have remained ODF	Official district ODF assessment (2017 and 2021)
	# and % of HHs reporting using an improved latrine	HH Survey
Have people maintained or upgraded their toilets/latrines in the last four years? Why or why not? What were their motivations/barriers for doing so? What factors influenced sustained ODF status and latrine use? To what extent did community-based structures like SAGs and CHCs contribute to sustained sanitation outcomes?	# and % of respondents who report maintenance and/or upgrading their toilet in the last year and in the last five years	HH Surveys, SSIs
	Reported reasons for toilet upgrades	HH Surveys, SSIs
	Reported barriers to building, maintaining, or upgrading toilets	HH Surveys, SSIs
	Average amount of money spent on upgrades or maintenance	HH Surveys
	# and % of respondents who report having a separate toilet for women and men	HH Surveys
	Average distance between toilets and HH	
	# and % of respondents who feel secure using the toilet at night	HH Surveys
	Reasons why respondents do not feel secure	
	# and % of respondents who feel safe going to the toilet at night	HH Surveys
	Reasons why respondents do not feel safe going to the toilet at night	
To what extent are CWP beneficiaries still practicing hygiene behaviors (i.e., handwashing, safe water storage, water treatment, and proper human waste disposal) promoted by CWP? What factors influenced sustained behavior change?	# and % of respondents that (always) wash their hands with soap	HH Surveys
What is the current state of water service across CWP villages regarding	# and % respondents that report using a safe water source	HH Surveys

functionality, accessibility, reliability, water quantity, and quality?	# and % of respondents that report their improved water source is reliable	HH Surveys
	# and % of respondents that report water sources always working	HH Surveys
	# and % of respondents reporting being able to collect all the water needed each day	HH Surveys
	# and % of respondents reporting always collecting their water from the same water source	HH Surveys
What factors influenced sustainability of water services? To what extent have community-based structures and governance bodies (i.e., WASH committees and WPCs) effectively managed water service?	# and % of respondents that report timely water point repairs	HH Surveys
	Average (reported) time required to repair broken water points	HH Surveys
	Reasons why respondents reported not being able to collect all their water needs, having to get water from multiple water sources, or water sources not always working	HH Surveys
	Management of improved water sources (WPC, private operator, government, NGO, etc.)	HH Surveys, SSIs
	# and % of respondents reporting WPCs consulting the community on siting of water points	HH Surveys, SSIs
	# and % of respondents reporting WPCs involving communities in planning how to manage water points	HH Surveys, SSIs
	# and % of WPCs that: communicate regularly with community, have funds, maintain a functional water source	SSIs
	% WPCs with a woman in a decision-making role	SSI
To what extent did CWP efforts to build local capacity for water point and latrine repair (via VPMs and LMs) lead to sustained construction, maintenance, and repair of water and sanitation facilities? Are WASH entrepreneurs still in business and supporting community needs? Why or why not?	# and % of WASH entrepreneurs still in business	SSIs
	Reported contributions of VPMs and LMs to sustained construction, maintenance, and repair of facilities	SSIs
	Reasons for business continuation or closure	SSIs
How is local and central government contributing to the functionality, reliability, and sustainability of WASH services post-project?	Ways government is involved in providing water services in communities, types of technical assistance provided by government, government strategies for increasing safe water services to communities, etc.	SSIs

How have WASH services in CWP villages been impacted by COVID-19?	# and % of respondents reporting COVID-19 impacts on HH water access	HH Surveys, SSIs
	# and % of respondents reporting COVID-19 impacts on communities' ability to access repair parts for water points	HH Surveys, SSIs
	# and % of respondents reporting COVID-19 impacts on communities' ability to access repair parts for HH toilets	HH Surveys, SSIs
	# and % of respondents reporting differential COVID-19 impacts on women	HH Surveys, SSIs
	# and % of respondents reporting COVID-19 impacts on women's ability to participate in community-level activities and/or committees	HH Surveys, SSIs

Communication & Dissemination Plan

The evaluation results were shared at stakeholder interpretation meetings in November 2021 to discuss overall findings. CARE Zimbabwe held a meeting at Chivi District with fifteen government officials to share the results of this study. It served as a reminder of water and sanitation challenges in villages and a call to action for the district government. Additionally, CARE facilitated twenty meetings across ten wards with village heads, Village Health Workers (VHWs), WASH entrepreneurs, and leaders of WPCs or CHCs. With over 800 participants across all meetings, these interactive sessions covered the results of this study, WASH challenges, and potential next steps. This feedback was later integrated into the evaluation report. This was a critical step in justifying the evaluation's conclusions and creating transparency in the process.

CARE will also hold a global webinar for the NGO and donor community to share lessons learned around WASH sustainability in Zimbabwe, promoting cross-learning and sharing best practices within the sector. The findings will also be shared with the public by publishing the final report online and with the evaluation funders, The Bill and Melinda Gates Foundation

(BMGF). CARE will also develop a complementary peer-reviewed manuscript for publication. This manuscript will provide a secondary analysis that will expand on the findings of this evaluation, exploring the determinants and predictors of WASH sustainability in the context of CWP. A CARE-branded and practitioner-facing version of these findings will also be published as part of a report in Spring 2022.

Table 8. Communications and dissemination plan for the Chivi WASH Project sustainability evaluation.

Purpose of Communication	Dissemination Product	How?	When?
Inform stakeholders about specific upcoming evaluation activities	Email	Email	Monthly
Keep informed about progress of the evaluation (district level and between evaluation stakeholders)	Email	Email	Monthly
Present initial/interim findings to internal and government stakeholders	Evaluation brief and PowerPoint presentation	Stakeholder interpretation meetings, briefing	November 2021
Locally relevant discussions in 10 wards	Evaluation brief (for external stakeholders), draft report, and PowerPoint presentation	Stakeholder meetings	November - December 2021
Present complete/final findings	Revised report and brief based on previous ward and district-level discussions/feedback	Stakeholder interpretation meetings, briefing	December 2021
Document the evaluation and its initial findings (summary statistics and endline/ex-post comparisons) as part of a CARE report – share with stakeholders internally and externally	CARE report, email	email	November - December 2021
Global Webinar for NGOs and Donors with a stake in WASH	PowerPoint Presentation for WASH technical audience	Zoom	Spring 2022
Formal event at Chivi District and national level in Harare, Zimbabwe	Final evaluation brief, CARE report, and PowerPoint presentation	TBD (pending COVID situation)	TBD (pending COVID situation
Draft manuscript with secondary analysis	Brief and publication through academic journal	Academic journal	February-April 2022
Publish final evaluation report	Online publication	care.org	April 2022

Roles, Responsibilities, & Timeline

The evaluation team was responsible for designing evaluation tools, engaging stakeholders, and administering semi-structed interviews and HH surveys. These data were collected by CARE in April 2021. Following data collection, the doctoral student and evaluator, Maria Hinson Tobin, analyzed these existing secondary data, developed the evaluation report, and communicated and disseminated the results with relevant stakeholders alongside the CARE USA and Zimbabwe teams. Dissemination activities will continue after the finalization of this evaluation.

Ethics & IRB

Because this evaluation involves human research, it was subject to IRB approval. HLM IRB, a research ethics service used by UNICEF, The World Bank, and others, reviewed the study protocol and tools and granted ethical approval for this study in March 2021. This research was also approved by the University of Georgia IRB in December 2021. CARE obtained informed consent before data collection. All personal data are kept private and confidential.

CHAPTER 4

RESULTS

Sample Demographics

Of the 315 HHs sampled from nine project wards across 29 villages in Chivi District, the mean age of HH head was 58.0 years old (CI 56.3 – 59.7), ranging between 18.0 and 100.0. Over half (58.6%) of sampled HHs were male headed (58.4%). Most HH heads attained secondary education (54.9%), followed by primary education (24.4%), and no formal education (16.2%). Less than three percent (2.9%) of the sample reported HH heads with college or university level education (Table 9).

Table 9. Summary statistics of sample demographics.

Variable		n	%
Gender of HH Head	Female	131	41.6
	Male	184	58.4
Principal HH Income Source	Buying and selling	11	3.5
	Casual labor	73	23.2
	Farming	130	41.3
	Formal employment	16	5.1
	Other	4	1.3
	Pension	18	5.7
	Remittances	63	20.0
HH Religion	Christianity	314	99.7
	Traditional/African Traditional	1	0.3
Education of HH Head	College or University	9	2.9
	No formal education	51	16.2
	Primary	77	24.4
	Secondary	173	54.9
	Vocational school	3	1.0
	Do not know	2	0.6

Nearly all reported Christianity as the main HH religion (99.7%), with only one HH (0.3%) following African or traditional religion. Primary HH income sources included farming (41.3%), casual labor (23.2%), remittances (20.0%), pension (5.7%), formal employment (5.1%), and buying and selling (3.5%). The mean HH size reported was 5.3 (CI 5.1 – 5.6), ranging between 1.0 and 15.0 (Table 9).

Sanitation

Latrine Use & Ownership

Most HHs reported using either a BVIP single squat (27.3%) or double squat (23.5%), with BVIP single squats being the most used facility. Upgradable BVIP (uBVIP) single and double squat facilities were used among 12.7% and 9.5% of HHs respectively, with the remaining using basic pit latrines (19.0%) or no facility, a bush, or a field (7.9%) (Table 10). It is not known whether HHs use more than one latrine or if they share a latrine with other HHs. Ninety-two (92.1) percent of HHs reported using a basic latrine[3]. There was no statistically significant difference in HH latrine use between old and new wards. Observational data collected by study enumerators corroborated these data, citing 92.7% of HHs owning a latrine. Of HHs observed, 91.4% had latrines showing signs of use, with 1.3% of latrines appearing not to be used and 7.3% having no latrine at all. Looking across evaluations, the CWP endline reported 97.0% of HHs having their own latrine (CARE, 2017, p. 39). This shows a slight decrease of 4.3% in HH latrine ownership since the end of the project (Figure 7).

[3] Basic latrines include pit latrines, uBVIP and BVIP latrine.

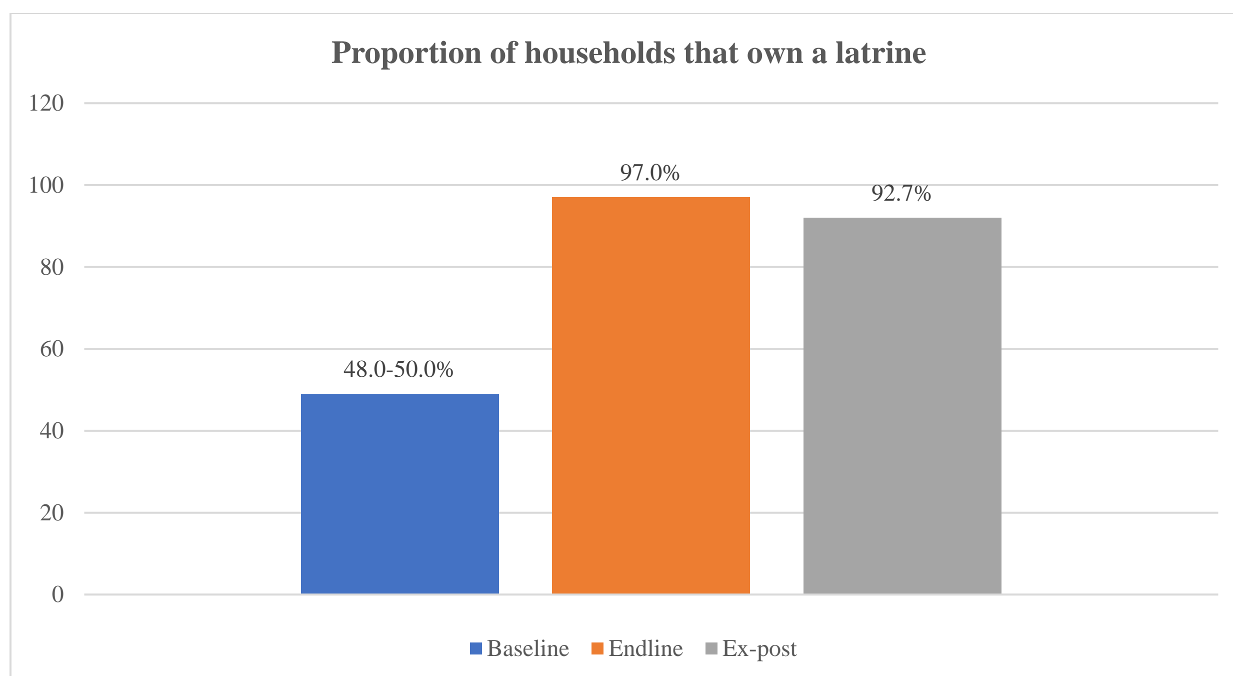


Figure 7. Comparison of HH latrine ownership (both improved and unimproved) observed across baseline, endline, and ex-post[4].

Across the sample, 73.0% reported using an improved latrine (defined as uBVIP single/double squat or BVIP single/double squat facilities) versus 27.0% using a pit latrine or openly defecating (Table 10). In this context, pit latrines, no facility, bush, or field were considered unimproved. The endline reported between 0.0-1.0% of sampled HHs using a bush/field by the end of the project compared to 7.9% captured ex-post (Figure 8) (CARE, 2017, p. iv). Conversely, district-level ODF certification data (a community-level metric) suggest that, of the villages sampled, just 27.6% (8/29) of those ODF certified in 2017 remained certified in 2021; similarly, across the project universe, 25.9% (44/170) of all villages certified as ODF in 2017 remained ODF certified in 2021 (DWSSC, 2017; DWSSC, 2021). The discrepancy between HH-level latrine use and community-level ODF status is possibly a function of how

[4] This figure shows observed latrine ownership as opposed to HH self-reported latrine use.

ODF is measured during the community certification process and is discussed further in Chapter 5.

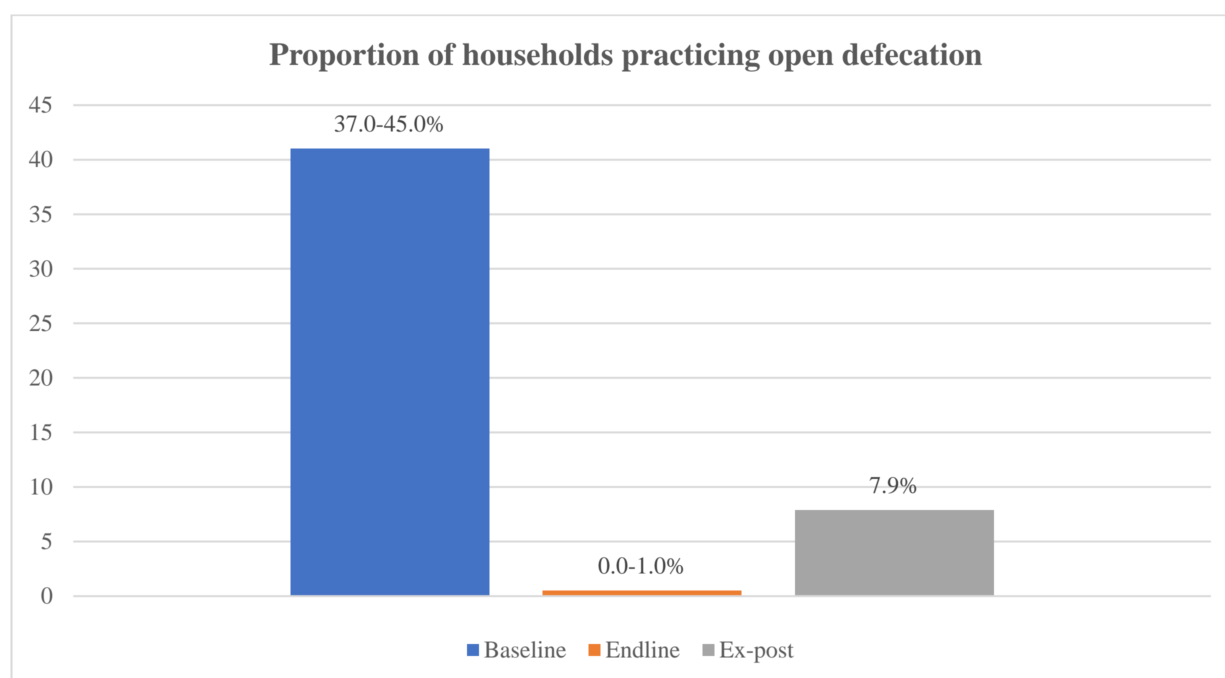


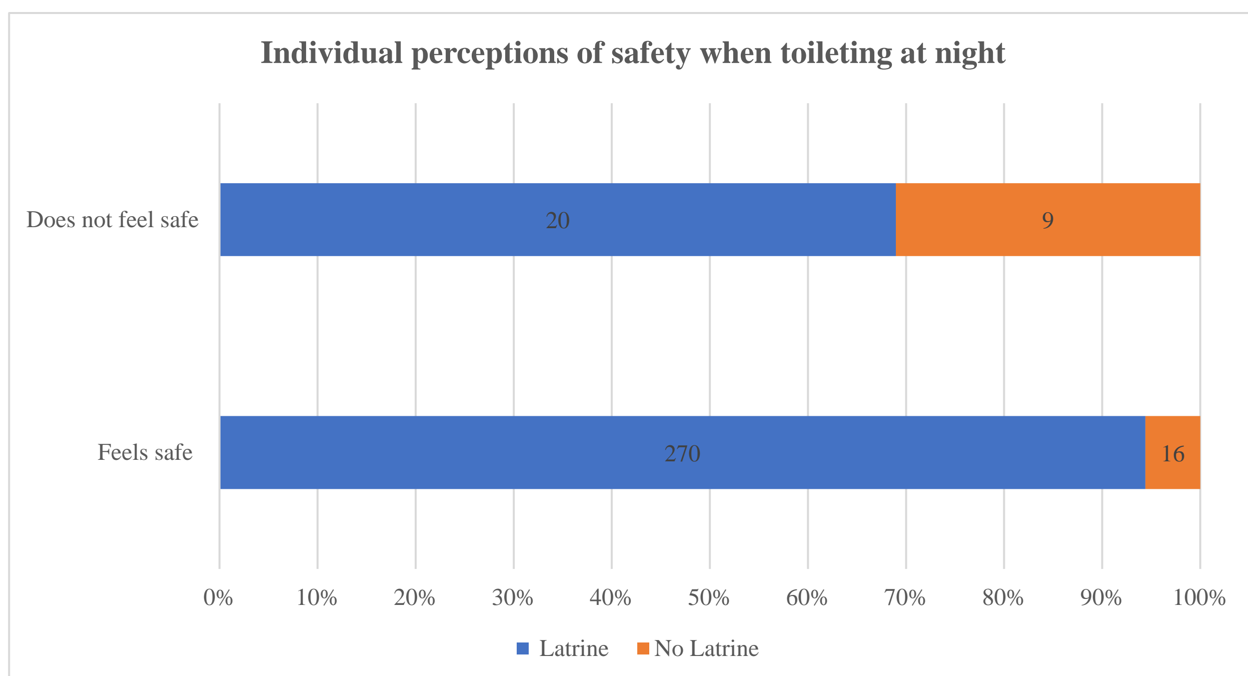
Figure 8. Comparison of self-reported open defecation across baseline (2014), endline (2017), and ex-post (2021).

