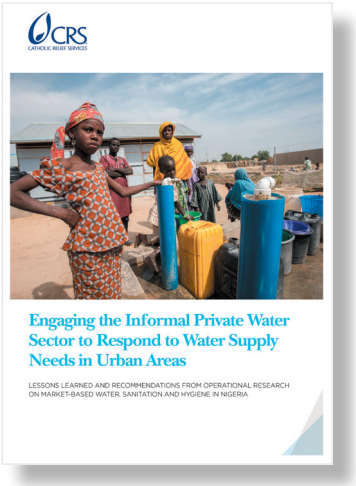
CATHOLIC RELIEF SERVICES

Engaging the Informal Private Water Sector to Respond to Water Supply Needs in Urban Areas

LESSONS LEARNED AND RECOMMENDATIONS FROM OPERATIONAL RESEARCH ON MARKET-BASED WATER, SANITATION AND HYGIENE IN NIGERIA



Cover: People in the Muna Dalti community in Maiduguri, Nigeria, collect clean water from tap stands constructed by CRS.

Photo by Michael Stulman/CRS

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Acknowledgements
For their contribution to this report, CRS would like to thank: Beth Muriithi, Tope Adunkpe, Jerome Farrel, Kathleen Gordon, Aude Bertrand, Moshood Ogunwoye, Timothy Daret, Usman Rhoda Kadama, Caleb Tidi Nathaniel, Modibbo Abubakar Ahmed, Hajja Bintu Konto, Giwa Aishatu Aliyu, Nancy Doran, Lora Nelson, Wilson Gu, John Agolu, Daniel Thompson, Donal Reilly, Jennifer Poidatz and Dina Brick

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Acronyms

BHA	Bureau for Humanitarian Assistance
CBO	community-based organization
FRC	free residual chlorine
IDP	internally displaced person
LGA	Local Government Area
NGO	nongovernmental organization
OFDA	Office of U.S. Foreign Disaster Assistance
O&M	operation and maintenance
RUWASSA	Rural Water Supply and Sanitation Agency
UN	United Nations
USAID	United States Agency for International Development
WASH	water, sanitation and hygiene
WATCOM	water committee

A. Executive Summary

Background

Since 2015, the humanitarian water, sanitation and hygiene, or WASH, sector in North-East Nigeria has been delivering water supply interventions focused largely on the rehabilitation of nonfunctional boreholes into solar-powered or hybrid systems to meet the water demands of internally displaced people and host communities. Most of these systems have been handed over to host and IDP communities. International NGOs have fostered the establishment of water committees, or WATCOMs, that collect fees, and operate and maintain the systems. But, these committees are often trapped in a cycle of water point breakages and are unable to pay for the repairs, due to limited household income and poor organizational capacity at the community level, resulting in low user-fee collection. This situation requires continuous NGO engagement to ensure that water quality standards are met and that systems are up and running, even though these systems have already been handed over to the communities. Catholic Relief Services saw this dependence of WATCOMs on NGOs as unsustainable and not cost effective, and believes that engaging the **informal private water sector** (IPWS) might provide a sustainable solution to meeting the water needs of populations affected by the humanitarian crisis in NE Nigeria. The IPWS in Maiduguri, the capital city of Borno state, is a market system composed of **private borehole owners** and **pushcart water sellers** who sell water to people across economic groups, and to both host and IDP communities.

CRS believes that engaging the informal private water sector may provide a sustainable solution to meeting water needs in the humanitarian crisis.

OVERVIEW

WASH actors rehabilitate nonfunctional boreholes

Water systems are handed over to trained community water committees

Water points break but communities cannot afford to pay for the repairs

Continuous engagement from WASH actors is required

This dependence of WATCOMs on NGOs is unsustainable and not cost effective

In this context, CRS embarked on an **operational research project**, co-funded by the United States Agency for International Development's Bureau for Humanitarian Assistance (formerly OFDA), the CRS Humanitarian Response Department and CRS Nigeria. The operational research began in 2019 with a comprehensive assessment of the water market system of Maiduguri to better understand the various actors involved, the extent to which the market was meeting the needs of end users, the key market constraints, and the opportunities to improve its functionality to better meet the water needs of the community.

The assessment report, *Mapping the Water Market System in Maiduguri: Market Assessment Report and Recommendations for Pilot Activities* describes the water market system and recommends a number of pilot activities that were started in 2020. These aimed to work with private borehole owners, pushcart water sellers and end users to improve access to quality water. A **context-specific comparative framework of costs and benefits** of traditional approaches to rehabilitating nonfunctional boreholes and handing over to WATCOMs *versus* supporting the IPWS was developed. Between January 2020 and July 2021, CRS implemented pilots aimed at borehole owners and pushcart water sellers. The results where then monitored between July 2021 and March 2022. This study summarizes the main findings and recommendations.

Key Findings, Opportunities and Recommendations

This study found that the informal private water sector plays a critical role in water provision for the population of Maiduguri. The study also found that CRS, and likely other NGOs and United Nations agencies, could invest less for greater sustainability of water supply activities if, instead of investing in rehabilitation and construction of community-managed water systems, they directed investment at collaboration and professionalization of the existing informal private water sector. This sector not only operated in Maiduguri well before the crisis caused by the Boko Haram insurgency and counterinsurgency since 2016, but has also expanded since the onset of the crisis.

The informal private water sector plays a critical role in water provision.

The costs incurred by CRS—and likely other NGOs and UN agencies—were mostly associated with initial rehabilitation and construction of water supply systems, and were later followed by longer-term costs related to the continuous support of WATCOMs for operation and maintenance. The WATCOM support has continued even for water systems that were rehabilitated and upgraded by NGOs several years ago and handed over to the community WATCOMs. Other more specific findings were that:

1. CRS investment in community-managed systems is double that of its investment in the rehabilitation of private boreholes; however, the output of community-managed systems is significantly lower.
2. The difference in water quality between private and community-managed boreholes is minimal.
3. Following project interventions, there was no significant difference in safety procedures and the cleanliness of the borehole compounds between private boreholes and community-managed boreholes. This highlights the importance of raising awareness and promoting appropriate practices among all water supply actors.
4. Private borehole owners invest significantly more in the operation and maintenance (O&M) of their boreholes than the WATCOMs of community-managed boreholes do. Engaging the private sector offers the potential to increase sustainability and ensure the continued operation of boreholes after NGO support ends.
5. Pushcart sellers continued to practice safe water-handling and storage behaviors, and these improved well beyond the end of the initial pilot interventions.
6. Supporting pushcart sellers to improve the quality of the water they delivered had an additional impact of improving their livelihoods; however, more could be done to strengthen pushcart seller livelihoods.

KEY FINDINGS

CRS invests less in private boreholes, yet their water output is higher

The difference in water quality between the private and the community boreholes is minimal

Post project, there was no significant difference in safety and cleanliness between community and private borehole compounds

Private borehole owners invested more in the O&M of their boreholes than WATCOMs did

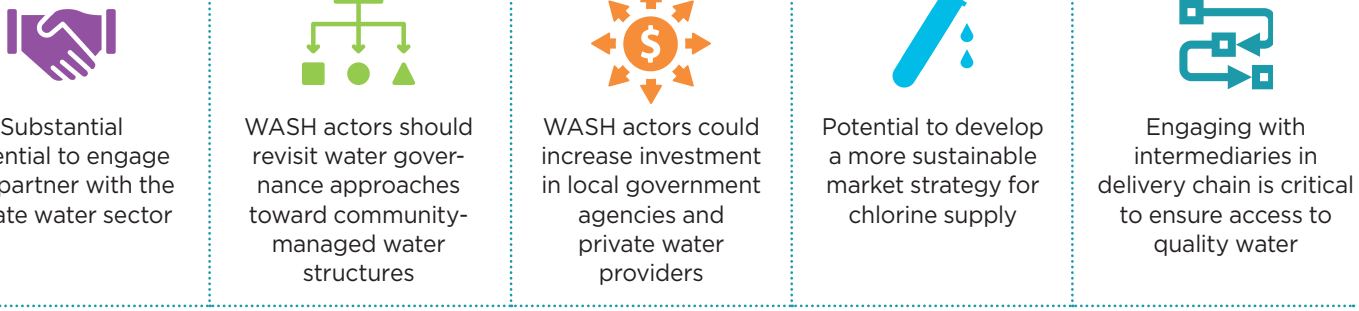
Pushcart sellers continued to practice safe water-handling and storage well beyond pilot interventions

Supporting pushcart sellers to improve the quality of the water they deliver improved their livelihoods

The results of this research point to a number of opportunities, including:

1. There is substantial untapped potential to engage and partner with the existing private water sector and support more sustainable access to water, especially in the context of a protracted crisis.
2. CRS and NGOs working in the WASH space should revisit water governance approaches toward community-managed water structures.
3. CRS and NGOs could optimize their water supply investment costs by reducing the amount invested in community-managed boreholes and increasing investment in supporting local government agencies and private water providers. Also, savings could be invested in more sustainable sanitation solutions and in influencing end users on higher water quality demands through hygiene promotion.
4. To access chlorine, private and community-managed water vendors depend on the state's Rural Water Supply and Sanitation Agency (RUWASSA) and WASH sector partners. However, there is potential to develop a more sustainable market strategy for private borehole owners to buy chlorine.
5. Engaging with intermediaries—such as pushcart owners and pushcart water sellers involved in the transportation of water to end users—is critical to ensure access to water of sufficient quality throughout the delivery chain.

OPPORTUNITIES



As WASH is a critical issue in Nigeria's growing urban environments, such as Maiduguri—as well as in similar urban settings in other countries, especially those with unplanned settlements in which city or municipal authorities are unable to provide essential services—it is fundamental for CRS (and other NGOs) that these recommendations are followed:

1. When designing a water supply response plan—whether for a humanitarian response, a humanitarian–development nexus, development response or a protracted crisis—map the water (and sanitation) sector to identify all the key market actors—including public, private, civil society, formal and informal—and explore whether there are opportunities to partner with or support existing systems.
2. When implementing market-based interventions in the WASH sector, focus on multiple interventions targeting different aspects of the market system to achieve effective outcomes. For example, influence end users to demand chlorinated water and improved water-handling practices among intermediaries, such as pushcart sellers; improve water-handling practices among intermediaries; and address issues of unhygienic environments and around water quality and water system compound upgrades. These complement each other to form a holistic approach rather than a focus on only one component of the market system.

3. If the market is informal or unregulated, an initial plan should be formulated—ideally with government—on how basic quality standards can be ensured, on frequent monitoring and support throughout the project, and on how to better regulate these actors in future. If key indicators, such as water quality and water handling, start showing signs of improvement, work more closely with government to regulate and incorporate the market sector into the wider water distribution system.
4. Actors should engage the appropriate technical staff to monitor water supply activities to ensure data is accurate and of sufficient quality to inform programming.
5. Actors should explore the potential of creating small businesses for chlorine production and look at opportunities to kick start a local chlorine market. There are numerous successful experiences worldwide. For example, CRS has implemented chlorine production projects in Madagascar, Burkina Faso, Ghana, and Liberia.