Nearly all HHs self-financed, either fully or partially, their toilet construction. Almost half (44.8%) reported latrines were self-constructed by HHs alone, with 2.2% jointly constructed by two HHs. Others constructed a significant proportion of latrines at a cost to the HH, including latrine masons (42.2%). NGOs or government constructed a small proportion at a shared cost (2.2%), including the external provision of materials (Table 10). Less than half were built before 2014 (42.8%), with 44.8% built during the project period (2014-2017), and 12.4% built after the project ended. Reported motivations for building latrines included greater awareness from/response to WASH, NGO, donor projects and programs, personal interests including personal hygiene and sanitation, avoiding OD, and community pressure.

Table 10. Type of latrine used and latrine construction.

Variable		n	%	Std. Error	95% CI	
					Lower	Upper
Type of Latrine Members of HH Usually Use	BVIP double squat	74	23.5	2.3	19.0	27.9
	BVIP single squat	86	27.3	2.4	22.2	31.7
	No facility/bush/field	25	7.9	1.5	5.1	11.1
	Pit latrine	60	19.0	2.2	14.9	23.2
	uBVIP double squat	30	9.5	1.6	6.7	13.0
	uBVIP single squat	40	12.7	1.9	9.2	16.5
HH Use of Improved and Unimproved Latrines	Improved	230	73.0	2.4	67.9	77.5
	Unimproved	85	27.0	2.4	22.5	32.1
Latrine Construction	My HH	141	44.8	2.8	39.0	50.2
	My HH and another HH	7	2.2	0.8	1.0	3.8
	Constructed by other at no cost to this HH	2	0.6	0.5	0.0	1.6
	Constructed by other at a cost to this HH	133	42.2	2.7	36.5	47.6
	Constructed by other at a shared cost	7	2.2	0.9	0.6	4.1
	No latrine	25	7.9	1.5	5.1	11.1

The mean distance from the latrine to HH was 18.0 meters (CI 16.5 – 19.6). When asked if the HH has a separate facility for males and females, 38.7% reported having gender-separate facilities. To assess individual perceptions of toilet safety, respondents were asked if they felt safe going to the toilet at night. Of those surveyed, 90.8% reported feeling safe going to the toilet, or area used as a toilet, at night. While only 9.2% of respondents reported not feeling safe, the majority (79.3%) were women. Although there was no notable variation between perceived safety at night and ownership of an improved latrine, there was a statistically significant difference in perceived safety at night between HHs with and without any latrine (improved or unimproved) (Figure 9). Those with no latrine were more than five times as likely to feel unsafe toileting at night compared to those with a latrine. Respondents that did not feel safe reported the following reasons: no lighting, no toilet, far from house, fear of snakes, fear of ghosts, toilet collapsed due to rain, and sharing the toilet with a neighbor.



* p-value <.001

Figure 9. Proportional comparison of perceptions of safety when toileting at night between HHs with and without a latrine.

Latrine Maintenance & Upgrades

Of HHs that reported owning and using a latrine (n=290), 1.0% reported performing maintenance in the last year. Seventy percent (70.7%) reported that maintenance was not needed, while 28.3% reported maintenance was needed but not performed. Regarding maintenance on HH latrines in the last five years, 1.4% reported having performed maintenance. Seventy-two percent (72.4%) reported not needing maintenance, while 26.2% reported maintenance was needed but not performed. When asked if upgrades were done in the last year, for example from a uBVIP to a BVIP, less than 1% of HHs (0.7%) reported upgrading their latrine. Sixty-eight percent (68.6%) reported upgrades were not needed, while 30.7% reported upgrades were needed but not done. Similarly, over the last five years, less than 1% of HHs (0.3%) reported upgrading their latrines, with 70.3% reporting upgrades were not needed, and 29.3% reporting upgrades were needed but not done. However, pit latrines and improved latrines such as the uBVIP and

BVIP require emptying of the septic pit once full and occasional repair of the slab, lid, seat, or superstructure (WHO, n.d., p. 107-110). The HH questionnaire defined maintenance as "repairs needed for toilet functionality." Given this framing, it is possible that respondents did not fully understand the question or consider emptying their pits as maintenance. Regular maintenance such as cleaning the drop hole, seat, handle of lid, slab, and superstructure to remove any excreta/urine was also not considered maintenance per the questionnaire which could explain the low reported maintenance as well (WHO, n.d., p. 107-110).

SAG Semi-Structured Interviews

To assess the extent to which community-based structures like SAGs contributed to sustained sanitation outcomes, semi-structured interviews were held with six (6) SAG members (all women), spanning the same number of groups, in wards 2, 4, 5,7, 10, and 15. In these interviews, members provided further insight into OD and access to and use of latrines among village HHs. Two members mentioned their communities still being ODF, while the others described OD recidivism in their communities due to toilets "destroyed" or "collapsed by heavy rainfall." One member said, "most [of the collapsed] toilets were destroyed by 2020 December rains, so communities are alternatively using the bush". While none of the members mentioned COVID-19 impacts on OD practices in their respective communities, five of the six SAG members communicated the impact of heavy rain and flooding on latrines. As discussed in the literature review, this is a common finding, especially in areas with sandy and rocky soil composition like Chivi District where pits are not adequately lined or supported.

SAG members also mentioned varying levels of access to and use of latrines. Five (5) members described inequitable latrine access among HHs. Only one member reported all HHs having access to a latrine. She went further to say, "We even have a toilet at the borehole." Some

reasons mentioned for community members not using latrines included, “do not have resources to build toilets” and “latrines were destroyed by last year’s heavy rains.” When asked what is needed to ensure everyone uses a latrine when they defecate, SAG members said, “every household must have a toilet”, “regular trainings should be conducted”, “maintaining toilets”, and that community members should be provided with resources, supplies, and support to build or rebuild toilets including cement, bricks, and funding. Some members mentioned instances of collective action and community mobilization to support HHs without sufficient resources to build or rebuild toilets. One member described the community coming together to “mold 4000 bricks so far to support the households who lack resources to build/rebuild toilets”. At the same time, another member shared that some in the community let resource-limited HHs use their latrines “until theirs are rebuilt.” Another member mentioned that the community is “helping them with bricks and money so they can build their toilets.”

Most members (four) described no follow-up or monitoring within the communities post-triggering. One member said CARE followed up monthly with the community after the triggering process “to inspect all households if they have managed to build toilets [and to] conduct trainings on the effects of OD.” This continued monitoring and support ended in 2019 per the SAG member interview. Similarly, another member described post-triggering follow-up in the community. However, this was led by the SAG members twice a month, “encouraging on construction of latrines.” The one remaining active SAG group also reported maintaining ODF status.

The SAG members shared various views on how their actions and activities have created change in their respective communities. Mentioned positive changes spanned impacts on OD and construction of toilets. Specific responses included “all households are ODF”, “reduces the rate

of OD", "many people built toilets", increased awareness of "the importance of toilets", and "community achieved ODF." The members were asked what the role of government in reducing OD should be. The responses shared a common theme: providing support for rebuilding, including the provision of materials like bricks and cement. There were also calls to action around government support for building and reconstructing toilets across resource-limited HHs without access. One member advocated for OD penalties and assistance for individuals living with disabilities. Another member indicated that "government should help us build toilets for those who do not have toilets so as to achieve ODF." Across the interviews, SAG members also shared insights on actions needed for further change on sanitation and sustaining gains made to date. Some mentioned that all HHs should have a toilet and "those without toilets should be helped." Others indicated the need for continued education, training, and awareness campaigns regarding "the importance of sanitation." It was also noted that SAG members should continue monitoring exercises within the community, with another mentioned maintenance of toilets.

These recommendations are made alongside an increased budget allocation by the GoZ toward sanitation for fiscal year 2021/2022 (Sanitation and Water for All, 2021). This funding will support the continued rollout of Zimbabwe's national strategy for eliminating OD, an effort led by the National Sanitation and Hygiene Taskforce. Demand-led sanitation is at the center of this strategy, with "communities who are financing the construction of their own household latrines" (Sanitation and Water for All, 2021). In the past, particularly throughout the implementation of its 2011-2015 national sanitation and hygiene strategy, the GoZ promoted a non-subsidized sanitation approach, yet their current national strategy for eliminating OD seems to include some targeted subsidies (Kanda et al., 2021; Sanitation and Water for All, 2021). At the same time, in a 2019 WASH sector review, the GoZ recognized that a critical intervention

area for the sector entails maximizing "the value from existing public funding by incentivizing sector performance, improving subsidy targeting and better sector planning and management" (Sanitation and Water for All, 2020). This suggests that while the GoZ has recently enacted pro-poor subsidized sanitation policy, subsidy targeting could be improved.

District Government Stakeholder Semi-Structured Interviews

Semi-structured interviews with three (3) district government stakeholders (all men) provided additional insight into study findings pertaining to OD recidivism. Officials shared challenges around communities sliding back into OD after being certified as ODF. A common theme shared pertained to environmental impacts on sanitation sustainability. District stakeholders cited heavy rains, floods, and natural disasters resulting in destroyed or collapsed latrines. One district stakeholder said, "the challenge with communities has always been on sustainability, some toilets were pulled down by the floods recently experienced in the district." Also cited as challenges to sustaining ODF was lack of ownership, "no appreciative of good benefits for toilets", and lack of continuous monitoring and support to communities. In contrast, all stakeholders interviewed reported the number of ODF communities increasing in the last three-five years due to an uptake in information on health and hygiene, demand-led sanitation, and partnership with the private sector in WASH.

When asked what the most challenging aspect of increasing latrine use for communities is, some reported "donor syndrome" or "dependency syndrome" as key challenges affecting the use and ownership of toilets and achieving ODF. One stakeholder from the Ministry of Youth said, "people need information about health and hygiene and dangers of open defecation," emphasizing the continued need for WASH education and its importance in disease prevention. District stakeholders also felt there are disparities in access to toilets within communities,

particularly among individuals with special needs. They reported that individuals using wheelchairs and those with other physical challenges require certain latrines that are often not accessible. One district stakeholder also shared disproportionate use of latrines between permanent and non-permanent residents of wards.

Several recommendations were shared regarding ways to address these challenges, including 1) triggering all wards as well as "cascading correct information on dangers of OD" and 2) "holding meetings with community leadership." Other feedback provided surrounded the importance of WASH education and data management. A District Environmental Health Officer reported, "WASH data is not effectively updated hence the issue of real time reporting is not working for decision making." At the same time, a representative of the Ministry of Youth recommended that we "encourage households to construct permanent and lasting infrastructures especially latrines and hand washing facilities [and] teach communities on sustainability."

Village Head Semi-Structured Interviews

Twenty-two village heads (1 woman and 21 men) representing the same number of committees across all nine study wards (1, 2, 3, 4, 5, 7, 8, 10, 15) were also interviewed to deepen understanding of the state of WASH in CWP communities. In the interviews, nine village heads reported their community is ODF, while twelve indicated that their villages are not ODF. One village head did not know the current status of his community, stating, "what I know is it was once ODF." All but three village heads indicated sanitation access disparities in their communities, with some HHs not having a latrine. Twenty village heads also mentioned environmental impacts on HH latrines, with "heavy rains", "harsh weather conditions", "floods", causing them to collapse. Some village heads also noted that a few latrines are cracked. Proposed reasons beyond collapse by rain and flood included "new families or homestead", "inadequate

materials to construct toilets", "lack of knowledge on the importance of latrines", "poverty", and "ignorance to change." One village head shared insight on sustained latrine maintenance and use, saying, "most built pit toilets but most have not maintained them and are no longer using them."

Key themes surrounding the challenges of reaching and sustaining ODF status emerged from the semi-structured interviews with village heads, including "limited" or "inadequate" resources for constructing latrines, with HHs not able to afford construction costs like cement and other materials. One village head commented on this theme, stating, "many households have dug pits only and cannot afford to construct [latrines]." Another indicated the materials might not be available for construction. Four village heads suggested that "negative attitude by community members" is a challenge in communities reaching ODF status. Other village heads commented on lack of awareness of the value of latrines. For instance, some said, "others do not see the importance of latrines" and "others are reluctant to construct latrine." On the other hand, village heads shared challenges pertaining to maintaining ODF status in their respective communities, with common themes including lack of resources and materials, latrine collapsing due to heavy rain, and attitudes and behavior of community members. For instance, one village head indicated that there is a lack of sustained behavior change after projects exit the community, saying "people forget about WASH when the project ends." Another stated that "most households are used to OD so it's hard to change their way of thinking." While these challenges provide further insight into individual perceptions regarding HH latrine use and OD, it is important to highlight the quantitative and qualitative data disparity. The former suggests that latrine use has remained high, while the interviews with village heads paint a different picture. This is likely a result of how the KII tool for village heads was structured. Questions around sanitation were focused primarily on OD recidivism and the challenges of maintaining and reaching ODF.

The semi-structured interviews also sought to understand village head perceptions around needed resources, actions, policies, etc., for creating an enabling environment in which everyone uses the latrine when defecating. Some referred to punitive measures like enacting fines for those engaging in OD, while others pointed to the need for equitable latrine access, ensuring every HH has a facility. Several village heads specifically mentioned supporting “those without” and “the vulnerable” with latrine construction. Others reflected on the need for continued education, “sensitization” and “awareness programs” on the importance of latrines and an ODF community. A few village heads also indicated the need for building materials, “cash to pay builders”, and “empowering the community.” One village head suggested new HHs prioritize sanitation infrastructure when building a new home, saying that to ensure everyone uses the latrine when defecating, “new families [need] to build toilets first before building main house.”

Predictors of HH Latrine Use

Logistic regression was estimated to identify potential factors that affected HH latrine use. Given all communities sampled were ODF at CWP endline, this estimation provided insight into the factors impacting latrine use post-project. The strongest predictors of HH latrine use included HHs headed by males (OR: 5.14, p=0.004), “feeling safe” when toileting at night (OR: 9.44, p<.001), HHs with gender-separate toileting areas (OR: 20.72, p=0.006), COVID-19 impacts on water (OR: 5.09, p=0.017), and HH access to an improved water source (OR: 4.38, p=0.006). The odds of HH latrine use were 5.14 times higher among HHs headed by men than women, holding other co-variates constant in the model. There was also a significant association between HH latrine use and perceptions of safety. The odds of HH latrine use were 9.44 times higher among respondents reporting “feeling safe” when toileting at night compared to respondents who do not feel safe. HHs that reported having a gender-separate area for toileting

had 20.72 times higher odds of HH latrine use than HHs without. Lastly, there was a positive association between HH latrine use and access to an improved water source. HHs with access to an improved water source had 4.38 times greater odds of latrine use than HHs without access. There was no significant association between HH size, village population size, length of programming (old wards), education level of HH head, main HH income source, or roundtrip water collection time (Table 11).

Table 11. Logistic regression for HH latrine use as dependent variable

Independent Variables	B	P-value	OR
HH Head Male	1.64	**0.004***	5.14
HH Size[1]	-0.047	0.65	0.95
Village Population Size[1]	-0.001	0.78	1.00
Old Wards[2]	-0.76	0.15	0.47
Education Level of HHH[3]		0.76	
Primary	-0.42	0.60	0.65
Secondary, College or University	-0.55	0.45	0.58
Main HH Income Source[4]		0.91	
Farming or Casual Labor	-0.90	0.46	0.41
Formal Employment or Pension	-0.92	0.52	0.40
Remittances	-0.80	0.54	0.45
Safety: Respondent Feels Safe Toileting[5] at Night (Yes)	2.25	**<0.001***	9.44
Privacy: HH Has Gender-separate Toileting Area (Yes)	3.03	**0.006***	20.72
COVID-19 Impact: COVID-19 Impact on HH Water Access (No)	1.63	**0.017***	5.09
Improved Water Source: HH has Access to Improved Water Source (Yes)	1.48	**0.006***	4.38
Water Collection Time: Roundtrip Water Collection within 30 Minutes (Yes)	-1.55	0.15	0.21
Constant	0.27	0.90	1.30

1) Continuous variable 2) Villages (and subsequent HHs) in Wards 2,4,5,6, and 7 received CWP intervention for a longer period and are referred to as "Old Wards". There is an assumption that the longer programmatic services are received, the greater the WASH outcomes and impact. 3) Reference variable = no formal education 4) Reference variable = buying and selling or other 5) Using the toilet or area used as a toilet

Hygiene

Handwashing

Over thirty-four percent (34.6%) of survey respondents reported "always washing their hands with soap at critical times." There was no significant difference in handwashing between old wards and new wards. Despite more than a third of respondents reporting always washing their hands with soap, enumerators observed soap next to a functional handwashing facility (defined as being equipped with water) within 10-15 meters of the latrine in only 1.9% of HHs; sixteen percent (16.5%) of HHs were observed to have a functional handwashing facility within 10-15 meters of the latrine. However, these were without soap (Table 12). Self-reported handwashing bias has also been recognized in the wider literature as a result of several factors, including social desirability responding (an "individual's tendency to respond in a socially desirable manner"), "the need to conform to social standards", recall error, and cognitive dissonance (Contzen et al., 2015, p. 3).

Table 12. Observations of handwashing facilities equipped with water and soap.

Variable	Observation	n	%	Std. Error	95% CI	
					Lower	Upper
Handwashing with soap at critical times	Always	109	34.6	2.6	29.5	39.4
	Sometimes	196	62.2	2.7	57.1	67.3
	Never	10	3.2	1.0	1.3	5.1
Handwashing facility within 10-15 meters of toilet facility	Yes, HW facility w/ water and soap	6	1.9	0.8	0.6	3.5
	Yes, HW facility w/ water	46	14.6	2.0	10.8	19.0
	Yes, HW facility but no water	53	16.8	2.2	12.7	21.3
	No HW facility	210	66.7	2.7	61.0	71.7

To understand the level of handwashing knowledge, respondents were asked to identify the five critical times for handwashing. While only 13.3% of respondents accurately identified the five critical times, most reported knowledge of handwashing before eating (96.8%), after defecating (95.6%), and before cooking (69.5%). Respondents reported lower levels of knowledge around handwashing before feeding a child (24.4%) and after touching child feces/changing a diaper (22.5%) (Figure 10) (CARE, 2017). However, when compared to endline and baseline, knowledge has improved across the board. No CWP baseline data were reported for handwashing before feeding a child or after changing a diaper.

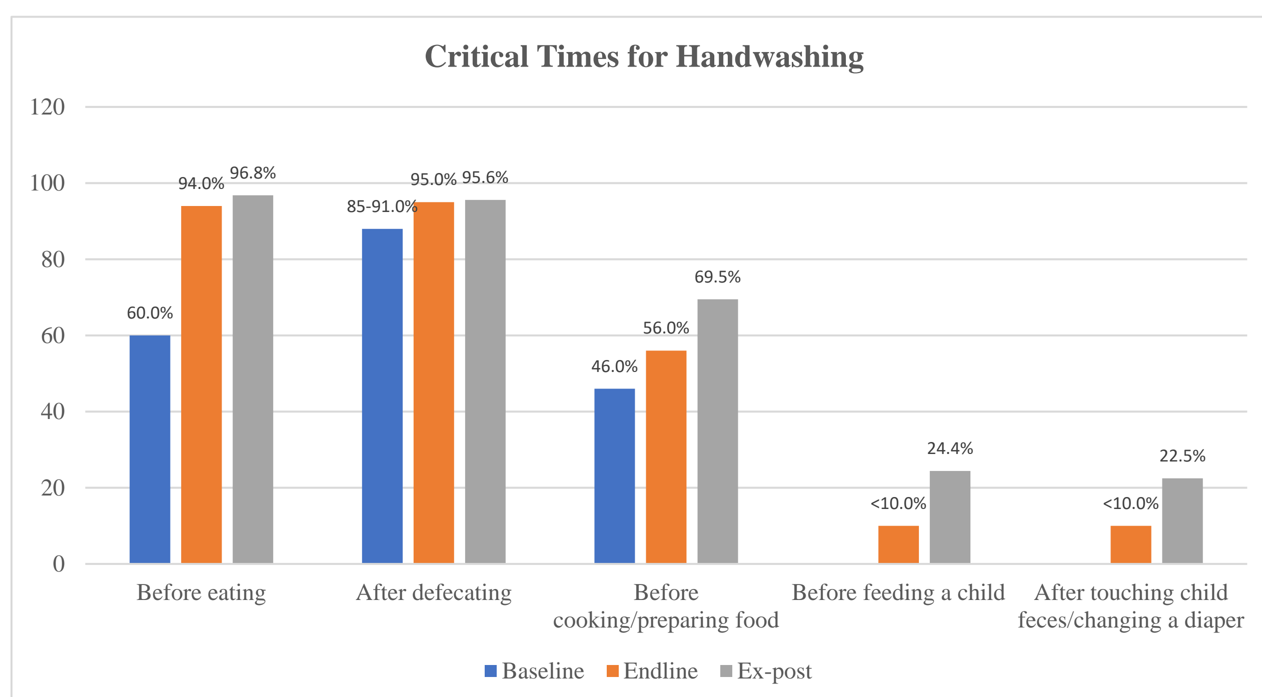


Figure 10. Critical times for handwashing reported by across baseline, endline and ex-post.

Predictors of Handwashing

Logistic regression was estimated to identify potential factors that affected handwashing behavior across the study population. This was performed to better understand the individual and HH level factors possibly impacting handwashing post-project. The strongest predictors of self-

reported handwashing (defined as always washing hands with soap at critical times) included access to an improved water source (OR: 2.19, p=.041), COVID-19 impact on water access (OR: 8.00, p=.047), knowledge of the five critical times for handwashing (OR: 4.99, p<.001), and type of latrine used (OR: 2.70, p=.008). There was a positive correlation between HH having an improved water source and handwashing. The odds of handwashing increase over two-fold if a HH has an improved water source. Similarly, the impact of COVID-19 on broad HH water access is also associated with handwashing. HHs that reported no COVID-19 impact on their HH water access had nearly 8-times higher handwashing odds than HHs whose water access was impacted by COVID-19. Moreover, knowing the five critical times for handwashing increased the odds of handwashing more than 4.9-fold. Lastly, there was an association between the type of latrine used and handwashing behavior. HHs that reported using an improved latrine have 2.69-times higher odds of handwashing than HHs using a pit latrine or no facility/bush/field. There was no significant association between gender of HH head, length of programming (old wards), education level of HH head, main HH income source, roundtrip water collection time, or observed presence of a functional handwashing facility (Table 13).

Table 13. Logistic regression for handwashing with soap at critical times as dependent variable.

Independent Variables	B	P-value	OR
HH Head Male	0.25	0.39	1.29
Old Wards	0.078	0.78	1.08
Education Level of HHH		0.63	
Primary	-0.39	0.39	0.68
Secondary, College, or University	-0.36	0.38	0.70
Main HH Income Source		0.014	
Farming or Casual Labor	1.01	0.17	2.75
Formal Employment or Pension	0.51	0.53	1.70
Remittances	-0.19	0.81	0.83
Improved Water Source: HH has Improved Water Source (Yes)	0.79	**0.041***	2.19

Water Collection Time: Roundtrip Water Collection within 30 Minutes (Yes)	0.036	0.92	1.04
COVID-19 Impact: COVID-19 Impact on HH Water Access (No)	2.08	**0.047***	8.00
Observed Presence of a Handwashing Facility (Yes)	0.050	0.87	1.05
Handwashing Knowledge: Respondent Demonstrates Knowledge of 5 Critical Times for Handwashing (Yes)	1.61	**<0.001***	4.99
Type of Latrine Used: HH Reports using an Improved Latrine (Yes)	0.99	**0.008***	2.70
Constant	-4.92	0.001	0.007

Water

When respondents were asked about the main drinking water source for the HH, most reported using a communal borehole/public tap (67.6%). Over fifteen percent (15.6%) reported using unprotected surface water for drinking, with the remaining using HH protected borehole/wells (7.9%), HH unprotected borehole/wells (5.1%), community protected shallow/deep wells (3.5%), and piped water (0.3%) (Table 14). Of sampled HHs, 79.4% reported using an improved water source for drinking (defined as a community protected shallow/deep wells, HH protected borehole/well, communal borehole/public tap, and piped water into dwelling) compared to about 94% at CWP endline (CARE 2017). However, reported access to improved drinking water was significantly higher among old wards (85.7%), wards that received a longer implementation period and additional water interventions, compared to new wards (75.1%) (p=.023). This finding is consistent with the endline evaluation, which suggested that HH in old wards had greater access to water because they received more water interventions, including drilling of new boreholes, which CWP did not do in new wards (CARE, 2017, p. ii).

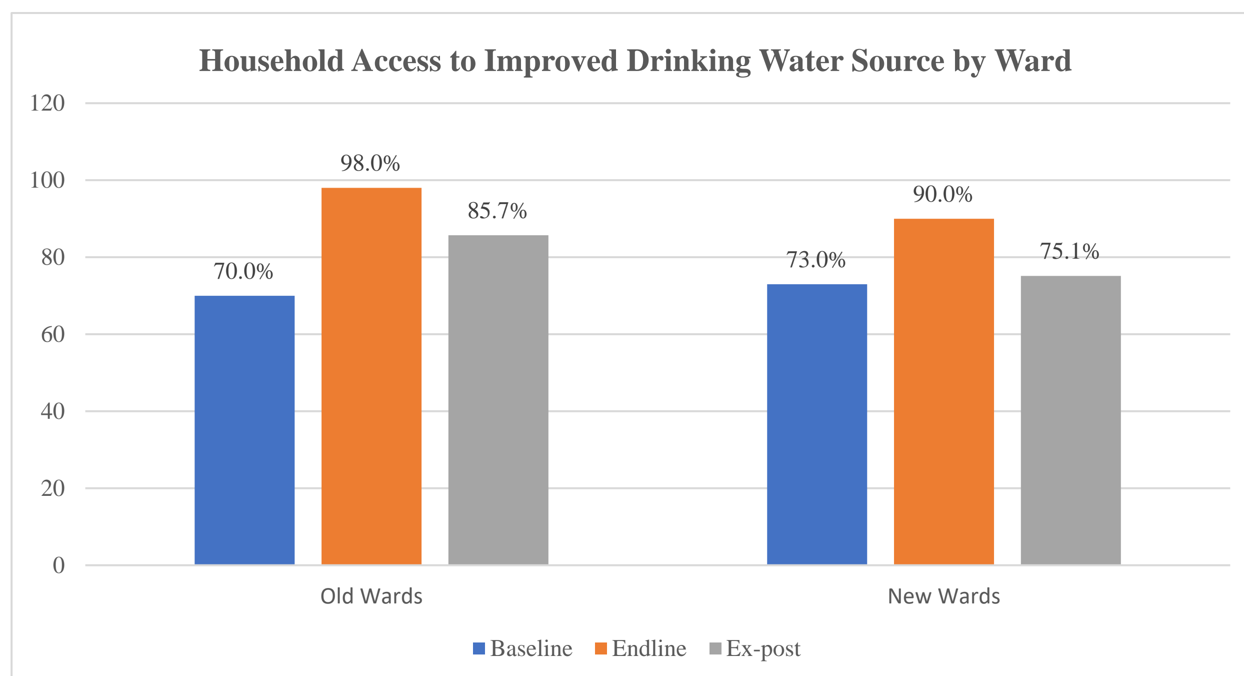


Figure 11. Comparison of ward-level HH access to improved drinking water sources across baseline, endline, and ex-post.

Fifty-eight percent (58.7%) of respondents reported their main HH water source is always working, with 41.3% reporting some levels of disfunction. At the same time, 14.9% of respondents reported not having sufficient quantities of drinking water when needed over the last 30 days. Greater than one in five HHs (21.0%) said water point repairs required longer than one week, while 33.9% reported more timely repairs of one week or less. Regarding perceived water quality, seventy-two percent (72.7%) said water has an “acceptable” taste, and 94.6% reported water having no odor when bringing it from the water point (Table 14).

Table 14. Household drinking water source and quality.

Variable	Response	#	%	Std. Error	95% CI	
					Lower	Upper
Main source of drinking water for members of HH	Unprotected surface water (i.e., dam, river, lake, stream, pond, canal, irrigation channels)	49	15.6	2.0	11.8	20.0
	Community protected shallow/deep well	11	3.5	1.1	1.6	5.7

	Household protected borehole/well	25	7.9	1.5	5.1	11.1
	Household unprotected borehole/well	16	5.1	1.3	2.9	7.9
	Communal borehole/public tap	213	67.6	2.7	62.2	72.7
	Piped water into dwelling	1	0.3	0.3	0.0	1.3
Household Use of Improved and Unimproved Drinking Water Sources	Improved	250	79.4	2.2	74.6	83.5
	Unimproved	65	20.6	2.2	16.5	25.4
Is your HH main water source always working?	Yes	185	58.7	2.8	53.0	64.1
	No	130	41.3	2.8	35.9	47.0
In the last 30 days, has there been any time when your HH did not have sufficient quantities of drinking water when needed?	Yes	47	14.9	2.0	11.1	19.4
	No	268	85.1	2.0	80.6	88.9
When your HH main water point breaks, how long does it normally take to get fixed?	3 days or less	70	22.2	2.3	18.1	27.0
	4 to 7 days	37	11.7	1.7	8.6	15.2
	8 to 29 days	28	8.9	1.6	5.7	12.1
	A month or more	38	12.1	1.9	8.6	15.9
	It has never broken down/does not have an improved WP	142	45.1	2.8	39.4	50.5
Does your drinking water have an “acceptable” taste?	Yes	229	72.7	2.5	67.9	77.5
	No	86	27.3	2.5	22.5	32.1
Does your water have any odor when you bring it from the water point?	Yes	17	5.4	1.3	2.9	8.3
	No	298	94.6	1.3	91.7	97.1

Water Collection

HHs reported a mean of 115.3 liters collected each day (CI 103.9– 126.8), an average of 25.5 liters/capita/day (CI 21.5 – 29.5). When asked “who usually goes to the source to fetch water for the HH”, 77.1% responded that females 15 years and above usually fetch water. One percent (1.0%) reported females under 15 years, 0.3% responded males under 15 years, and 20.0% responded males 15 years and older (Table 15). Regarding the time burden of water fetching, 54.0% of HHs cited the length of water fetching as requiring 30 minutes or less. This includes going to the main water point, collecting water, and returning to the homestead. More

than a quarter of respondents (27.3%) reported that the water point is very close to or within their homestead. The remaining respondents (18.7%) cited water fetching requiring more than 30 minutes (Table 15).

Of those sampled, 67.9% reported always being able to collect all water needed each day, while 31.7% reported sometimes being able to and 0.3% never being able to (Table 15). Sixty-two percent (62.9%) of HHs reported always getting water from the same water source (Table 15). Explanations for why HHs cannot always get water from the same water source included boreholes drying up during the dry season, long distances to water source, pump and borehole malfunction and breakages.

Table 15. Water collection responsibility, length required for collection, and ability to collect daily water needs.

Variable	Response	n	%	Std. Error	95% CI	
					Lower	Upper
Who usually goes to the source to fetch water for the HH?	Female (under 15 years)	3	1.0	0.6	0.0	2.2
	Female (15 years and above)	243	77.1	2.4	72.4	81.6
	Male (under 15 years)	1	0.3	0.3	0.0	1.0
	Male (15 years and above	63	20.0	2.3	15.6	24.8
	N/A: Water point in house or homestead	5	1.6	0.7	0.3	3.2
How long does it take to go to the main water point, get water, and come back?	Within 30 minutes	170	54.0	2.8	48.6	60.0
	More than 30 minutes	59	18.7	2.1	14.3	22.9
	Water point is very close/within homestead	86	27.3	2.5	22.2	32.1
Is your HH able to collect all the water you need each day?	Always	214	67.9	2.5	63.2	73.0
	Never	1	0.3	0.3	0.0	1.0
	Sometime	100	31.7	2.5	26.7	36.5
Do you always get water from the same water source?	Yes	198	62.9	2.8	57.1	68.3
	No	117	37.1	2.8	31.7	42.9

Water Treatment & Storage

When asked what they "usually do to the water to make it safer to drink", around seven percent (7.6%) of all HHs reported treating drinking water, with the most common forms of treatment reported including: 1) aquatabs/waterguard (66.7%), 2) boiling (29.2%), and let stand and settle (4.2%). Regarding water storage, in this ex-post evaluation and the endline evaluation, safe storage of water was defined as a having a container with a lid. Since endline, there has been a 31.2 - 34.2% decrease in the proportion of HHs using safe water storage methods (CARE, 2017). When asked how HHs mainly store drinking water, 24.1% reported using a wide-mouthed container without a lid, 17.1% using a narrow-mouthed container without a lid, 57.8% using a wide-mouthed container with a lid, and 1.0% using a narrow-mouthed contained with a lid (Table 16).

Table 16. Frequency distribution of HH water storage practices.

Variable	Response	n	%	Std. Error	95% CI	
					Lower	Upper
How is your HH drinking water mainly stored?	In a wide-mouthed container without a lid	76	24.1	2.4	19.4	29.2
	In a narrow-mouthed container: without lid	54	17.1	2.1	13.0	21.3
	In a wide-mouthed container with a lid	182	57.8	2.8	52.4	63.2
	In a narrow-mouthed container: with a lid	3	1.0	0.5	0.0	2.2

Water Point Management

The systems-based water point management model promoted by CARE included the establishment of WPCs that manage the financing, maintenance, and minor repairs of water points in coordination with VPMs and DDF, the local authority facilitating major repairs and other needs outside of the scope of VPMs and WPCs. The WPC is thus a structured and supported water point management model. Most HHs reported having a WPC (81.9%), while

1.3% reported having a private operator, and 1.0% reporting school management of water points. Over three percent (3.2%) reported not knowing who manages their water point, while 1.2% reported having multiple management bodies, and 11.4% reported “other”, consistent with the CWP endline in which the majority of respondents (73.0%) reported having a WPC controlling their water access and management. Seventy-four percent (74.6%) of respondents reported always being satisfied with their water point management, while 15.2% and 10.2% reported never or sometimes being satisfied. The greatest level of dissatisfaction was reported in wards 4, 8 and 10; these three wards accounted for about 62.5% of all “never satisfied” responses (Table 17).