RECOMMENDATIONS

Map the water sector and identify market actors to see whether there are opportunities to partner and/or extend support

Plan for a portfolio of interventions that addresses constraints in the water market

Work with government on how basic quality standards can be ensured

Engage technical staff to monitor water supply activities to ensure data is accurate enough to inform programming

Explore the potential to support the creation of small businesses for chlorine production

For future WASH interventions in Maiduguri, CRS and NGOs should consider supporting private water sector actors and bringing onboard RUWASSA and the Borno State Ministry of Water Resources, with the intention of working toward the **regulation of the private water market**. CRS and NGOs should better understand the incentives, interests, motivations and potential business models for private borehole owners in order to effectively co-design market support interventions. This might include exploring options to increase investment in chlorination and other water treatment options; exploring how to reduce fuel costs (e.g., through the introduction of solarized water supply systems); better understanding affordability factors among end users; and facilitating the integration of private boreholes into a more regulated system.

CRS and NGOs should better understand the incentives, interests, motivations and potential business models for private borehole owners.

Exploring more viable cost-recovery models for community-managed WATCOMs to ensure sustainability is also critical. CRS and NGOs must revisit current approaches when creating WATCOMs and especially rethink water governance approaches. The current model, based on a rapid governance training and delivery of repair kits to a selected group of community members that on a voluntary basis are supposed to look after and steward a community's water interests requires a "go/no-go" model based on a thorough analysis. Only community structures able to reach self-sufficiency at an early stage should be approached with the present model. Looking for models in which WATCOMS can be transformed into small enterprises that create income and support local livelihoods while also reducing dependence should be a way to transition out of the created dependence.

B. Background

Context in North-East Nigeria

In North-East Nigeria, insurgencies and counterinsurgencies and the resulting insecurity have devastated livelihoods, cut off essential services and caused a protection crisis.[1] Some 8.4 million people are estimated to need humanitarian assistance in 2022, including 3 million people in urgent need of access to water, sanitation and hygiene services.[2] The COVID-19 pandemic and deteriorating food security has continued to exacerbate humanitarian needs among internally displaced people, returnees and host communities. Waterborne diseases spread rapidly and cholera outbreaks occur on an annual basis across several Local Government Areas. For example, 2021 saw 93,362 suspected cases of cholera, including 3,283 deaths across the country.[3]

8.4 million

PEOPLE ARE ESTIMATED TO NEED HUMANITARIAN ASSISTANCE IN 2022, INCLUDING 3 MILLION PEOPLE IN URGENT NEED OF WASH SERVICES.

93,362

NUMBER OF SUSPECTED CHOLERA CASES IN 2021.

Maiduguri in NE Nigeria experienced a huge population rise as IDPs arrived in peri-urban and central locations of the city. Maiduguri was already facing a major water service gap crisis,[4] which became more acute with the sudden increase of IDPs when the conflict started and which continues. As in many rural towns and cities in Sub-Saharan Africa, low government investment in the sector has created a governance crisis that has slowly been deteriorating water service provision in Maiduguri since the 1990s.[5] As of mid-2022, the conflict continues as intensely as ever.

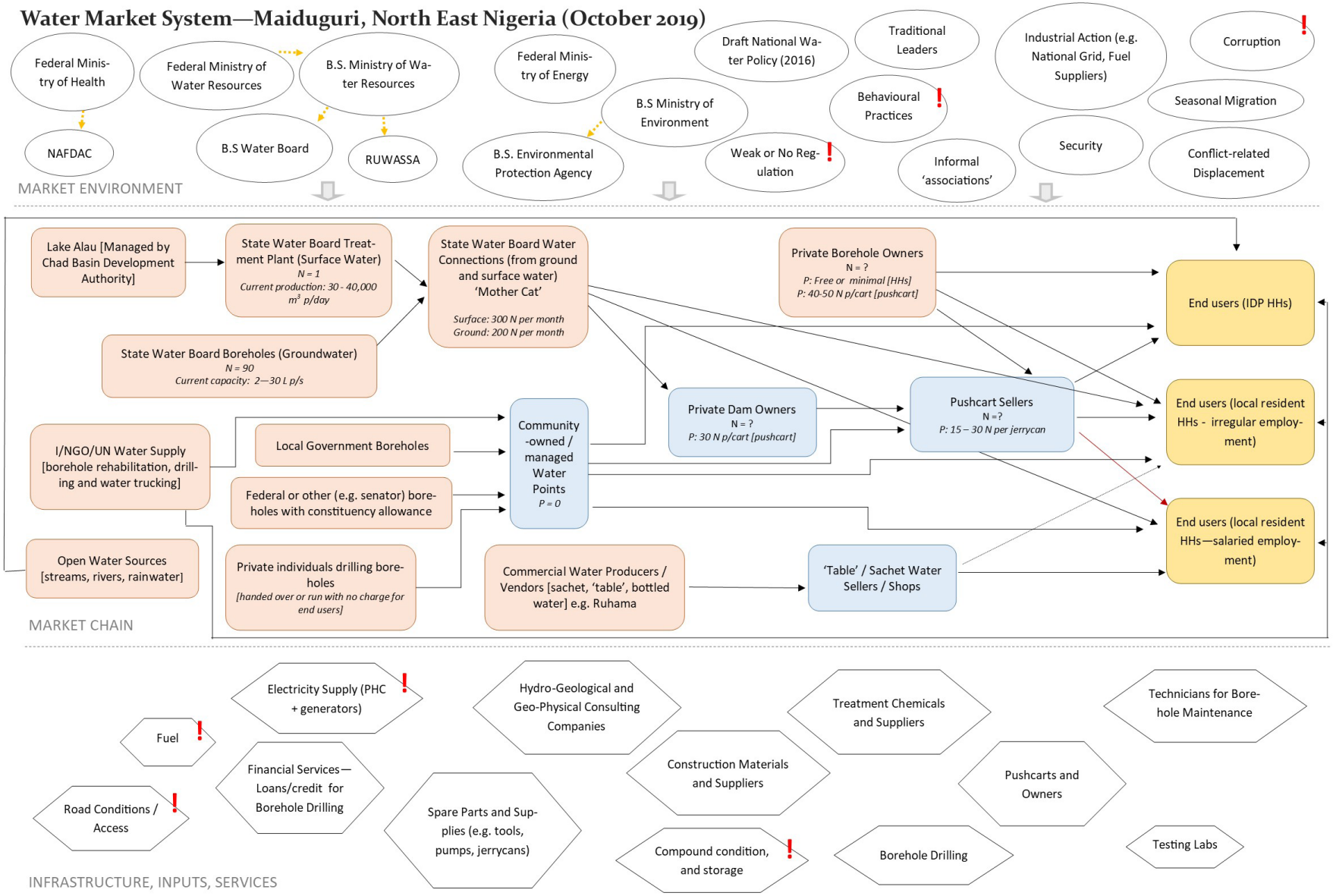
Overview of the Operational Research and CRS WASH Programming

Since 2015, the Humanitarian WASH sector, in collaboration with the RUWASSA and the Borno State Ministry of Water Resources, has been delivering water supply interventions that have mostly focused on the rehabilitation of nonfunctional boreholes into sustainable solar-powered or hybrid systems to meet the water demands of IDPs and host communities. Most of these systems—with the exception of those in official camps—have largely been handed over to host and IDP communities, where WATCOMs formed by INGOs collect fees, and operate and maintain the systems.

But WATCOMS are usually trapped in a continuous cycle of water point breakages and are unable to pay for repairs. The reasons are likely a combination of limited household income and poor organizational capacity at the community level, resulting in low user-fee collection. This situation requires continual engagement from NGOs to ensure that water quality standards are met and that systems are up and running, even though these systems have already been handed over to communities who should be responsible for their operation and maintenance.

1. OCHA Nigeria Humanitarian Needs Overview 2022 (February 2022).
2. Ibid.
3. Ibid.
4. Ibid.
5. Weatherall J and Wallusche Saul R. 2019. *Mapping the water market system in Maiduguri: Market assessment report and recommendations for pilot activities.* CRS.

Figure 1: Water Market System Map (Source: CRS Market Assessment Report, 2019)



The water supply sector in Maiduguri is comprised of a number of actors, including the Ministry of Water Resources, the State Water Board network, NGO-supported or community-managed boreholes, commercial water producers and bottlers, private borehole and dam owners, and transporters or pushcart sellers.[6] The latter private actors and individuals make up a largely informal and unregulated section of the private water market. This sector has historically been an active source of water delivery with many clients of informal actors engaged in the provision of water for households. The informal private water sector (IPWS) includes private borehole owners, self-employed individual water sellers known as pushcart sellers, and private owners of pushcarts, who rent their carts to the pushcart sellers. Until 2019, there was little or no attention paid by the government and/or INGOs/UN to this sector. No institution or organization, including CRS, has engaged these private water market actors as key partners in solving the need for safe water supply delivery in the context of Maiduguri and other parts of NE Nigeria.

No institution or organization has engaged these private water market actors as key partners.

CRS believes that the current dependence of WATCOMs on INGOs is unsustainable and not cost effective, and that more sustainable solutions can be found, including through engaging with the IPWS. Thus, CRS embarked on a learning project or operational research that began in November 2019[7] with a comprehensive assessment of the water market system of Maiduguri to better understand the various actors involved, the extent to which the sector was meeting the needs of end users, its key constraints, and the opportunities to improve its functionality to better meet community water needs.[8]

The water market system assessment resulted in three fundamental findings:

1. The informal private water sector has existed since the 1990s and grew considerably with the onset of the crisis due to increasing water needs and demands. The sector is a key water service provider for host and IDP populations, and also for mid- and upper-income families in Maiduguri.
2. IDPs, hosts and clients of these private water actors do pay for water, although private borehole owners also practice social responsibility and provide water free of charge to the most vulnerable in the community.
3. Many private borehole owners and water sellers had significant challenges in terms of their safety procedures and cleanliness of the borehole environment, which were compromising the quality of the water that end users were accessing.

Based on these findings, CRS designed a number of pilot interventions to support market actors to improve their operations, capacity and service quality. The pilots were rolled out in January 2020 in urban and peri-urban communities adjacent to where CRS was implementing WASH programming in informal camps within host communities. The table below outlines the interventions undertaken by CRS and its partners during the program.

6. Ibid.
7. Ibid.
8. Ibid.

Table 1: Overview of CRS' humanitarian WASH interventions in NE Nigeria (2019-2021)

Intervention type	Target group	Main activities	Description	Reach
Market-based pilots	Private borehole owners	Water compound improvement and technical support	• Rehabilitation and construction of infrastructure and compound improvement activities, including storage, water supply outlet, borehole (e.g. sanitary seals), drainage/soak pits and tap stands • Installation of flow meters • Savings and financial management	12 borehole owners
		Promoting hygienic water handling and improving the environmental sanitation of the compound	**Provision of training on:** • Cleaning and disinfection of water reservoir and batch chlorination • Borehole operation and maintenance • Use of flow meters • Safety procedures (safe electrical connection, etc.) • Waterborne diseases • Safe water handling and storage • Importance of water treatment • Minimization of pollution and contamination, and compound cleanliness • COVID-19 prevention **Support to borehole owners:** • Protecting borehole, including reservoir tank, from outside contamination and setting system maintenance targets and monitoring plan • Provision of chlorine during cholera outbreaks	
		Strengthening linkages with other actors	• Linking borehole owners with pushcart sellers to encourage safe water-handling practices • Formation and/or strengthening of borehole association[9] • Promoting partnerships between public (RUWASSA) and private water service providers for water disinfection • Engaging partners in provision of chlorine to actors in targeted locations	

9. CRS Nigeria found that some borehole owners were organized and had an association, with a leadership responsible for mobilizing members on issues affecting them. CRS Nigeria used this association for capacity building purposes around chlorination, and linked it with RUWASSA.