Table 17. Water point management satisfaction by ward.

Variable	Ward	Always n (%)	Sometimes n (%)	Never n (%)	Total N
WP Management Satisfaction*	1	28 (58.3)	15 (31.3)	5 (10.4)	48
	2	38 (79.2)	6 (12.5)	4 (8.3)	48
	3	24 (100.0)	0 (0.0)	0 (0.0)	24
	4	16 (66.7)	1 (4.2)	7 (29.2)	24
	5	18 (72.0)	3 (12.0)	4 (16.0)	25
	7	24 (82.8)	0 (0.0)	5 (17.2)	29
	8	24 (61.5)	4 (10.3)	11 (28.2)	39
	10	30 (71.4)	0 (0.0)	12 (28.6)	42
	15	33 (91.7)	3 (8.3)	0 (0.0)	36
		235 (74.6)	48 (15.2)	32 (10.2)	315

*p-value <.001

Across respondents, 62.5% reported paying a water point maintenance fee; however, fees are only paid when the borehole breaks down. Of those paying water point maintenance fees, 86.3% reported fees being affordable. The mean HH water point maintenance fee reported was $1.19 per month (CI 1.04 – 1.33). Respondents shared insight into WPC communication, planning, and siting of community WPs. Among survey respondents, 70.8% reported WPCs

communicate with the community on income, repairs, and expenses, with 8.3% citing no communication, 14.3% reporting having no WPC, and 6.7% did not know (Table 18).

Table 18. Water point management, satisfaction, fees, and community engagement.

Variable		n	%	Std. Error	95% CI	
					Lower	Upper
Who manages the improved water source(s) in the community?	WPC	258	81.9	2.2	77.5	86.0
	Private Operator	4	1.3	0.6	0.3	2.5
	School	3	1.0	0.5	0.0	1.9
	Do not know	10	3.2	1.0	1.3	5.4
	Other	36	11.4	1.8	7.9	15.2
	Private operator and WPC	2	0.6	0.4	0.0	1.6
	WPC and other	2	0.6	0.5	0.0	1.6
	Total	315	100.0	0.0	100.0	100.0
Satisfied with the water point management	Always	235	74.6	2.4	69.8	79.4
	Never	48	15.2	2.1	11.4	19.7
	Sometimes	32	10.2	1.7	7.0	13.7
	Total	315	100.0	0.0	100.0	100.0
Do you pay any water point maintenance fee?	Yes	197	62.5	2.8	56.8	67.6
	No	118	37.5	2.8	32.4	43.2
	Total	315	100.0	0.0	100.0	100.0
Is the amount paid for water affordable?	Yes	170	86.3	2.4	81.2	91.4
	No	27	13.7	2.4	8.6	18.8
	Total	197	100.0	0.0	100.0	100.0
Does the Water Point Committee communicate with the community on income/repairs/expenses?	Yes	223	70.8	2.6	65.7	75.6
	No	26	8.3	1.5	5.4	11.4
	N/A: no water committee	45	14.3	2.1	10.5	18.4
	Do not know	21	6.7	1.4	4.1	9.8
	Total	315	100.0	0.0	100.0	100.0
Was your community consulted on the original siting of the water point?	Yes	180	57.1	2.9	51.7	62.9
	No	66	21.0	2.3	16.5	25.4
	Do not know	69	21.9	2.4	17.1	26.3
	Total	315	100.0	.0	100.0	100.0
Was your community involved in planning on how to manage the water point?	Yes	199	63.2	2.8	57.8	68.6
	No	61	19.4	2.2	14.9	23.8
	Do not know	55	17.5	2.2	13.0	21.6
	Total	315	100.0	0.0	100.0	100.0

Regarding community engagement by WPCs, 57.1% of HHs reported communities being consulting on the original siting of the water point, with 21.0% reporting not being consulting and 21.9% did not know. Furthermore, 63.2% of HH respondents reported the community being

involved in planning on how to manage the water point, while 19.4% reported not being involved and 17.5% did not know (Table 18). The study found a significant association between WPC consultation of communities during water point siting, WPC involvement of communities in planning on water point management, and ward. A higher proportion of HHs in wards 4, 8 and 10 indicated communities neither being engaged on original water point siting (p=.001) nor planning on how to manage water points (p=.0024) (Table 19).

Table 19. Water point committee consultation and engagement of communities in water point siting and management disaggregated by ward.

Variable	Ward	Yes n (%)	No n (%)	Do Not Know n (%)	Total N
Was your community consulted on the original siting of the water point?*	1	35 (72.9)	4 (8.3)	9 (18.8)	48
	2	28 (58.3)	6 (12.5)	14 (29.2)	48
	3	13 (54.2)	5 (20.8)	6 (25.0)	24
	4	13 (54.2	8 (33.3)	3 (12.5)	24
	5	18 (72.0)	5 (20.0)	2 (8.0)	25
	7	11 (37.9)	4 (13.8)	14 (48.3)	29
	8	25 (64.1)	11 (28.2)	3 (7.7)	39
	10	17 (40.5)	15 (35.7)	10 (23.8)	42
	15	20 (55.6)	8 (22.2)	8 (22.2)	36
	180 (57.1)		66 (21.0)	69 (21.9)	315
Was your community involved in planning on how to manage the water point?**	1	35 (72.9)	4 (8.3)	9 (18.8)	48
	2	35 (72.9)	5 (10.4)	8 (16.7)	48
	3	19 (79.2)	4 (16.7)	1 (4.2)	24
	4	14 (58.3)	7 (29.2)	3 (12.5)	24
	5	16 (64.0)	6 (24.0)	3 (12.0)	25
	7	13 (44.8)	5 (17.2)	11 (37.9)	29
	8	26 (66.7)	10 (25.6)	3 (7.7)	39
	10	16 (38.1)	14 (33.3)	12 (28.6)	42
	15	25 (69.4)	6 (16.7)	5 (13.9)	36
	199 (63.2)		61 (19.4)	55 (17.5)	315

* p-value = .001; ** p-value=.0024

WPC Semi-Structured Interviews

To assess to extent that WPCs have effectively managed water service, 12 WPC members (8 women and 4 men) representing the same number of committees across eight wards (1, 2, 3, 4,

7, 8, 10, 15) were interviewed to deepen understanding of WPC governance, water point functionality, reliability, financial management, and community and government support for maintaining water points. Across the semi-structured interviews, WPC members provided insight into the functionality of both the WPCs and community water points. Nine of the twelve WPC members reported that their committees are still functional, with meeting cadences including weekly, biweekly, thrice monthly, monthly, and every three months. Five members indicated that their WPCs are not functioning and/or not meeting regularly. One member said the WPC is functioning but has never met since COVID, and similarly, another said, "the WPC is not functioning. WPC last met in 2019." Two other members said the WPCs are functioning; however, when asked if they meet regularly one said "we met last in February 2021 due to farming activities" while another said "yes [we meet] once in three months. We did not meet because we were in the rainy season and we were collecting water from roof tops".

Eleven of twelve WPC members reported the proportion of women in leadership positions at 50% or higher, with eight WPC members indicating 67% and above levels. Seven WPCs shared that their committees are led by women, with a woman serving as president across each group. Eight members indicated that their WPCs have written bylaws and/or legal status. When asked if their water points are still functional, ten of the twelve members indicated functionality of their water points, while two members said their water points are not functional and/or need major repairs. Both of these dysfunctional water points are in communities (Wards 4 and 10) where WPCs are also not functioning or meeting regularly. Similarly, these groups do not have adequate finances for minor and major repairs. In contrast, half of WPCs members reported water points in poor condition, characterizing them as "too old" and "poor quality." Some members shared that the pipes have "fallen inside" or "into the borehole." Others indicated

issues with rusty pipes and water, missing or loose bolts, having “no fence”, and the pumps requiring “more than 30 strokes” and being “heavy.” Of the others that reported water points in good condition, one WPC member stated that while it is well constructed, “it is only 9 meters deep”.

Most committee members (eight) indicated timely repair of water points when they break down, reporting one week or less repair times. Responses included “one day, the VPM is always available”, “less than two days”, “a few days”, “2-3 days”, “less than a week”, and “1 week.” However, one respondent noted that repair times depend on the availability of VPMs and the type of repair needed, saying repairs require “less than 2 days if the VPM stays in the village, but if it is a bigger problem it takes 2 weeks.” Conversely, two members indicated repair times of more than a year, with one member stating that the water point has not been repaired since 2018 despite not being functional and collapsing due to heavy rainfall. Causes of breakdowns shared by members were similar and included “leather cups”, overuse and “too much pressure on the borehole”, issues with cylinders, loose, falling, or too few pipes, lost bolts and nuts, loose valves, “inadequate grease for lubrication”, and having “no stand.”

Seven WPCs members reported either insufficient water yield, water points drying up, or both, with several indicating impacts on water yield during the dry season. These members also shared HHs in the community resorting to use of alternative water sources, including unprotected HH wells, boreholes in other villages, unprotected surface water, dams, and shallow wells. One WPC member commented on the implications of insufficient water yield on community members, stating, “in the dry season they fetch in another village and it takes three hours to get there.” Eight members indicated that technical support is available from local district authorities;

however, not all WPCs have received support to date. Those that have received support cited receiving training, pipes, or repair services from DDF.

Regarding financial management and support for repairs, most members noted that while they have financial resources for minor maintenance and repairs, there are not sufficient resources for major repairs which require help from local authorities like DDF. Eight members reported committees having water point funds. However, several indicated that these funds currently have no money, and those fund contributions are made when water points break down. While none reported HHs paying fees to access water, some indicated that HHs are required to contribute when water points break down or require maintenance. For instance, one member described the collection of HH fees, saying, "$2.00 is paid per HH only when it breaks down. The caretaker collects the money and hands it over to the treasurer." Members noted that VPMs lead most minor repairs. However, one member cited "the community itself" manages minor repairs while another cited not having a "VPM or tools in the village." Most major repairs were reportedly led by DDF, although one commented on fees for DDF services stating, "we pay for fuel and repair parts as a village.

VPM Semi-Structured Interviews

All six (6) interviewees were VPMs representing wards 2, 3, 4, and 10 (three women, three men). Each mentioned being trained either by DDF, CARE, and/or Red Cross and shared that the trainings were beneficial in improving knowledge and skills of borehole repair. At the same time, one VPM said "we are now knowledgeable about boreholes and [can] determine [the] cause of the problem when it breaks down though I do not have tools to repair boreholes," citing access to tools as a challenge in her role. Similarly, the VPMs shared some missing aspects of training that they wish were included, like "new technologies" and "cylinders." Others

mentioned needing a refresher course and the previous training not being "deep" enough. Another comment about tools was mentioned, stating, "they should have given us tools so that we could depend on ourselves in repairing boreholes."

During the semi-structured interviews, VPMs described their experiences providing services to the community. All but one remains in business. One VPM reported not being in business because "we do not have enough tools to repair boreholes." Regarding income generation, while some VPMs noted receiving payment for their repair services, the earnings across varied. One VPM mentioning not earning enough money in this role, citing, "I don't get any enough money [and] can be paid only $3.00. It's not adequate at all." In contrast, the others shared that they do not generate income as part of their role. All VPMs mentioned service demand challenges, specifically that "demand is not always high" or "not consistent." Some said they are not satisfied because they "do not get any income" and customers are taking "pump minders from other villages." Two VPMs mentioned being satisfied with their earnings. However, one noted that boreholes do not "require repairs everytime." In general, most VPMs either earn supplemental income or no income within their VPM roles.

When asked about the changes observed across communities because of their support as VPMs in maintaining and repairing water points, some said there is "clean water for the whole community," and they can "help my community with repairing of boreholes." In contrast, a VPM said there has been no change "as we still hire someone outside the villages, though we offer some help." VPMs shared additional challenges in their roles, including not having enough tools or "money to buy tools", "not being paid", and "leadership hiring pump minders from other villages whilst we are available." All but one VPM mentioned requiring an adequate supply of tools and repair parts for boreholes to ensure continued services in the community. Another

VPM said, “we need to be paid after repairing boreholes.” One VPM shared COVID-19 impacts on their role and earnings, saying, “we were not free to do our services during COVID-19 and we lived in fear.” All VPMs mentioned that communities were not affected by COVID-19, aside from “fear” of being infected. Half said no when asked whether women face different challenges than men in VPM roles. Conversely, one VPM said, “women are not being considered,” while another said, “women are not respected, we are seen as weak who are not strong to handle the job.”

The VPMs shared recommendations for ensuring the sustainability of WASH services in communities. For individuals, recommendations included maintaining “self-cleanliness”, “building toilets so that we are a free disease community” and ensuring “boreholes are clean.” VPMs mentioned the need for “participation in repairs and upgrades” and “using the borehole with extra care” at the community-level. Also mentioned were recommendations regarding paying VPMs and “making sure no one openly defecates.” All VPMs mentioned the need for additional resources from the government as being necessary for sustaining WASH services. VPMs described needing “more resources”, “help with boreholes and toilets”, “increased water points and boreholes”, “equipment/tool kits for repairs”, and “more handsome payment after repairs.” Lastly, at the service provider-level, VPMs described the role of service providers in WASH sustainability surrounding the provision of affordable materials (like tools and repair parts), timely and equitable services, and village piped water schemes.

District Government Stakeholder Semi-Structured Interviews

District stakeholders described challenging aspects of increasing safe water services for communities, including dry holes, rocky terrain, lack of water understanding, poor siting and fencing of water points. A District Environmental Health Officer described some communities as

being "both dry and rocky with no or very little underground water. Sometimes the water is very hard and not potable," Another stakeholder from the DWSSC shared a similar perspective, saying, "the major challenge is of dry holes in some of the villages hence, no boreholes can be drilled in such villages." At the same time, a representative from the Ministry of Youth described challenges relating to "water point locations usually not central" and "dry holes leading to people resorting to riverbed water sources."

Stakeholders also shared their experiences regarding water access inequity in communities, with all reporting remaining inequalities. All stakeholders discussed the long distances some community members still have to travel to access water. Two stakeholders described the need to use piped water where possible, while another from the DWSCC said, "bush pumps are heavy and they need more boreholes and solar powered water lifting devices." In contrast, all district stakeholders described access to safe water improving over the last three-five year, including through the drilling of new boreholes, installation of solar-powered pumps, "partner corporations", repair and rehabilitation of water points, "resurrection of some piped water schemes", and "mandatory pre and post water quality tests." Across the interviews, stakeholders provided recommendations for addressing water quality and access challenges, including "piped water schemes", "water purifying plants", and "drilling boreholes in other villages." All stakeholders described the introduction of piped water schemes as a key recommendation.

Across stakeholder interviews, all participants described women being involved in WASH services, especially WPCs. A representative from DWSSC said "most members of WPCs are women," while a Ministry of Youth official similarly stated, "70% of WPC members are female." The District Environmental Health Officer provided additional insight, saying that

"female latrine builders and women are in decision making positions in water point committees." When reflecting on whether women are in leadership roles in WASH services, all stated that women are in leadership – specifically as chairpersons for WPCs.

Village Head Semi-Structured Interviews

When asking the village heads about their roles in ensuring communities have reliable and safe water, common responses included "maintaining the borehole." Others stated their role in advocating for support with local government and engaging in awareness-raising activities within the community. One village head said he "seeks help from the government and ensure that water sources are repaired well on time to enable community to have water on time," while another stated he "approaches council and politicians." One village head mentioned that he "promotes hygiene on every village meeting and always finds ways to reduce water borne diseases." Some used the opportunity to share the state of water access in their communities. Some indicated that their boreholes are broken and need repair, while others said they have no borehole. One village head elaborated on the level of water access in his community, stating, "We don't have a borehole in the village and people rely on river sources which never dries up. The river is also far away, and villagers do not treat the water." Several mentioned not having aquatabs to treat water. Others indicated that they must use other water sources like shallow wells, surface water, and other boreholes when water is scarce, particularly during the dry season. On the other hand, some mentioned having greater access to water, with one village head stating, "we have three boreholes in the village." At the same time, another said, "the village uses a borehole which has a good yield and is functioning well."

COVID-19 Impacts

According to the survey, the COVID-19 pandemic had variable impacts on HH water access, with 3.8% reporting increased demand for water in the community, 2.5% reporting more water being used due to COVID-19 prevention activities, 1.0% reporting water points needing repair, and 92.4% indicated no change. When asked if COVID-19 impacted communities' ability to access repair parts for water points, 4.8% of HHs reported impacts on repair part access while 69.2% reported no impacts. About 5.1% of HHs mentioned not knowing, and 21.0% cited N/A as no breakdowns occurred, and repairs parts were not needed. Similarly, the evaluation assessed COVID-19 impacts on repair parts for HH latrines and found 1.6% of HHs reported pandemic-related impacts on access to repair parts for latrines, 75.2% reported no impacts, 3.5% did not know, and 19.7% reported not needing parts for repair (Table 20).

Based on survey results, few respondents (1.3%) felt COVID-19 impacted women differently than men. Those who did report differential gender impacts cited women's gatherings being banned, an increase in HH chores, and no longer going to work due to COVID-19. At the same time, all respondents reported COVID-19 impacts on women's ability to participate in community-level activities or committees. Across the sample, 21.0% reported women not being able to participate in formal gatherings, while 62.2% reported COVID-19 having no effect on women's community-level participation (Table 20). Other qualitative data regarding COVID-19 impacts from the HH survey suggest no COVID-19 impacts on water access or service in more than half of the sampled communities. These impacts cited are consistent with the above and mainly include not being able to meet or gather.