Intervention type	Target group	Main activities	Description	Reach
Market-based pilots	Pushcart sellers	Provision of kits to pushcart sellers to improve jerry can cleaning and business operations	Provision of materials to pushcart sellers, including: • Personal protective equipment (gloves and boots) • Jerry can cleaning materials • Tools for cart maintenance	90 pushcart sellers
		Training and hygiene promotion to improve water handling throughout the water chain	Training and hygiene promotion including: • Safe water handling and storage, safe water chain • Improved jerry can cleaning methods • Importance of water treatment/usage • Hand-washing and personal hygiene • Minimization of water pollution and contamination • Cart and jerry can maintenance • Waterborne and related diseases • Importance of water chlorination • Cholera prevention • COVID-19 prevention • Environmental health and sanitation	
		Strengthening linkages with other actors and other activities	• Link pushcart sellers with borehole owners to encourage safe water-handling practices • Support the creation of pushcart association • Weekly jerry can cleaning exercises • Water point sensitization • Support borehole owners in environmental sanitation of water points • Encourage savings and financial management practices	
	End users	House-to-house hygiene promotion	• Improving knowledge of safe water storage and handling practices • Sensitization on safe water chain, improved storage and cleaning methods, hand-washing, and personal hygiene • Cholera and COVID-19 prevention	Households in the catchment population around the target boreholes
		Small group sessions on hygiene promotion	• Health sessions with male and female community members, including children, on water safety, chlorination, cholera prevention and COVID-19 prevention	
		Promotion of water chlorination	• Household water testing (free residual chlorine) and effective water treatment methods	

Intervention type	Target group	Main activities	Description	Reach
Community-based water provision	Water committees	Formation of WATCOMs	• Water committees formed (10 members each; 5 male and 5 female), including technicians, water monitors and hygiene promoters	10 WATCOMs
		Training and equipping WATCOMs	• Hygiene promotion training on safe water chain, protection mainstreaming, waterborne diseases, environmental sanitation, reservoir cleaning and resource mobilization • Technical training on operation and maintenance of water infrastructure and water chlorination • Provision of tool kits for O&M • Provision of kits to incentivize WATCOM member participation	
		Strengthening linkages with other actors	• Linked RUWASSA with private borehole owners • Engaged NGOS and RUWASSA in the provision of chlorine to private borehole owners	• Government stakeholders • Local partner organizations • CBOs
	Community-level water points	Rehabilitation or construction of water points	Typically including: • New pump installation or repair of existing pump • Installation of new or repair of existing security chain-link fencing • Supply and installation of new solar panels • Installation of a new water reticulation system • Supply and installation of new flow meter • Installation of well head protector • Handover to WATCOMs	
	End users	House-to-house hygiene promotion	• *Same as market-based end-user activities above*	Households (IDPs, host communities, and returnees)
		Small group sessions on hygiene promotion		

The intention was to regularly monitor the pilot activities to enable data collection for this learning project; however, monitoring was delayed by a year due to the COVID-19 pandemic.

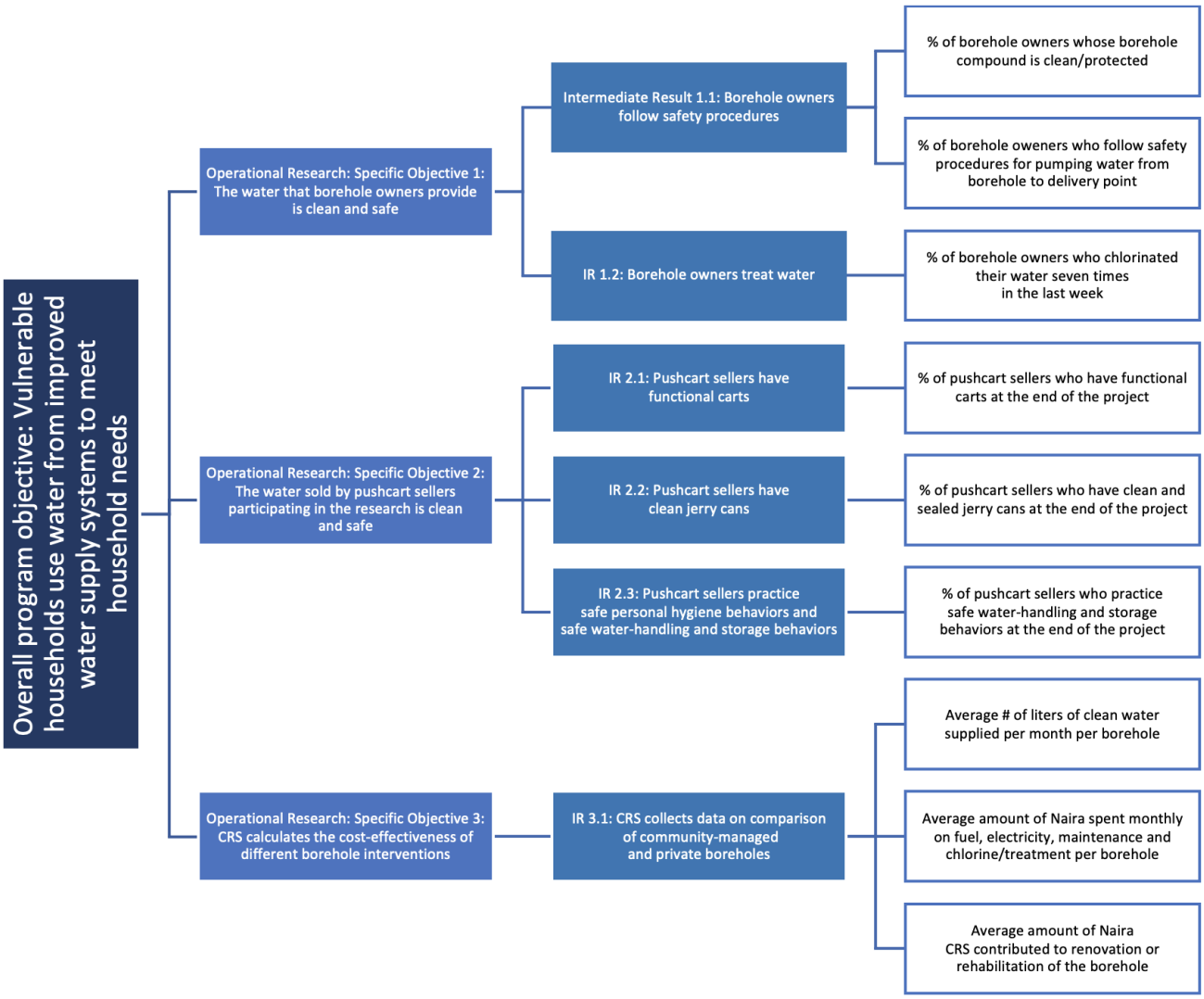
The aim and rationale behind the pilots, and ultimately this research, was to explore the potential of engaging private sector actors as key humanitarian partners so they are able to contribute to meeting water supply gaps; explore whether these can meet minimum quality standards; and ultimately find a more sustainable solution to how water supply is delivered.