When asked how COVID-19 has impacted meetings or communications between communities and WPCs, 56.5% of respondents noted no impacts. Conversely, 41.6% of

respondents noted COVID-19 impacts on meetings or communications with WPCs, citing having no WPC or not being able to meet due to gathering restrictions. Other reported COVID-19 impacts on water access/service and feedback shared by community members include long queues at water source due to social distancing (2.9%), more water needed to wash hands (0.3%), need for additional boreholes (0.3%), closer water sources (1.0%), and water treatment (0.3%) (Table 20).

Table 20. Household reported COVID-19 impacts.

Variable		n	%	Std. Error	95% CI	
					Lower	Upper
Has COVID-19 impacted your HH access to water?	Increased demand for water in the community	12	3.8	1.1	1.6	6.0
	More water being used due to COVID prevention	8	2.5	0.9	1.0	4.4
	Water point needs repair	3	1.0	0.5	0.0	1.9
	Other	1	0.3	0.3	0.0	1.0
	No change	291	92.4	1.5	89.2	95.2
Has COVID-19 impacted your community's ability to access repair parts for your water point?	Yes	15	4.8	1.2	2.5	7.3
	No	218	69.2	2.7	63.8	74.6
	NA: no breakdowns	66	21.0	2.4	16.5	26.0
	Do not know	16	5.1	1.3	2.5	7.6
Has COVID-19 impacted your community’s ability to access repair parts for your HH toilet?	Yes	5	1.6	0.7	0.3	3.2
	No	237	75.2	2.5	70.2	80.0
	NA: no toilet/no need for repairs	62	19.7	2.3	15.6	24.4
	Do not know	11	3.5	1.0	1.6	5.4
Has COVID-19 impacted women differently than men?	Yes	4	1.3	0.6	0.3	2.5
	No	311	98.7	0.6	97.5	99.7
How has COVID-19 impacted women’s ability to participate in community-level activities /committees?	No formal gatherings	66	21.0	2.3	16.5	25.7
	Other impacts	3	1.0	0.5	0.0	2.2
	No impact	196	62.2	2.7	56.8	67.6
	No comment	2	0.6	0.4	0.0	1.6
	N/A	47	14.9	2.0	11.4	19.0
	Do not know	1	0.3	0.3	0.0	1.0
Anything else you want to share about the impact of COVID-19 on water access or water services in your community?	Long queue at water source due to social distancing	9	2.9	0.9	1.3	5.1
	More water needed to wash hands	1	0.3	0.3	0.0	1.0
	Need for additional boreholes	1	0.3	0.3	0.0	1.0

	Need for closer/nearby water source	3	1.0	0.5	0.0	2.2
	Water has to be treated	1	0.3	0.3	0.0	1.0
	We had enough water	1	0.3	0.3	0.0	1.0
	No comment	218	69.2	2.6	64.1	74.3
	N/A	80	25.4	2.5	20.3	30.5
	COVID did not change anything	1	0.3	0.3	0.0	1.0
How has COVID-19 impacted meetings / communications within your community with the Water Committee?	Yes	131	41.6	2.8	36.2	47.3
	No	178	56.5	2.8	51.1	62.2
	Do not know	6	1.9	0.8	0.6	3.5

District Government Stakeholder Semi-Structured Interviews

All interviews with district stakeholders described COVID-19 impacts water services and availability, including the state of water points, WASH program implementation, and water demand. A stakeholder from the DWSSC mentioned that "some water points broke down during the lock down and they took a long to be repaired." Another stakeholder from the Ministry of Youth said, "programs were not implemented to full capacity due to COVID-19 and gatherings at water sources were limited due to COVID-19 regulations," while the District Environmental Health Officer noted an increase in "the demand for daily use of water at household level." Similar experiences around COVID-19 impacts on use of latrines were shared by stakeholders. Most agreed that COVID-19 impacted the use of latrines, with the District Environment Health Officer sharing that "construction increased a bit as people realized the need for more than one toilet for a household." The Ministry of Youth stakeholder similarly said that "we witnessed the increase of latrine use as most shun OD" among those who had facilities during the pandemic.

Thoughts regarding the impact of COVID-19 on women and men differed across district stakeholders. Some shared that the impacts of COVID-19 were the same for women and men, with impacts reported including "their relatives died" and "regulations." Others described different impacts between women and men, with the District Environmental Health Officer

mentioning that "[because] people were at home because of the lockdown, women had been affected most with additional workload." A Ministry of Youth official described women as being more "exposed" than men across communities. Other observations by district stakeholders regarding COVID-19 challenges included the need to "encourage ODF villages to sustain", "keep WASH infrastructure in place", "improving routing water quality monitoring", and "providing title to land."

Predictors of HH Access to Improved Drinking Water Sources

Logistic regression was estimated to identify potential HH level factors that affected HH access to an improved drinking water source. This was performed to better understand the individual, programmatic, community, and HH level factors possibly impacting safe drinking water access post-project. Based on the model estimation, the strongest predictors of access to improved drinking water sources included length and scope of programming (old ward) (OR: 2.40, p=.024), formal employment or pension as main HH income source (OR: 26.42, p<.001), and presence of a WPC (OR: 17.26, p<.001).

HHs from old wards had 2.4-times greater odds of HH access to an improved drinking water source than HHs in new wards. Main HH income source was also a strong predictor. HHs with formal employment or pension as their main income source had over 26-times higher odds of HH access to an improved drinking water source. Lastly, the output regarding WP management suggests that the odds of a HH having access to an improved drinking water source increases more than 17-fold when the WP is managed by a WPC, compared to other water management schemes (i.e., government, schools, private operator, none). There was no significant association between gender of HH head, HH size, education level of HH head, roundtrip water collection time, or presence of WP maintenance fee (Table 21)

Table 21. Logistic regression for HH access to improved drinking water source as dependent variable.

Independent Variables	B	P-value	OR
HH Head Male	-0.041	0.912	0.959
HH Size	-0.126	0.105	0.881
Old Wards	0.877	**0.024***	2.403
Education Level of HHH		0.715	
Primary	0.446	0.428	1.561
Secondary, College, or University	0.365	0.482	1.440
Main HH Income Source		0.015	
Farming or Casual Labor	1.183	0.053	3.264
Formal Employment or Pension	3.274	**0.001***	26.419
Remittances	1.170	0.094	3.221
Water Collection Time: Roundtrip Water Collection within 30 Minutes (Yes)	0.708	0.091	2.029
WP Management: Water Point Managed by WPC (Yes)	2.848	**<.001***	17.259
WP O&M Cost: HH Pays a WP Maintenance Fee (Yes)	0.043	0.924	1.044
Constant	-2.502	0.015	0.082

Perceptions of Gender Roles

As part of the quantitative survey, the evaluation assessed HH respondents' perceptions regarding the role of women and girls within the community, rights to education, and decision-making power. This information was collected to understand the continued impact of the project on perceptions of HH gender roles and social norms. The literature suggests that women "can act as catalysts for improved practices in their communities, as well as being empowered to drive change by influencing men's participation in WASH development" (Smyrilli & McRobie, 2017, p. 16). The barriers women and girls face in accessing education, attending school while menstruating, engaging in leadership and income-generating roles, and HH decision-making continue can limit the impact WASH interventions have. Assessment of key gender and social inclusion variables was therefore essential.

Regarding HH perceptions around girls' rights to education, the evaluation found that while most respondents (96.5%) strongly agree or agree that "girls should be given equal opportunity to education", nearly one of five respondents strongly agreed or agreed that girls should not attend school when they are menstruating (19.4%). With respect to women's leadership, 96.2% of those sampled strongly agreed or agreed that women should be allowed to play leading roles in community WASH projects. Similarly, 89.5% strongly agreed or agreed that women should be leaders in the community. However, when analyzing responses to questions assessing women's decision-making power, 69.2% strongly agree or agreed that women should obtain permission from her spouse before she goes out to public places. Half (50.2%) of respondents strongly agreed or agreed that the husband should be the decision-maker when purchasing major HH items (Table 22).

Table 22. Household roles and gender perceptions.

Variable	**Girls should be given equal opportunity to education**					**Girls should not attend school when they are menstruating**				
Response	**#**	**%**	**Std. Error**	**95% CI**		**#**	**%**	**Std. Error**	**95% CI**	
				Lower	**Upper**				**Lower**	**Upper**
Strongly agree	302	95.9	1.1	93.7	97.8	52	16.5	2.1	12.7	20.6
Agree	2	0.6	0.4	0.0	1.6	9	2.9	0.9	1.3	4.8
Neutral	4	1.3	0.6	0.3	2.5	9	2.9	0.9	1.3	4.4
Disagree	0	0	0	0	0	94	29.8	2.6	24.8	34.9
Strongly Disagree	7	2.2	0.8	0.6	3.8	151	47.9	2.8	42.2	53.6
	Women should be allowed to play leading roles in community WASH projects					**If my daughter wants, I think it is fine for her to work outside the home**				
	#	**%**	**Std. Error**	**95% CI**		**#**	**%**	**Std. Error**	**95% CI**	
				Lower	**Upper**				**Lower**	**Upper**
Strongly agree	270	85.7	2.0	81.6	89.5	263	83.5	2.1	79.4	87.6
Agree	33	10.5	1.7	7.3	14.0	32	10.2	1.7	7.0	13.7
Neutral	11	3.5	1.1	1.6	5.7	13	4.1	1.1	2.2	6.3
Disagree	0	0	0	0	0	6	1.9	0.8	0.6	3.5
Strongly Disagree	1	0.3	0.3	0	1.0	1	0.3	0.3	0.0	1.0

	A woman should obtain permission from her spouse before she goes out to public places					Women should be leaders in the community just like men				
	#	%	Std. Error	95% CI		#	%	Std. Error	95% CI	
				Lower	Upper				Lower	Upper
Strongly agree	187	59.4	2.8	54.0	64.8	243	77.1	2.4	72.4	81.6
Agree	31	9.8	1.6	6.7	12.7	39	12.4	1.8	8.9	15.9
Neutral	51	16.2	2.1	12.4	20.6	11	3.5	1.1	1.6	5.7
Disagree	20	6.3	1.4	3.5	9.2	4	1.3	.6	0.0	2.9
Strongly Disagree	26	8.3	1.6	5.4	11.4	18	5.7	1.3	3.2	8.3

	The husband should be the decision-maker when buying major HH items				
	#	%	Std. Error	95% CI	
				Lower	Upper
Strongly agree	109	34.6	2.7	29.5	40.3
Agree	49	15.6	2.1	11.4	19.7
Neutral	56	17.8	2.2	13.7	21.9
Disagree	34	10.8	1.8	7.3	14.6
Strongly Disagree	67	21.3	2.3	16.8	25.7

CHAPTER 5

DISCUSSION

Sanitation Summary

Regarding sanitation practices, most metrics remained somewhat stable since the project endline, neither improving nor declining substantially over the last four years. For instance, about 9 in 10 adults sampled (92.1%) reported using a latrine. This is aligned with observational data showing 92.7% of HHs owned a latrine, a relatively minor decrease in latrine ownership since 2017. While OD still occurs in a subset of sampled communities, it remains at low levels, with 7.9% of respondents indicating use of a bush/field/no facility. This is also consistent with observational data showing 7.3% of HHs not having a latrine and 1.3% of latrines not being used. The type of latrines used vary, with nearly three-quarters of HHs using an improved sanitation facility promoted as part of CWP and the Zimbabwe-specific SaFPHHE methodology – BVIP and uBVIP latrines (73.0%). This shows relatively high levels of improved sanitation access compared to some other ex-post WASH evaluations, which report access ranging from 19% to 47% (USAID 2019, USAID, 2020). It also demonstrates high levels of continued use of project promoted and government endorsed latrines.

Upkeep and enhancement of existing sanitation facilities are reportedly low. Only about 1.0% of HHs cited performing maintenance on their latrine, although nearly one-quarter of respondents reported needing to. This may indicate a lack of sustained value of HH sanitation among some latrine owners (USAID, 2020). Other ex-post literature suggests this might also be a

result of “insufficient access to financial and material resources” and that the poorest HHs may “be in a cycle of building poor quality latrines that required frequent repairs or replacement, which had an impact on sustainability” (USAID, 2019). However, how maintenance was defined in the questionnaire may have narrowed HH perceptions of maintenance and thus led to underreporting. At the same time, nearly half of HHs reported building their own latrines (44.8%), with a majority built during the project (44.8%) or after (12.4%). This may suggest that CWP created strong demand for sanitation and that supply has generally been able to support it. In fact, the motivations reported by respondents regarding latrine construction point to the positive influence of the project and its sanitation awareness efforts.

While over ninety percent of sampled HHs reported using latrines, district-level data suggests that only one-quarter of sampled CWP communities (27.6%, 8/29) are still ODF certified as of February 2021. The district reported ODF certification slippage data is high compared to ex-post evaluations. Most literature shows slippage rates between 9-31% in the African context; however, a few cite higher levels of reversion to OD consistent with these results (Abebe & Tucho, 2020; Odagiri et al., 2017). For instance, a study by PLAN international found an overall slippage rate of 92% based on “a range of criteria… used to originally award ODF status for a village” (Tyndale-Biscoe et al., 2013, p.viii). Similarly, a more recent ex-post evaluation in Mozambique found OD occurring in 73% of communities four years post program, similar to OD rates reported by Chivi District officials in 2021 (USAID, 2020).

Various definitions and criteria for measuring OD slippage are used globally. One study measured ODF status by calculating the percentage of “HHs [that] claimed to know of people who defecated in the open” while another applied five separate criteria including HH having “1) a functioning latrine with a superstructure, 2) a means of keeping flies from the pit (either water

seal or lid), 3) absence of excreta in the vicinity of the house, 4) hand washing facilities with water and soap or soap-substitute such as ash, and 5) evidence that the latrine and hand washing facilities were being used" (Tyndale-Biscoe et al., 2013, p.viii; USAID, 2020). Another study by Stuart et al. (2021) found that ODF certification criteria – particularly latrine coverage thresholds used as a primary criterion for certification – differ by country. For instance, in Ghana and Cambodia, the threshold is 80% and 85%, respectively, while Liberia and Zambia have thresholds of 100% (Stuart et al., 2021).

The same study developed a CLTS performance metric, creating a binary variable for "ODF sustainability" using longitudinal data from Zambia. The researchers defined "a community as sustaining ODF if latrine coverage equaled or exceeded 90% in all follow-up reports posterior to ODF achievement" (Stuart et al., 2021, p. 4066). If this same methodology is applied to this evaluation, the percentage of communities sampled that "sustained ODF" becomes 72.4%, significantly higher than what was reported by district authorities. Since over 90% of CWP HHs are using latrines, it raises the question of whether methods used by the GoZ for measuring ODF in these communities are appropriate, given both user-reported and observational data suggest OD has remained low since the conclusion of CWP. In fact, latrine coverage has remained over 90% in nearly 3 out of 4 sampled communities (21/29) and over 80% in 9 out of 10 sampled communities (26/29) – a significant achievement and demonstration of the long-term impact of CWP in these communities when considering baseline latrine coverage of 48.0-50.0%.

Factors Influencing Sustainability of Sanitation Outcomes

Behavioral, Social, & Cultural

Across the qualitative interviews, some respondents mentioned several behavior-change-related barriers to sustaining sanitation outcomes and maintaining ODF status. A few interview respondents attributed OD to community member attitudes, ingrained habits, mentality around OD, and lack of awareness of the importance and value of latrines. Some community members commented on the challenges of behavior change, stating, "it's hard to change their way of thinking." District stakeholders further said that a lack of ownership, lack of appreciation for sanitation benefits, and donor dependency across community members might also inhibit sustainability. However, these factors did not emerge as barriers to latrine use in the study's quantitative component. This might suggest a disconnect between user perceptions of recidivism and evidence-based drivers of recidivism.

Demographic, Social, & Cultural

Logistic regression showed that HHs headed by men have greater odds of latrine use than those headed by women. This finding is consistent with some studies in Africa, which show disparities in latrine use between HHs headed by men and women in Ethiopia, Mozambique, and Tanzania (Aiemjoy et al., 2017; Carolini, 2012; Kema et al., 2012; Tamene & Afework, 2021). One possible explanation for this could be the disparity in latrine ownership, with higher latrine ownership observed among male-headed HHs in the study (95.7%) compared to female-headed HHs (88.5%). A greater proportion of female-headed HHs do not have a latrine and could thus be more likely to engage in OD because of a lack of access to a HH facility.

Though no explicit explanations emerged from the qualitative interviews or HH survey, the gender disparity could be due to "greater barriers to latrine construction [among widows and

single women], lacking the manpower to dig latrines," as well as higher levels of poverty among HHs headed by women (USAID, 2020, p. 30; Tamene & Afework, 2021). Female-headed HHs may not be able to afford payment to latrine construction service providers, either due to absence of a male partner's financial contribution or "patriarchal values [that] tend to limit socio-economic opportunities in which women are involved in, including the acquisition of resources necessary to build latrines" (Kema et al., 2012, p. 4). These unique challenges could lead to inadequate self-construction of latrines among female-headed HHs, and thus less durable latrines and the inability to pay for reconstruction following collapse or damage (Carolini, 2012; Tamene & Afework, 2021). However, this is speculative and requires further inquiry into wealth disparities between male- and female-headed HHs in Chivi District.