C. Methodology

Methodology and Sampling

The operational research was designed to understand the relative cost-effectiveness of the various WASH components of CRS' programming, including the market-based pilots that supported private water market actors to improve the quality of their services. To do this, the CRS team designed a monitoring framework to guide data collection.

Figure 2: Results framework for operational research



The CRS team then developed a sampling framework to collect data consistently from a sample of a) supported private borehole owners, b) supported community-managed borehole owners, and c) supported pushcart sellers.

Each year, CRS, in coordination with the WASH Cluster, identifies communities with water supply needs and gaps for assistance. Communities were identified for community-managed boreholes based on these criteria:

- Has high water needs, with less than 15 liters of water per person per day.
- Is more than 500 meters from the nearest functional water point.
- Has high levels of waterborne disease, as per health facility records.
- Has a nonfunctional submersible water pump.
- Has a damaged or nonfunctional water point.
- Has a functional water system needing improvement.
- Has no other interventions or planned interventions by WASH actors.

For the selection of private borehole owners to support, CRS used the following criteria:

- Has an operational water-vending business.
- Supplies more than 1,000 individuals with water.
- Possible rehabilitation is feasible and cost-effective.
- Is willing to partner with CRS, attend trainings and provide 10% matched funds for the rehabilitation work.

Among the targeted community-managed boreholes and private boreholes, CRS monitored four community-managed boreholes and seven private boreholes at regular intervals for this learning project. In addition to the above criteria, the boreholes had to be: in an urban setting; serving a mix of IDP and host communities; and in an area where the security situation was conducive to the team visiting regularly for monitoring. CRS installed a flow meter in each of the monitored boreholes to facilitate data collection.

Regular data collection was conducted using quantitative tools preprogrammed into the CommCare data collection application by trained enumerators (for pushcart seller respondents) and CRS technical WASH staff (for private and community-managed borehole respondents). Data was to be collected every two months from mid-2020 to Q1 2022. However, due to the COVID-19 pandemic, data collection began in July 2021 and continued until March 2022. The data was reviewed by the CRS team after each round of collection to ensure data quality, and also to spot any issues that required further investigation by the team. The last round of data collection in March 2022 was complemented by qualitative data collection at all sampled boreholes through semi-structured key informant interviews, and with a sample of pushcart sellers in each location through focus group discussions.

Table 2: Respondents by month participating in operational research data collection

Respondent type	Number of respondents per data collection round					No. of unique respondents
	July 2021*	Oct 2021	Nov/ Dec 2021	Feb 2022	Mar 2022	
Private borehole owners	NA	7	5	7	7	7
WATCOM representatives	NA	4	4	0	4	4
Pushcart sellers	31	13	12	32	23	32**

** July 2021 data collected from boreholes was removed due to data quality issues.*
***Pushcart sellers were not necessarily tracked throughout the data collection (i.e. same pushcart seller each round), therefore at least 32 unique pushcart sellers were involved in the data collection.*

Figure 3: Borehole locations (CMB in red)

Figure 4: Sampled pushcart seller locations

Limitations

There were a number of constraints and challenges faced by the team that impacted the data collection for the operational research. These should be considered when interpreting the data and findings:

COVID-19 pandemic: The market-based pilots were to start in Q2 2020, which coincided with the outbreak of the COVID-19 pandemic. This had significant impacts on both the implementation of the pilot activities, which took longer than planned, and the planned data collection for the operational research, which did not start until July 2021. The pandemic impacted the team's ability to move to the field to collect data and conduct monitoring, and also resulted in prioritization of the immediate response to the pandemic.

Data quality: The first round of data collection for boreholes in July 2021 was conducted by non-technical WASH staff, which resulted in some inconsistencies and data quality issues. This data was removed from the analysis, and subsequent data collection rounds for boreholes were conducted by the relevant technical WASH staff (e.g., WASH engineer) to ensure the accuracy of the data. The team had also planned to use flow meter readings to measure water output for each borehole; however, some readings were not accurate, so an alternative calculation for water output was used based on tank size and number of tank refills in a given period. Finally, not all data was collected consistently from each borehole during the data collection periods, so the last round of data collection in March 2022 gathered data from all sampled boreholes and was used for the purposes of the final calculations on output and costs for the comparison.

Limited sample size: The number of boreholes considered for the research is relatively small. Data from seven private boreholes and four community boreholes is presented in this report.

Staff turnover and resourcing: Due to the extended data collection period (i.e., a number of years) there was inevitable staff turnover which made continuity of the operational research more challenging, particularly for the CRS MEAL team. Also, after the initial BHA-funded program ended in 2020, the WASH team no longer had dedicated resources to follow up on the pilot activities and collect data for the operational research. Instead, the team were focused on implementation of ongoing WASH programs and had to find the resources to conduct "good enough" data collection to achieve the objectives of the operational research.

End user perspectives: Although CRS implemented hygiene promotion interventions throughout the project that targeted end users, the operational research monitoring did not collect data from end users on their perspectives on changes in the quality of services provided by the market actors participating in the CRS program.

Limited data available on costs and investments from other WASH actors: Finally, an important limitation was related to the objective of developing a context-specific comparative framework of the costs and benefits of drilling new boreholes and rehabilitating nonfunctional boreholes *versus* supporting the existing private water supply market system. Unfortunately, no WASH partners in Maiduguri responded to CRS' request to provide data on the costs of their rehabilitations and support to WATCOMs. To respond to this objective, only CRS data on costs and investments was used.

D. Key Findings

Our study found that CRS could have considerably lowered costs for greater sustainability if, instead of investing solely in the rehabilitation and construction of community-managed water systems, investments had also been directed toward the established informal private water sector. These higher costs incurred by CRS were mostly associated with initial rehabilitation and construction, followed by longer-term costs related to the continuous support to WATCOMs for operations and maintenance. The support to WATCOMs continues even for water systems that were rehabilitated or constructed several years ago.

CRS could have lowered costs for greater sustainability if it had also invested in the informal private water sector.

For example, in key informant interviews (KIIs) with WATCOM representatives of community-managed boreholes (CMB), most interviewees mentioned that between 30% and 40% of users contributed money. They added that there was no fixed amount to contribute, and that users only contributed when there was a need for minor repairs. If the repair was beyond their technical and/or financial capacity, they contacted the NGO partner that had constructed the borehole.

Other respondents said that payments were made in cash through the treasurer with the support of community leaders. An example of the dependence of WATCOMs on NGOs was highlighted when CRS asked whether the WATCOM had used the O&M tools that had been provided when the system was handed over. One respondent said, "*not yet, because the borehole is still being managed by an INGO.*" In the case of a CMB handed over to a community by CRS in 2019, a respondent said that the committee that had received CRS trainings was no longer functional, and the new committee had received trainings from another INGO, which continued to help to keep the borehole area clean and to chlorinate it.

This study found that chlorination of the sampled CMBs was always done by NGOs and that no CMB had ever interacted with RUWASSA.

Finally, all CMB respondents were aware of the existence of private boreholes. When asked what the difference was between CMBs and private boreholes, all CMB respondents said that when there was a breakdown, the private borehole owner (PBO) would repair it within 24 hours, while breakdowns of CMBs usually took much longer to resolve as NGOs were often requested to make the repairs.

All CMB respondents said that when there was a breakdown, the private borehole owner would repair it within 24 hours.

Most PBOs were aware of CMBs and called them government- and/or community-managed water points or water systems. During the KIIs at the end of the operational research, PBOs were asked their opinion on the key differences between private boreholes and CMBs. One said, "*there is a huge difference because the private boreholes are well maintained and, when they have technical issues, are repaired as soon as possible, while the CMBs may spend weeks without being repaired and, in most cases, elders* [community leaders] *have to intervene. There is negligence on the side of the community as well. Therefore, private boreholes are better.*" Another said, "*Privately owned boreholes are used every day while community-managed 'hybrid' boreholes are only used when there is light* [electricity]."

PBOs noted the benefits of participating in the pilot interventions with support from CRS. For example, when asked what the key differences to their businesses were before and after the CRS intervention, all said that their borehole environment was cleaner, and that they now knew the quantity of water sold and the quantity wasted. All agreed that they had more customers than before and that the hygiene of borehole workers had improved. The PBOs also considered that the interventions had led to greater cleanliness of the water point compound, and all indicated that the improvements had helped ease pushcart sellers' jobs as additional water outlets had diminished crowding.

Chlorination was found to be one of the weaknesses among private boreholes as there was still a reliance on NGOs and RUWASSA. When asked whether they chlorinated their water, all respondents said they did, although not every day, and that the chlorine was obtained from NGOs or RUWASSA, especially during the cholera season. Some PBOs said they had hoped to buy chlorine, but that none was available in the market. An advantage was that before the CRS pilot project, PBOs did not chlorinate their water at all and also had not had any contact with RUWASSA or NGOs.

CRS also found considerable benefits from supporting existing water vendors (e.g., pushcart sellers and borehole owners) on the quality of water services. In the FGDs with pushcart sellers, they reported the critical role they played in connecting households to water services—with one saying, "*the pushcarts are the intermediaries between families who need water but can't get it and need the support of pushcarts"*—highlighting the importance of these intermediaries. Some pushcart sellers in Gwange III also reported a reduction in disease outbreaks in the project area and linked this to improvements in the quality of water they were delivering. All pushcart sellers reported collecting their water exclusively from private boreholes due to their proximity and reliable supply. Some reported an increased awareness among end users of which boreholes provided better quality water, and requests to collect water from CRS-supported private boreholes, with one saying, "*End users ask pushcarts to bring water to them from a preferred borehole because of its improved nature."*

All pushcart sellers reported collecting their water exclusively from private boreholes due to their proximity and reliable supply.