Further quantitative analysis suggests that safety issues, also identified as a determinant of HH latrine use in the logistic regress, remain a barrier for individuals when toileting at night – especially for women. This is also evidenced by the greater proportion of women reporting feeling unsafe toileting at night compared to men. Safety could thus be a motivator for women to practice OD in areas perceived as "safer" at night, closer to the homestead, with better lighting, or with locks to enable privacy and reinforce feelings of safety and security (Caruso et al., 2017; Obeng et al., 2015). Similarly, the linkage between privacy for women and HH latrine use might also be a driver of OD, especially among female-headed HHs. The preference for greater privacy may motivate individuals, particularly women, to find secluded areas when toileting (Caruso 2017; Gebremendhin et al., 2018; Obeng et al., 2015). Having separate areas for toileting, defined as separate locations for elimination for men and women, may influence individual sanitation behavior. In fact, privacy as a concern and motivation for women to use "a more private bush area" has been documented in other WASH literature (USAID, 2020, p. 30). In the

literature, concerns about where to eliminate have been notably expressed among women during menstruation. Caruso et al. (2017) found that "toilet availability does not necessarily enable the privacy women need…toilets can serve to expose women's menstrual status by removing their freedom to privately dispose of materials away from the home" (p. 10). In the context of Chivi, perhaps the availability of a HH toilet in itself is not the only driver of latrine use. Rather, HHs with gender-responsive sanitation may be more likely to use a latrine than those without (Caruso et al., 2017).

Lastly, the results show that level of educational attainment is not a predictor of latrine use across the sample - an unexpected finding. The effect of education on HH latrine use varies across the literature, with many suggesting a positive association between educational status and latrine use while others present contrary results (Leshargie et al., 2018; Nunbogu et al., 2019, p. 2; Oljira and Berkessa, 2016; Sinha et al., 2017; Yimam et al., 2014;). For instance, Kanda et al. (2022) found education is not a significant predictor of BVIP use in the Zimbabwean context, suggesting that perhaps community-based technicians and village health workers within the study area "freely give awareness and knowledge on the use of a BVIP latrine as part of their routine work" (p. 19). Applying this rationale to the Chivi context, previous and continued awareness building of sanitation and the benefits of latrine use through SAGs and other mechanisms may positively influence broader utilization outcomes, particularly among those with informal or no education.

Environmental

In some instances, weather and harsh climatic conditions, like heavy rain and floods, combined with poor construction practices eroded sanitation gains after project closure. In qualitative interviews, numerous district government stakeholders, village heads, and SAG

members discussed challenges related to collapsed and destroyed latrines due to heavy rains in 2020 and 2021. The lack of access to latrines because of environmental factors was cited across interviews and is referred to in many other CARE programs as a barrier to sustained use of latrines and maintaining ODF. In November 2021, participants in the evaluation dissemination meetings suggested the use of dry bonding (construction of latrine pits with stones only, no mortar), as latrines constructed like this last through heavy rains and flooding. They also indicated that uBVIP latrines are not being upgraded, and thus more subject to collapse. An ODF study in Zimbabwe by Kugedera and Machikicho (2017) supports this finding, demonstrating a negative relationship between uBVIPs and ODF achievement. The researchers asserted that communities and HHs might “relax” expectations to upgrade uBVIPs after construction, and “if there is no continuous monitoring and support to communities to upgrade their uBVIPs within a reasonable time there will be relapses with communities going back to practicing OD” (Kugedera & Machikicho, 2017, p. 5)

Financial

Qualitative interviews highlighted the relationship between latrine access and poverty, and the impact of limited financial resources on sanitation sustainability more broadly. SAG members and village heads revealed that poverty and HHs not able to afford construction or reconstruction costs were key factors related to the discontinued use of latrines and OD. Some respondents revealed that inequities in latrine access also have led to OD within the communities. While the regression analysis did not identify income source (a proxy for income levels and wealth) as a predictor of latrine use, the wider literature underlines the linkage between wealth and access to improved sanitation which may have influenced the sustainability of sanitation outcomes across CWP villages (ZIMSTAT & UNICEF, 2019). The inclusion of

more accurate data representative of wealth/poverty levels, as opposed to main HH income source as a proxy, would be necessary to determine the extent of this relationship in the Chivi context.

Structural

CWP built the capacities of SAGs to continue WASH promotion after the program. Qualitative interviews showed most SAGs are no longer playing a significant role in follow-up or monitoring of communities post-triggering. Only one SAG mentioned continued community support and current activity, including bimonthly follow-up dedicated to promotion of latrine construction. This community was also the only one to maintain ODF status across those included in the semi-structured interviews with SAGs, a potential indicator of the linkage between continued support of SAGs and sustained sanitation practices. While this evaluation was not able to assess SAG functionality and continued activity as a predictor of latrine use or ODF, Kugedera and Machikicho (2017) found having an active SAG to be a determinant of ODF status. The study posits that “continuous support of SAGs and CHC by government extension workers including EHTs is essential in ensuring that communities attain ODF status” and presumably sustain it (Kugedera & Machikicho, 2017, p. 5).

District officials interviewed highlighted some other factors that may impact sanitation sustainability, including inadequate data collection systems that do not capture real-time, leading to authorities' lack of data-informed decision-making. Two other district officials said more needs to be done to educate communities on sanitation and OD while also promoting the construction of higher-quality latrines. However, evidence across the HH survey and remaining semi-structured interviews suggests education is likely not a driver of recidivism but rather poor construction quality and motivation to continue making latrine investments once repairs and

upgrades are needed. Dissemination meetings with community stakeholders support this assumption, with stakeholders alluding to other potential challenges with brick molding, dry bonding of pits, and lack of capacity of latrine masons leading to sub-standard quality structures.

Lastly, access to an improved water source was identified as a predictor of HH latrine use as part of this evaluation, consistent with some of the literature that postulates access to water as a "pre-condition" to latrine use (De, 2018; Sinha et al., 2017, p. 913). This finding is expected as latrine construction, operations, and maintenance (including daily cleaning of slabs, lids, etc.) require water; thus, greater access to and availability of water can enable broader latrine use. At the same time, HH reported COVID-19 impacts on water access was also a determinant of latrine use. HHs with no reported COVID-19 impacts on water access had greater odds of latrine use. This may indicate that while availability and the physical presence of a water source influence latrine use, they are not the only water-related factors driving sanitation outcomes. Water access is complex and "shaped by structural and individual characteristics" (Young et al., 2021). In this study, COVID-19 impacts on water access speak to the downstream effect that COVID-19 prevention policy has had on water accessibility. Respondents reported increased demand for water as well as long queues at local water sources due to social distancing and thus increased time burden placed on users and individuals tasked with water fetching. This may have negatively impacted the amount of water collected among some HHs, limiting water collected for latrine use, cleaning, and construction, thus dissuading some from using and/or repairing their latrines.

Hygiene Summary

Despite nearly a third of HHs from CWP villages reporting always washing their hands with soap at critical times, observational data suggest self-reported handwashing may be inflated,

and actual handwashing is much lower. About two-thirds of HHs did not have a handwashing facility (66.7%), while most present facilities were either without water, soap, or both. Enumerators observed soap next to a functional handwashing facility in just 1.9% of HHs. These observations are a significant decline from the CWP endline, which cited nearly 87.0% of HHs with appropriate handwashing facilities at the end of the project period (CARE, 2017). Results from the stakeholder dissemination meeting revealed that many HH tippy taps are no longer functional and need to be replaced, explaining the high levels of HHs without any observed handwashing facility.

Factors Influencing Sustainability of Hygiene Outcomes

While these observations are significantly lower than expected, knowledge of handwashing at critical times has improved since the CWP endline, especially knowledge of handwashing before cooking/prepping food, before feeding a child, and after changing a diaper. The influence of handwashing knowledge on handwashing behavior was reaffirmed through the regression output, confirming the importance of quality handwashing education campaigns in WASH programming. The observed knowledge increases could be reflective national trends. For instance, the Ministry of Health and Child Care reported 71.5% of respondent reported handwashing knowledge before preparing food which is in line with the figure reported in this evaluation (69.5%) (Ministry of Health and Childcare, 2021). Handwashing knowledge may have increased since CWP due to ongoing COVID-19 campaigns and prevention measures led by government and grassroots awareness campaigns (UNICEF, 2021). These efforts promoted hand hygiene aligned with the broader Zimbabwe Preparedness Response Plan on Coronavirus Disease involving "large scale community engagement for social and behavior change approaches to ensure preventative community and individual health and hygiene practice"

(Ministry of Health and Childcare, 2020, p. 17). However, in this study, handwashing knowledge was not widely translated into practice, with only one-third of HHs self-reporting handwashing with soap at critical times.

Logistic regression also found both access to improved water sources and COVID-19 impacts on water were significant predictors of handwashing post-project. The former is aligned with findings in the literature which underline the positive effect of water access on handwashing with soap. In fact, some studies argue that water access and the type of water supply both facilitate handwashing behavior (Gorter et al., 1988; Seimetz et al., 2016); these studies suggest that access to an improved water source like piped water or protected hand-dug wells is an importance enabling factor that contributes to the use of larger amounts of water for hygienic purposes like handwashing (Gorter et al., 1988; Seimetz et al., 2016, p. 1414). Regarding the association between COVID-19 impacts on water access and handwashing, Stoler et al. (2020) provide insight into the effects of COVID-19 and pandemic control strategies on water security and vice versa. Less reliable water supply and limited water service, exacerbated by increased demand, "may limit handwashing, as scare water is often prioritized for other tasks" (Stoler et al., 2020. p. 1).

The logistic regression also found that the type of HH latrine used is also a predictor of handwashing; HHs with a pit latrine or no latrine at all were less likely to report handwashing. This is consistent with the literature which suggests that the type of latrine used by HHs can be a determinant of handwashing practices. Schmidt et al, (2009) found those lower on the sanitation ladder were less likely to practice handwashing, while To et al. (2015) cited a greater likelihood of handwashing among HHs with improved sanitation facilities. One possible explanation could be that HHs with improved sanitation, and thus higher on the sanitation ladder, have better

economic conditions that enable them to construct and maintain the necessary infrastructure for hygienic practices. However, this would require validation through further inquiry into the economic status of the study population not captured as part of this evaluation.

Water Supply and Management Summary

Most HHs (79.4%) reported having access to an improved water source for drinking, a decrease of 14.6% compared to endline. The most common source was a communal borehole or public tap (67.6%). However, this level of access is on the high end of improved water access compared to other ex-post literature, which cites access levels ranging between 24.5 - 83% ex-post (USAID, 2017; USAID, 2020). At the same time, about one in six (15.6%) HHs continued to use unprotected surface water for drinking. Regarding water functionality, over half of HH respondents reported their main water source is always working, while most WPC members indicated that their water points are still functional. Regarding women's engagement in these committees, most reported 50% or greater representation of women in leadership, and half are led by women, demonstrating that the project's gender impacts continued after the project ended. However, while most respondents reported functional water points and WPCs, about half of WPC members and some HH respondents commented on water point conditions. Several cited aging water points, falling pipes, fencing, and missing or loose bolts as necessary repairs. Furthermore, the dissemination meetings with community members suggest that water point functionality may be worse than expressed in interviews with WPC members or have worsened since data collection. However, unlike this evaluation's HH latrine and handwashing components, there are no observational data to confirm self-reported water access or functionality.

In terms of water quantity, 85.1% of HHs reported having sufficient quantities of drinking water. Based on HH surveys, on average, water points provide water quantity at a basic service level (≥ 20 liters per person per day). Over two-thirds (67.9%) of HHs reported being able to always collect their daily water needs. Similarly, most HHs are able collect their water from the same source (62.9%). However, qualitative interviews suggest that some water points have high stroke rates, which require greater time and physical exertion for sufficient water collection. HH perceptions of water quality appear mostly positive, with nearly three-quarters (72.7%) reporting water having an acceptable taste and nearly all (94.6%) reporting water having no odor. Regarding accessibility, more than half of HHs (54.0%) reported roundtrip water collection requiring 30 minutes or less and over a quarter (27.3%) have a water point very close or within their homestead. While the majority reported accessibility, nearly one-fifth of HHs (18.7%) reported water collection requiring more than thirty minutes. At the same time, women bear the brunt of water collection responsibility, with over three-quarters of HHs (77.1%) reporting water fetching led by women and girls 15 years and older.

In terms of reliability – continuous provision of water – some HH respondents and stakeholders indicated challenges, with several water points not providing year-round access mostly due to seasonal failure. In the HH surveys, some respondents said they cannot always get water from the same water source due to boreholes drying up during the dry season or due to borehole malfunction and breakages. Qualitative data, with specific references from WPC members and district government stakeholders, supported these findings. All district government stakeholders indicated reliability issues related to dry holes and community members having to use secondary water sources, including unprotected surface water, to meet their needs. Several WPC members further supported this finding, citing water points drying up or providing

insufficient water yield, with HHs fetching water at secondary sources, traveling to other villages at times. Lastly, compared to CWP 2017 endline, about a third fewer HHs reported safe storage methods, and only a few are treating their water. This is a sizable decrease compared to endline, demonstrating that safe water storage and treatment practices were not sustained.

Factors Influencing Sustainability of Water Outcomes

Demographic & Structural

Nearly a third of HHs (33.9%) reported repairs requiring less than a week. However, over one-in-five HHs cited repairs requiring longer than a week, and over one-in-ten requiring more than a month. This shows that while many water points are in good condition and repaired promptly, some are not receiving the support necessary for ensuring consistent water access. WPC committee members validated these findings, with most citing timely repairs. However, a few WPC members revealed some jarring disparities. One member stated their water point required more than a year to repair, and another indicated the water point has been in disrepair since 2018. These data correspond with HH satisfaction, with over three-quarters of HHs always satisfied with their water point management, which likely indicates that timely repairs and maintaining good water point conditions are drivers of HH satisfaction. Similarly, 70.8% of HHs said WPCs communicated with the community on income, repairs, and expenses. Less HHs reported WPCs consulting them on water point siting (57.1%) and involving them in WP management (63.2%); however, this level of consultation and inclusion is still relatively high compared to many WASH programs.

Logistic regression highlights the impact of the CWP scope and delivery timeline on water access. Old wards that received longer program implementation and a more comprehensive delivery model – specifically the drilling of new boreholes that new wards did

not receive – showed greater access to water both at endline and ex-post. This finding is expected given the greater emphasis on increasing water service coverage through the construction of new boreholes and rehabilitation of existing boreholes in old wards, compared to focus on the latter activity only in new wards. This led to wider access to water in old wards at endline and has had lasting effects demonstrated ex-post (CARE, 2017). This suggests that program design and delivery were determinants of access to improved water sources ex-post. CWP's emphasis on creating new water infrastructure in old wards led to greater access to water over time than in new wards.

Type of employment and HH's main source of income generated from formal employment or pension was a predictor of improved water source access and had greater water access odds than HHs with other main income sources. One possible explanation for this finding could be the association between employment type, income generation level, and wealth. HHs with formal employment and pensions may be more likely to have stable income generation and earn higher wages than those engaged in other employment types, like small-scale entrepreneurship, which can be market-driven and unpredictable. The positive association between wealth and access to improved water is well documented and given its linkage to employment type in this study, it could be a contributing factor to water access in Chivi, with HHs with higher income and wealth ownership more likely to have access to improved water sources (Agbadi et al., 2019).

Some HHs reported having no WPC, while a few WPC members interviewed revealed that they are either not functional or not meeting regularly due to COVID, the farming, and rainy season. At the same time, enumerators cited some sampled villages were without boreholes and thus had no WPCs. This is consistent with program documents which indicate that, at endline, a

subset of communities was not reached with water interventions, nor had WPCs established. With that said, logistic regression indicates that WPCs as a water scheme management structure may contribute to access to improved drinking water sources post-project. The estimation showed that having a WPC is a factor positively associated with access to improved drinking water, with HHs in communities with a WPC significantly more likely to have access to improved drinking water than other HHs. This is an important finding, considering the establishment of WPCs and promotion of strong water governance structures are central to the approach enshrined within CWP.

This could be the result of greater functionality of water points managed by WPCs, thus leading to better water access among communities with WPCs. Previous studies on the effect of WPCs on water facility sustainability in Zimbabwe have found that "where water points had functional WPCs, sustainability was high and the opposite for water points without functional WPCs" (Kativhu et al., 2022, p. 27). The positive effect of WPCs on long-term access to improved water sources in Chivi may also be due its unique responsibility and role in the community, and systems approaches linking WPCs to local authorities and service providers, compared to traditional community-managed water point schemes. WPCs are a coordination body responsible for overseeing the financing and maintenance of the WP. Unlike some community-managed water point schemes, the WPC does not perform repairs itself but instead outsources minor repairs to VPMs while coordinating with DDF and local service providers for major repairs. This unique coordination role may be more manageable for community members and more sustainable as a long-term governance structure for ensuring water access when adequately supported by the government and other relevant actors like VPMs.

Financial, Technical, & Institutional Factors

In terms of water point financing at the HH level, about two-thirds of HHs reported (62.5%) paying maintenance fees. However, most feel these fees are affordable, with an average fee of $1.19 per HH per month. The proportion of HHs paying water management fees is relatively high compared to other ex-post evaluations, which report proportions between 33.0 – 60.0% (USAID, 2019; USAID, 2020). WPC members say that while they have sufficient funds for minor maintenance and repairs, there are insufficient resources for major repairs. Fees and financial systems as insufficient for covering operations and maintenance of water points is a consistent theme across the ex-post literature (USAID, 2019; USAID 2020). This finding was also supported in the dissemination meetings, with community members noting insufficient funds and a lack of mobilization of funds by the community to pay for repairs.

At the same time, some respondents shared that VPMs are not always available for repairs. On the other hand, despite the CWP design and goals around VPMs, about half of VPMs interviewed reported not being paid or paid enough for their services. Others indicated a lack of access to repair tools and spare parts for boreholes. Furthermore, many VPMs noted that they are not properly trained to address all repair needs, including the repair of cylinders and new technologies. These results were also supported by the dissemination meetings during which community members articulated insufficient VPM training for certain water systems and insufficient funds to pay VPMs for their repair services. Some VPMs also noted that the communities sometimes use VPMs from different villages, despite being available for service. In this sense, the project trained VPMs may be undervalued, underpaid, and undertrained, lacking access to the parts and tools necessary for pump repair. This may be linked to the longer repair times and dissatisfaction in some wards and communities. Lastly, gender perceptions and norms

may impact the perceived value and use of women VPMs despite the project's focus on women’s economic empowerment and entrepreneurship. Some women VPMs are neither considered for pump maintenance work nor respected in their roles, indicating that continued gender disparities may exist across the role and the community.

While many WPCs reported receiving support from the DDF for major water point repairs, not all have received support to date. Results from the dissemination meetings suggest the need for more formal repair request channels and informing DDF of boreholes needing major repairs. Village heads validated these findings, stating that communities need money to pay VPMs while highlighting their role in engaging local officials for major water point repairs and support.

CONCLUSIONS

CWP HHs maintained high levels of sanitation use while only a small proportion of HHs reverted to OD. Flooding and heavy rain significantly impacted some sanitation infrastructure, with ultra-poor and vulnerable HHs often unable to recover after these environmental shocks. Some communities are also facing challenges surrounding the supply and affordability of latrine construction materials. At the same time, SAGs did not provide expected levels of support to CWP communities post-project, which may have impacted sanitation outcomes.

Access to an improved water source remained high despite a small-moderate decrease from endline. Many water points remained functional, despite a few breakdowns, aging hardware, and some repairs needed. However, insufficient funds and formal channels for communication and requesting major repairs with local authorities remain a significant barrier to long-term water point sustainability. Although some WPCs did not meet regularly due to rainy seasons and COVID-19 pandemic, many remained active, and HHs appear highly satisfied with their water point management and community involvement. The logistic regression shows WPCs were influential in facilitating continued access to improved drinking water for CWP communities, underlining the importance of this approach within the CWP framework.

Women have taken on leadership roles and are greatly represented across WPCs, driving water points' ongoing management and oversight. On the other hand, some VPMs are often not paid nor recognized in their roles, despite CWP design. This suggests that perhaps this project element was not well integrated and requires further attention during future design and

implementation phases to ensure continued demand and supply for quality local water pump mechanic services. Lastly, HH members in CWP communities continue to exhibit high levels of handwashing knowledge. This shows the hygiene promotion activities embedded within CWP's SaFPHHE approach effectively led to sustained handwashing knowledge. However, despite high and growing handwashing knowledge, most individuals are not translating that into practice nor have functional handwashing facilities.

Limitations

It is important to note the data collection process for this evaluation was performed during the COVID-19 pandemic and following incidences of flooding across certain areas of Chivi District. This may have influenced overall study outcomes, especially the assessment of functional latrines, some of which may have been recently damaged. Also, only HHs in villages that achieved ODF by the end of the project were included as part of the study. These might represent high-performing villages and show positively skewed sustainability outcomes. Also, raw data could not be recovered for comparison resulting in the comparison of aggregate data. This is a significant limitation as statistical application could not be applied between data sets. Lastly, a control group was not included as part of this research, which may impact the analysis given the lack of control for extraneous factors that may have influenced the sustainability of program outcomes evaluated.

FUTURE CONSIDERATIONS & RECOMMENDATIONS

In general, CWP's integrated approach led to sustained understanding of WASH and behavior change across its target population. Its comprehensive design and engagement of district government led to greater access to safe drinking water and improved latrines while also facilitating increased community ownership over WASH management after the project's close. At the same time, some barriers to WASH sustainability have emerged, limiting the impact continuity of certain project components. These barriers and WASH challenges necessitate a call to action for NGOs, private sector, government, and service authorities. The recommendations listed below were developed to inform future program design, policy, advocacy, and multi-stakeholder coordination mechanisms in the WASH sector. These recommendations align with the UNICEF WASH Sustainability framework and build on the successes demonstrated as part of CWP while also addressing gaps and limitations highlighted in this study[5] (UNICEF, 2018).

1. **Promote higher quality latrine construction and strengthen community-based sanitation support mechanisms.** While most HHs still have and use a latrine in CWP supported communities, a major barrier to sustainability and continued use of latrines for a small subset of HHs is related to environmental shocks like floods and heavy rain, resulting in latrine damage - findings cited across the study semi-structured interviews by SAG members, village heads, and district government stakeholders alike. Future projects and government should promote and support HHs to build higher quality latrines that can

[5] These recommendations are not officially representative of CARE but have been pulled out as potential areas for future focus or exploration.

withstand harsh environmental conditions and erratic weather. This could include ***developing more robust criteria for latrine design, construction, and placement*** that facilitate long-lasting functionality and use. The construction should be "specific to the village's geography, conditions, and soil structure" (CARE, 2016). Future efforts should ***integrate proven disaster risk reduction strategies into WASH programming,*** promoting the use of "materials that resist the effects of flooding and erosion", creation of round pits for latrines to reduce risk of collapse, adequate lining [and reinforcing] of latrine pits, and installation of slaps around latrine pits in unconsolidated soils" (Global WASH Cluster, 2011, p. 56-57). Latrine construction should also consider the unique needs of women to ensure their safety and privacy. At the same time, based on the qualitative results surrounding latrine collapse and damage in this study, strengthening latrine construction skills and capacities for latrine masons and community members could improve construction quality across the board, consistent with agreed construction quality criteria, and further improve latrine durability. Construction skills development, especially the more challenging aspects around digging the substructure, lining, and reinforcing pits, should be better integrated into future programming curricula.

2. **Reimagine long-term sanitation financing options for extremely poor and vulnerable HHs**. SaFPHHE, which was central to CWP, promotes the construction of the BVIP latrine, and for resource-poor HHs, the uBVIP latrine using locally available resources, which could eventually be upgraded. While CWP provided technical assistance to community members in building latrines, emphasizing the use of locally available resources to construct latrines that can be progressively upgraded over time, this study shows that upgrades are rarely performed, and some fall into disrepair. According

to the HH survey, less than 1% of HHs reported upgrading their latrines. Some semi-structured interviews within the study suggest that some HHs cannot afford to build or rebuild latrines following damage and collapse. For the most resource-poor HHs, future projects could provide targeted subsidies that facilitate construction of more durable latrines, like BVIP latrines, as opposed to uBVIP latrines which are promoted among the most vulnerable and ultra-poor but shown in this study to not be upgraded over time, leaving them vulnerable to damage and collapse.

3. **Develop a post-ODF strategy.** Given the OD recidivism found in this study, and the abundance of evidence surrounding the lack of sustainability of SaFPHHE (and CLTS broadly), there is a need for continued refinement of the overall strategy and thoughtfulness surrounding post-ODF follow-up and support. Many villages are able to achieve ODF, but there is not a clear understanding of how to maintain ODF. CWP villages would benefit from more consistent post-project sanitation promotion, monitoring, and follow-up. While part of this was a role intended for the SAGs, based on semi-structured interviews, many no longer appear to be functional groups nor providing support for communities; the literature suggests they can facilitate greater attainment and sustainability of ODF status if active post-project (Kugedera & Machikicho, 2017). The roles of SAG members and other community leaders, after ODF is achieved, also needs clarification to ensure continued sanitation support post-project. A post-ODF strategy could thus improve the sustainability of SaFPHHE outcomes. This approach was adopted as part of a national strategy by the Government of Mali to "ensure a coherent and coordinated implementation of the post-ODF phase in order to contribute to the improvement of sanitation and hygiene conditions in rural areas" and implemented in

various programs in coordination with the government with some success (Gnahore & Gueye, 2014, p. 7- 9; Keita, 2021, p. vii). Future sanitation programming should work across stakeholders, including village heads, government WASH stakeholders like the DWSSC, and community-based governance structures such as SAGs, to create ***post-ODF action plans,*** aligned with the wider post-ODF strategy, as well as the Chivi District Development Plan, and define clear roles and responsibilities of service authorities. This should include specific plans for continued monitoring and follow-up, behavior change communication, and stakeholder coordination. It should also include a feedback mechanism for community and district leaders to inform stakeholders of ongoing challenges as well as steps needed for corrective action. Together, these plans would provide roadmaps for stakeholders to continue providing needed support for sanitation at the community level – providing clarity on individual expectations, roles, and responsibilities – while also serving as an accountability mechanism across actors.

4. **Improve availability, accessibility, and affordability of latrine construction materials.** While CWP made efforts to bring materials closer to communities, the supply of latrine construction materials remains a barrier to maintaining and building latrines, with cement and other products not always available for HH purchase. Village heads and SAG members noted challenges to maintaining ODF surrounding affordability of construction materials like cement and materials and the supply not always accessible. One possible way to address these challenges is by creating decentralized supply via small community-based enterprises, which has demonstrated successful in some contexts. For instance, the WASHplus project in Mali (2012-2016) worked alongside local suppliers to ensure more consistent access to latrine construction materials for HH members and

latrine masons (CARE, 2016). If successful in the Chivi context, this would also provide additional livelihood and income-generating opportunities across communities. Another option is for communities to ***self-organize into collectives that can better coordinate with suppliers and traders*** outside the communities for bulk purchase of latrine materials. This could include negotiating planned opportunities for communities to purchase materials that are challenging to transport to rural areas (CARE, 2017).

5. **Enhance borehole siting and drilling practices.** The study highlighted some potential challenges with water source reliability. About a third of HHs (37.1%) reported not always being able to collect water from the same source. Among those who reported not being able to always collect water from the same source, 63.2% cited issues with the borehole drying up or it being "seasonal". At the same time, interviewed stakeholders, including district government officials, village heads, and WPCs, all cited challenges with boreholes drying up. While some best practices are already applied in Zimbabwe, including drilling during the dry season, enhanced borehole siting and drilling practices may address challenges regarding the seasonal failure of water points. For instance, borehole pumping tests should be performed at the height of the dry season "when water levels are at their deepest" (Harvey, 2004, p. 343; MacDonald et al., 2002). Drillers and project management should consider drilling at greater depths for boreholes with low initial yield as well as rainfall levels at the time of drilling. The latter should inform the development of compensation strategies for seasonal drilling to account for seasonal fluctuations. In general, better use of hydrogeological data (i.e., local aquifer characteristics throughout the year) in borehole decision-making processes can mitigate seasonal failure, ensuring greater reliability of water points. Moreover, integrated

accountability and oversight processes for adherence to drilling design specifications during the contracting and construction processes could facilitate greater compliance with planned drilling design.

6. **Establish stronger coordination mechanisms with government stakeholders to address WASH disparities, timeliness of water point repairs, and water point infrastructure degradation.** Semi-structured interviews indicate a need for greater support from local water service authorities in addressing major water point repairs. For instance, several WPC members said they have not received support to date from local authorities, specifically regarding major water point repairs. Furthermore, 12.1% of HHs reported WP repairs requiring over a month, leaving a sizable proportion of HHs with limited access to safe water due to repair delays. In the Chivi context, a stronger coordination mechanism between the WPCs and DDF could facilitate increased frequency and timeliness of repairs, particularly major repairs beyond the technical scope of VPMs. This could include strengthening formal channels for communicating water point repair needs and improving district-level monitoring and support for maintaining the functionality of community boreholes. In the same vein, refresher courses for VPMs provided by the local government may enhance their technical capacity to address minor repairs with higher quality and consistency, improving demand for and trust in their services and thus addressing payment for service challenges. Ward officials should also be engaged to explore further ward-level disparities in water outcomes, including water access, water point management, and community governance.
7. **Create a stronger financing model for water point maintenance, operations, and repair:** Less than two-thirds of HHs (62.5%) reported having to pay a water point

maintenance fee; however, most fees are only paid once water points need repair. Some interviewed stakeholders suggested that WPCs do not have sufficient resources at times for repairs, especially major repairs. A regular tariff collected by WPCs, as opposed to the current "as needed" model, could create more significant reserves and better support water point maintenance and repair costs in the future.

8. **Ensure a mechanism for facilitating access to spare parts for water points and tool kits accessible to VPMs**. Several interviewed WPCs and VPMs mentioned difficulty paying for transport or finding the spare parts needed for repair. Communities should regularly mobilize funds for parts and labor, but the GoZ and thus DDF may need to assist in stockpiling items for purchase. Many participants mentioned the need for tools to repair water points. A centralized stockpile of spare parts required for minor repairs should be created to prevent repair delays and ensure greater access to materials needed, given the considerable need for repair tools for VPMS.

9. **Deepen social norms change programming and women's empowerment approaches.** As a result of CWP, women have taken on leadership roles and are greatly represented across WPCs, driving the continued management and oversight of water points. This level of women's engagement, particularly in leadership, and the demonstrated sustainability of water outcomes underline the importance of women's empowerment as drivers of effective governance and sustainability. On the other hand, VPMs are often not paid, despite CWP design. Some women VPMs are not recognized nor respected in their roles, and some community members prefer to engage other VPMs outside the community, leading to demand issues articulated by several VPMs. VPMs interviewed may require additional training, as evidenced by interviewee requests for "deeper" training and

refreshers, and tools for repairs. Regression analysis and stakeholder interviews shed light on existing gender norms and disparities that continue to impact women and WASH across Chivi District, impacting the long-term sustainability of WASH outcomes. Future programs should integrate more comprehensive social norms change approaches into their theoretical and implementation frameworks. This work should reinforce the importance of having women involved in WASH roles and leadership, paid for their labor (i.e., VPMs), while increasing community acceptance and recognition of women as autonomous decision-makers, leaders, skilled artisans, and more.

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APPENDIX A

Qualitative Semi-Structured Interview Guides

WATER POINT COMMITTEE

READ CONSENT FORM   AGREE TO PARTCIPATE YES/NO

IF YES CONTINUE WITH INTERVIEW.

Gender of individual: ___________

START TIME STAMP: - -: - - AM/PM

DATE: - - / - - / - -   MM/DD/YY

	WATER POINT COMMITTEE (WPC) MEMBERS			
1.	Does this Water Point Committee (WPC) still "function"/ meet regularly?			Y/N If yes, how often does the WPC meet?
3.	Can you tell me the leadership positions on the committee, whether they are male or female and their education level? **FILL THE TABLE BELOW**			
	Title	**Gender**	**Education Level**	**Other**
3a	President			
3b	Vice-President			
3c	Secretary			
3d	Treasurer			
3e	Member			
3f	Other			
4a	When was this water point committee (WPC) formed?			
4b	Has there been any changes in the role of men and women in this WPC over the years? What needs to be improved / or added to WPC training?			Y/N If yes, please explain the changes
6	Does the WPC have written bylaws? Y/N Does the WPC have legal status with local government? (E.g. has been certified by local govt)? Y/N			
7	How many water points (WP) does this WPC manage?			
	FUNCTIONALITY			

	NOW I AM GOING TO ASK YOU ABOUT WATER POINT FUNCTIONALITY	
9	What is the type of WP?	
10	How old is the WP / when was it constructed?	
11	Who paid for construction of the WP?	
12	Who constructed the WP?	
13	Describe the overall quality of the WP?	
14	Was the WP constructed from scratch or rehabilitated?	
15	In most cases if the WP breaks down, what is the cause of breakdown?	
16	When the WP breaks down, generally how long is it nonfunctional?	
17	Is the WP currently functional?	Y/N If no, does it require minor or major repairs?
19a	Is technical support from local district authorities available?	Y/N/DK
19c	Has the committee ever received support?	Y/N/DK If yes, please describe the support
	RELIABILITY	
20a	Is the water point protected?	Y/N If yes, please describe
21	How many meters away are the closest sanitation facilities from the WP?	meters
22	Who is responsible for DAILY management of the WPs?	
23	Is there any water allocation (limit of water that can be collected) per HH?	Y/N If yes, how many liters per day? ______________liters
25	Who monitors the allocation?	
26a	Who pays the person responsible for water allocation (or for DAILY management)?	
26b	What is the source of funds for paying this person?	
27a	Is the WP open 24/7**?** **If no, when is the WP open?**	Y/N

28	How many households (HH) does this WP serve?	
29	How many HHs regularly pay a fee to access water?	
30	Does the water point provide sufficient water for all families in the community daily?	Y/N
32a	Are there other water source(s) the community uses?	Y/N
32b	If yes, please describe the source(s)	
33a	Does the water point ever dry up?	Y/N If yes, how many weeks a year is it dry?
33c	If it dries up where do HHs access water?	
	FINANCES	
34 b	Does the committee have a water point fund?	Y/N
35a	Did the committee lose any money because of dollarization?	Y/N/NA If yes, lost by how much $ _________ gained by how much $ _______
36a	Does the committee have a bank account?	Y/N
36b	How do you pay for repair expenses? Who collects money and how is that money stored? Are regular financial records kept?	
36c	Is there sufficient money to pay for minor maintenance?	Y/N
36d	Is there sufficient money to pay for major repairs?	Y/N
	WPC REPAIRS	
37a	Who does repairs?	Minor Major
37b	Do they conduct satisfactory work?	Y/N/NA If no, please explain
37d	Did this person / these people receive training?	Y/N Please explain:
	GOVERNMENT AND COMMUNITY PARTICIPATION	
38	How many of these skilled community members are present in your community? (approximate) **FILL THE TABLE BELOW**	

	Latrine Builders	Pump Mechanic	Village Healthcare Workers	Extension Workers	Other Specify	Other Specify
Female						
Male						
Total						

39a	Does the water point service a school?	Y/N
39b	Does the water point service a heath facility?	Y/N
40a	Are there any WP inspections for water quality and safety?	Y/N If yes, how many times per year? ________ by whom ________
41	What role does the local government play in water services in this community?	
42	What do you want your government to contribute for WASH services in your community?	
44	What role does the community play in water services? AND/OR what do you think the community should do (differently/better)?	
44b	Do you believe there is a good level of trust and communication between people in this community? (e.g. *social cohesion, social capital, people get along well…)*	
	COVID-19 RELATED CHALLENGES	
45	Has there been an impact on your communities' water or water services / water availability due to COVID?	Y/N If yes, please describe the impact
49	Are there any challenges with repairs due to COVID?	Y/N If yes, please explain the impact
51	Are there any challenges with WPC meetings due to COVID?	Y/N If yes, please explain the impact
	Any other comment?	

THANK YOU FOR YOUR PARTICIPATION **END-TIME STAMP: - -: - - AM/PM**

SANITATION ACTION GROUP MEMBERS (SAG)

READ CONSENT FORM. AGREE TO PARTICIPATE? Y N

IF YES, CONTINUE WITH THE INTERVIEW.

Gender of individual: __________

START TIME STAMP - -: - - AM/PM

DATE - - / - - / - - - - MM/DD/YY

	ROLE AND TRAINING **I AM GOING TO ASK YOU ABOUT YOUR ROLE AND TRAINING AS A SAG MEMBER**	
1	What role do you / did you play in ensuring HHs in this community do not openly defecate?	
2	Did you receive training**?**	Y/N **IF NO SKIP TO NUMBER 7**
3	What skills do you feel were missing from this training?	
4	What was the main benefit to you as part of the CWP?	
	TRIGGERING AND OPEN DEFECATION FREE (ODF)	
7	What is the approximate year of CLTS triggering in this community? (If applicable)	
8	Which agency performed the triggering? (If applicable)	
9	What is the approximate date of ODF certification/completion? (If applicable)	
10	Is your community still ODF?	Y/N **Please explain**
13	Were there any follow-up visits after the triggering?	Y/N **IF NO SKIP TO SANITATION SECTION**
14	If yes, who did the follow up?	
15	What is done during the follow up visits?	
16	How often do they follow up? / When was the last time someone did a follow up visit?	
	SANITATION: NOW WE ARE GOING TO TALK ABOUT SANITATION	
18	Do all HHs in this community have access to a toilet / latrine?	Y/N/DK (estimate a proportion…)

19	Do all community members use toilets/latrines for defecation all the time?	Y/N/DK
20	If no, what do you think is the reason community members are not using toilet/latrine?	
21	What is needed to ensure everyone uses a toilet every time they defecate?	
22	Are there any HHs that do not have sufficient resources to build / re-build a toilet?	Y/N If yes, what can be done?
23	What is being done by the community to support these HHs?	
25	Have there been any change(s) in your community because of your actions / activities as a SAG member?	Y/N Please explain your thoughts on this (why/why not)
28	What do you think should be done for positive change on sanitation? **OR** What do you think should be done to sustain gains made?	
	Do you believe there is a good level of trust and communication between people in this community? (e.g. *social cohesion, social capital, people get along well…)*	
	GOVERNMENT AND COMMUNITY PARTCIPATION	
30	In your opinion, what should be the role of the local government in reducing OD in this community? Any other recommendations to the government for reducing OD in this community?	
31	In your opinion, what should be the role of the community in reducing OD in this community? Any other recommendations to the community for maintaining open defecation free status in this community?	
34	Has COVID had an impact on defecation practices in your community?	Y/N Please explain

THANK YOU FOR YOUR TIME **END-TIME STAMP - - : - - AM/PM**

WASH ENTREPRENEUR

READ CONSENT FORM. AGREE TO PARTCIPANT? YES/NO

IF YES, CONTINUE WITH THE INTERVIEW

Gender of individual: ________________

START TIME - -: - - AM/PM

DATE - - / - - / - - - - MM/DD/YY

	ROLE AND TRAINING **I AM GOING TO ASK YOU ABOUT YOUR ROLE AND TRAINING**	
1	What do you do as a WASH entrepreneur?	
2	Do you earn money in this role? Does this role represent your primary income, or supplementary income? Do you find this a good/satisfactory income? Please explain. What percentage/amount of your annual earnings does this role provide? Has demand for your work been consistent? Are your earnings consistent?	Y/N Please explain
3	Did you receive any training for this role?	Y/N Please explain
5	If yes (to receiving training): How has your training benefited you? What was good about your training? What are aspects that you think were missing in the training that you wish were included?	
7	What were the changes in your life due to this new role / job?	
8	What are the changes you have seen in the community because of the work you do?	
9	What further changes would you like to see in your community in terms of water, sanitation or hygiene?	

10	What is needed to ensure that you can continue to offer services to the community?	Does this need prompts for enumerators? E.g. Does the entrepreneur need specific support such as training or materials? Is there a condition in the community that needs to change in order to ensure the entrepreneur can offer support?
11	What are the challenge(s) you face in your role?	
	Do women face different challenges than men – when in a role like yours?	If yes, what are examples of the different challenges that women entrepreneurs and men entrepreneurs face?
	COVID-19 RELATED CHALLENGES **FINALLY, I AM GOING TO ASK YOU ABOUT COVID RELATED CHALLENGES**	
13	Did COVID affect your role? Has COVID affected your earnings?	**Y/N** If yes, please describe how you have been affected
15	Is/was the community affected by COVID?	**Y/N** If yes, please describe how the community was affected?
18	Do you have any recommendations for WASH services to be sustainable in communities? Role of individuals Role of community Role of government Role of service providers	

THANK YOU FOR YOUR TIME. **END TIME - -: - - AM/PM**

VILLAGE HEAD

READ CONSENT FORM. DO YOU AGREE TO PARTICIPATE? YES/NO

IF YES, CONTINUE WITH THE INTERVIEW.

Gender of individual: __________

START TIME STAMP - -: - - .AM/PM

DATE: - - /- - / - - - - MM/DD/YY

	I AM GOING TO ASK YOU A BIT ABOUT YOUR ROLE WITH SANITATION	
1	Is your community Open defecation free (ODF)?	Y/N/DK
4	If yes, was it verified?	Y/N
5	How many HHs in this community do not have a toilet? Why? What do you think are the reasons?	
6	Are there HHs that *had a toilet* but now do not due to damage/collapse? *Please explain*	
7	Do you have meetings about sanitation with the community members?	Y/N If yes, please explain
9	What role do you play in ensuring HHs in this community do not openly defecate?	
10	What is needed to ensure everyone uses a toilet every time they defecate?	
10a.	Do you have a constitution for toilets construction	
10b.	Do you promote the uBVIP concept	
11	What is the most challenging aspect of **reaching** ODF in your community?	
12	What is the most challenging aspect of **maintaining** ODF in your community?	
13	Within the community are there certain HHs or vulnerable groups who do not consistently have / use toilets?	Y/N If yes, please explain
	Any other recommendations for encouraging or maintaining open defecation (free) status in this community? (Gov't / community / other?)	
	WATER	
	What role do you play in ensuring HHs in this community have a reliable and safe water supply?	

	Did you receive any training on this?	Y/N Who/When/What
15	What is the most challenging aspect of increasing safe water services in your community?	
16	Within the community are there any inequalities of access to water? (certain people/groups, etc.?	
19	Any recommendations to the government for supporting a reliable and safe water supply in this community?	
23	Any other recommendations for reducing OD in this community?	
	GENDER EQUALITY **NOW WE ARE GOING TO DISCUSS EQUALITY OF WOMEN AND MEN**	
25	What role do you play in promoting equality among women and men in your community?	
27	Why is it important for men and women to have equal rights?	
	Do you believe there is a good level of trust and communication between people in this community? (e.g. *social cohesion, social capital, people get along well…)*	
	COVID-19 RELATED CHALLENGES	
28	Has COVID-19 impacted water services / water availability in this community?	Y/N If yes, please explain the impact
30	Has COVID-19 impacted the use of toilets/latrines?	Y/N If yes, please explain the impact
32	Has COVID-19 impacted women and men the same**?**	Y/N If yes, please explain the impact
35a	Do you have child headed HHs in this community?	Y/N Has COVID impacted child headed HHs Y/N If yes, please explain the impact
36a	Do you have HHs with people with disabilities?	Y/N How has COVID impacted people with disabilities in the community?

37	What is the government doing to help child headed HH?	
38	What is the government doing to help people with disabilities in the community?	
39	What is the community doing to help child headed HH?	
40	What is the community doing to help people with disabilities in the community?	
	Any other comment or observation on water or sanitation in this community?	

THANK YOU FOR YOUR TIME **END TIME STAMP: - - : - - AM/PM**

DISTRICT/WARD WASH LEAD (GOVERNMENT REPRESENTATIVE)

READ CONSENT FORM. DO YOU AGREE TO PARTICIPATE? Y/N

IF YES, CONTINUE WITH INTERVIEW.

Gender of individual: ________

	WATER SERVICES **NOW I AM GOING TO ASK YOU ABOUT WATER SERVICES**	
1	What is your role in relation to water supply?	
2	How is the government involved in providing water services in communities?	
3	What technical assistance does the government provide to help with water services in communities?	
4	What is the government's overall strategy for increasing safe water services to communities?	
5	What are some of the most important components of the water strategy?	
6	What measures are put in place to ensure water quality and safety for the community?	
7	What is the role of private sector in water services?	
8	What are the most challenging aspects of increasing safe water services for all communities?	
9	What do you think / or what needs to be done to address these challenges?	
12	Within communities are there any inequalities of water access?	Y/N If yes, what is being done to resolve the inequalities?
14	Has access to safe water services improved or in the last 3-5 years?	Y/N Please explain
	SANITATION **NOW I AM GOING TO ASK YOU ABOUT SANITATION IN THE COMMUNITIES**	
17	What is your role in relation to sanitation coverage/ encouraging people to use toilets?	
18	What are the most challenging aspects of increasing use of toilets for all communities?	

19	What needs to be done to address these challenges?	
20	Within communities are there any inequalities of access and use of toilets?	Y/N If yes, please explain the inequalities / what is being done to resolve them.
22	What is government's strategy for increasing sanitation services to communities?	
23	What is the role of private sector in sanitation?	
24	Does the government provide any training/education for prevention of diarrheal diseases?	Y/N If yes, please explain the training/education
26a	Has the number of ODF communities increased in the last 3-5 years**?**	Y/N What do you think are the reasons?
27a	Can you discuss the challenges of "sliding back" to OD after ODF certification? Is this a problem? Please elaborate your thoughts and experience	
28	Do you have anything you want to share with us about WASH services in these communities?	
	GENDER EQUALITY **NOW I AM GOING TO ASK YOU ABOUT GENDER EQUALITY**	
29	What is your office doing to promote gender equality?	
30	Please give examples of projects/programs that the government has done to promote gender equality	
31	Are women are involved in WASH services?	Y/N If yes, please explain how women are involved and how they participate in WASH services If no, please explain why women aren't involved in WASH services
32	Are there women in leadership roles in WASH services?	Y/N Please provide some examples If no, please explain why there aren't women in leadership roles in WASH services
	COVID-19 RELATED CHALLENGES **FINALLY, WE ARE GOING TO TALK ABOUT COVID RELATED CHALLENGES**	
28	Has COVID-19 impacted water services / water availability in this community?	Y/N If yes, please explain the impact
30	Has COVID-19 impacted the use of toilets/latrines?	Y/N If yes, please explain the impact

32	Has COVID-19 impacted women and men the same**?**	Y/N If yes, please explain the impact
35a	Do you have child headed HHs in this community?	Y/N Has COVID impacted child headed HHs? Y/N If yes, please explain the impact
36a	Do you have HHs with people with disabilities?	Y/N How has COVID impacted the disabled people in the community?
37	What is the government doing to help child headed HH?	
38	What is the government doing to help people with disabilities in the community?	
39	What is the community doing to help child headed HH?	
40	What is the community doing to help people with disabilities in the community?	
	Any other comment or observation on water or sanitation services and coverage in communities?	

THANK YOU FOR YOUR TIME **END TIME STAMP: - - : - - AM/PM**

APPENDIX B

Quantitative Survey

INTERVIEWER: I WILL START WITH SOME BASIC QUESTIONS ABOUT YOU AND YOUR HOUSEHOLD

A: DEMOGRAPHICS

1. Respondent ward number?

2. Respondent village name?

3. What is your household size?

4. Are you the household (HH) head?

5. If no, what is the age of the HH head (in years)?

6.What is the sex of the HH head?

7.What is the education level of the HH head?

7a. If other please specify:

8. What is your relationship to the HH head?

9. How old are you (in years)?

10. Sex of respondent?

10a. What is your education level?

10b. If other, please specify

11.What is the main religion of the HH?

12. What is the ethnicity of the HH?

13a. Has anyone in the HH had diarrhea in the last week?

13b. Was at least one of the people with diarrhea a child under the age of 5?

B: INCOME

14a. What is the main source of income household?

14b. Other main source of income (specify)

14c. How many household rooms are used for sleeping?

14d. Does this household own any livestock, herds, poultry or other farm animals?

14e. If yes, how many cattle?

14f. If yes, how many goats/sheep?

14g. If yes, how many donkey

14h. If yes how many poultry

15. Does your household have:

16. Does any member of this household have:

17. Does any member of this household have a bank account?

18. Does any member of this household belong to a village savings group?

19. What type of fuels does your household use for cooking?

20. If other fuel for cooking, specify

C: Water Source, Treatment, and Water Fetching Responsibilities

21a. What is the main source of drinking water for members of your HH?

21b. If other, please specify

22a. Do you treat your water in any way to make it safe to drink?

22b. If yes, what do you use for treatment? (Choose all that apply)

22c. If other, please specify

23a. Does your drinking water have an “acceptable” taste?

24a. Does your water have any odor when you bring it from the water point?

25a. How is your household drinking water mainly stored?

25b. If other, please specify

26a. Who usually fetches water for the HH?

26b. If other, please specify

27. How long does it take to go to the main water point, get water, and come back?

28. How many liters does your household collect each day?

29a Is your household able to collect all the water you need each day?

29b. If sometimes or never please explain

29c. In the last 30 days, has there been any time when your household did not have sufficient quantities of drinking water when needed?

30a. Do you always get water from the same water source?

30b. If no, please explain why not

31a. Is your household main water source always working?

32. When your household main water point breaks, how long does it normally take to get fixed?

33. In your opinion does the main water point get fixed quickly when it breaks?

D. SANITATION

34a. What kind of toilet facility do members of your HH usually use?

34b. If other, please explain

35. Who constructed your toilet?

36. Approximately what year was your toilet built?

37. Why did your HH decide to build a toilet?

38a. Have you done any maintenance to the toilet in the last year? (maintenance = repairs needed for toilet functionality)

38b. If yes, how much money was spent on toilet maintenance in the last year (in USD equivalent)?

39a. Have you done any maintenance to the toilet in the last 5 years?

39b. If yes, how much money (in USD equivalent) was spent on toilet maintenance over the last 5 years?

40a. Have you done any upgrades to the toilet in the last year? (from Ubvip towards BVIP)?

40b. If yes, how much money was spent on upgrades in the last year?

41a. Have you done any upgrades to the toilet in the last 5 years?

41b. If yes, how much money was spent on upgrades in the last 5 years?

42. How far is your toilet located/(area used as toilet) from the houses? - - meters

43. Does the household have a separate toilet facility (/(area used as toilet) for males and females?

44a. At night do you feel safe to go to the toilet (area used as toilet)?

44b. If no, please explain why not

45a. The last time any young child (under 5 years) passed stool, what was done to dispose of the stool?

46a. What are the “critical” times for one to wash their hands? (enumerator, please DO NOT READ OPTIONS)

46b. Do you use soap to wash your hands at the critical times?

E. WATER COMMITTEE

47a. Who manages the improved water source(s) in your community?

47b. If other, please specify

48. Are you satisfied with the management of your water point?

48.a. If sometimes or never, please specify

49a. Do you pay any water point maintenance fee?

49b. If yes, amount (in USD)

49c. Amount (above) per month:

49d. Is this amount affordable?

49e. Do you have any additional comments about the fee or affordability?

50a. Does the Water Point committee communicate with the community on income/repairs/expenses?

50b. Are there any further details you want to share regarding the communication of the Water Point Committee?

51. Was your community consulted on the original siting of the water point?

52. Was your community involved in planning on how to manage the water point?

F. HOUSEHOLD ROLES

53. INDICATE YOUR LEVEL OF AGREEMENT WITH THE FOLLOWING STATEMENTS

- Girls should be given equal opportunity in education
- Girls should not attend school when they are menstruating
- If my daughter wants, I think it's fine for her to work outside the home
- Women should be allowed to play leading roles in community WASH projects
- A woman should obtain permission from her spouse before she goes out to public places
- Women should be leaders in the community just like men
- The husband should be the decision-maker when buying major household items

54. ENUMERATOR to answer: Is this an intervention CWP village?

54a. INTERVENTION VILLAGE (IV): Did you / someone in your HH participate in the Chivi WASH project that ended in 2017?

54b. IV: If yes, did the participation in this project make a difference in you or your family’s life?

54c. IV: If yes, please explain

54d. IV: If no, please explain why not

55a. IV: Did you change any of your practices because of the project?

55b. IV: What do you think should have been done better or differently?

G: COVID-19

56a. Has COVID-19 impacted your HHs access to water?

56b. If other, please specify

56c. Has COVID-19 impacted your community's ability to access repair parts for your water point?

56d. Has COVID-19 impacted your community’s ability to access repair parts for your HH toilet?

56e. How has COVID-19 impacted meetings / communications within your community with the Water Committee?

56f. Has COVID-19 impacted women differently than men?

56g. If yes, please explain how

56h. How has COVID-19 impacted women’s ability to participate in community-level activities / committees?

56i. Anything else you want to share about the impact of COVID-19 on water access or water services in your community?

INTERVIEWER: THANK YOU FOR YOUR PARTICIPATION. DO YOU HAVE ANY QUESTIONS FOR ME?

OBSERVE: Main material of housing floor

OBSERVE: Main material for roof of housing

OBSERVE: Main material of exterior walls

OBSERVE: toilet or latrine facility

OBSERVE: Handwashing facility within 10-15m of toilet facility?