The following section highlights **six key findings** from the operational research:

Key Finding 1: CRS' investment in community-managed water systems was double its investment in private boreholes; however, the water output of community-managed systems was significantly lower. As shown in Table 3, our study found that the average amount of water output[10] from private boreholes was higher than that of community-managed systems. On average, private boreholes had a monthly output of 86.8 cubic meters, whereas community-managed systems had an average monthly output of 57.6 cubic meters.[11]

Table 3: Monthly output by borehole type

Borehole type	Average monthly output (m^3)	Minimum (m^3)	Maximum (m^3)	Average tank size (m^3)
CMBs	57.6	36	90	13.4
Private boreholes	86.8	67.2	105	20
Total (average)	**74.5**	-	-	**17.25**

To compare investment costs, the study measured the costs incurred by CRS to rehabilitate or construct humanitarian water supply systems, that included training, human resources and logistics, as well as longer-term incurred costs associated with supporting WATCOMs on O&M. These were compared with the costs CRS incurred to support the private water market to upgrade water compounds, as well as for training, human resources and logistics. The study found that CRS had spent an average of **6,719 USD** per community-managed borehole versus **3,055 USD** on upgrading private boreholes. Table 4 shows the detailed results.

$6,719

AVERAGE CRS INVESTMENT IN COMMUNITY-MANAGED BOREHOLE

$3,055

AVERAGE CRS INVESTMENT IN PRIVATE BOREHOLE

There is a considerable difference between the amounts invested in community-managed and private boreholes, and there were some differences in the type of rehabilitation supported for each. In addition, the rehabilitation of each water point was case specific. For **private boreholes**, this could include: 1) borehole protection boxes; 2) installation of new or repair of existing reticulation systems; 3) provision of water storage tanks, including the construction of water storage platforms; 4) repair and/or replacement of faulty mechanical and electrical equipment; 5) installation of the concrete apron, including an access ramp and drainage, at the pushcart seller parking/filling station. A typical **community-managed water point** rehabilitation could include: 1) installation of new pump or repair of existing pump; 2) construction of new or repair of existing security chain-link fencing; 3) supply and installation of new solar panels; 4) installation of a new water reticulation system; 5) supply and installation of a new flow meter; 6) installation of a well head protector.

10. Water meter data was to have been used to calculate water output; however, this data was not captured consistently by the monitoring teams. Therefore, during site visits to each private borehole, the WASH team made an estimate based on how much water was reportedly sold per day (by private boreholes), storage tank volume and estimated refills for the community, and validated this through an interview with the borehole owner.

11. The figures represent the total water volume pumped by both private and community-managed boreholes per month; this equates to a daily average of 2.8m^3 for private boreholes, and 1.9 m^3 for community-managed boreholes.

It should be noted that the rehabilitation of private water points did not include the installation of any solar or hybrid power systems as in the public water points. Also, the rehabilitation of the private water points required a 10% matching fund from the water vendors, and thus the extent of rehabilitation took into consideration their financial capacity. Private borehole owners also invest continuously in operations and maintenance.

Rehabilitation of private water points required a 10% matching fund from the PBO.

Table 4: Costs incurred by CRS for water system rehabilitation

Water system type	Average cost to CRS per borehole (USD)							
	Renovation and rehabilitation of borehole		Staff salaries	Staff transportation	Materials	Training	Indirect costs	Total
CMB	3,391	2,074-4,230	1,536	125	450	98	1,120	**6,719**
Private	832	209-2,096	1,536	125	0	54	509	**3,055**

Key Finding 2: The difference in water quality between private and community-managed boreholes was minimal. Our proxy for water quality was the presence of free residual chlorine in the water supplies of both private boreholes and community-managed ones. Figure 5 shows that, in terms of quality, the private water sector was almost as reliant as community-managed water systems on NGOs/UN or RUWASSA for chlorine. However, in some cases, the private water sector chlorinated without outside help, unlike any of the community-managed water points in our study, but, as per key finding 4, the private sector did not buy the chlorine.

Figure 5: Who chlorinates the water?

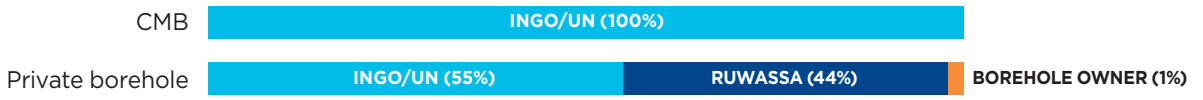


Table 5 below indicates chlorination patterns. There was an increase in chlorination during August and December, when cholera cases increase in Borno, and RUWASSA and WASH sector actors increased chlorination efforts in the water points of Maiduguri. During the 2021 cholera outbreak,[12] in one outbreak spot (Gwange, Maiduguri Metropolitan Council), a dense urban community where CRS implemented WASH programing, PBOs reported an uptick of water sales on the days when water was chlorinated. CRS had ramped up monitoring and supported both partner PBOs as well as new ones. This was contrary to some of the resistance to water treatment CRS had experienced in more rural communities. The downside of this was that water treatment was not occurring without continued CRS support.

12. 2021 cholera outbreak started in August and continued to the end of that year.

Table 5: Average number of times boreholes were chlorinated in previous week, by data collection period

Data collection period	Borehole type	Average number of times boreholes were chlorinated in previous week
October 2021	*Community managed*	0
	Private	0.38
Nov/Dec 2021	*Community managed*	1.75
	Private	4.20
March 2022	*Community managed*	0
	Private	2.71

Key Finding 3: Following the project interventions, there was no significant difference between safety procedures and cleanliness of the private and community-managed borehole compounds. This highlights the importance of increasing awareness and promoting appropriate practices among *all* water supply actors. Besides the focus on water quality, the study considered other important public health elements critical for any water distribution operation. These were related to the cleanliness of water compounds, and health and safety procedures. Specifically, we focused on the following six procedures:

1. Whether the hose filling the jerry cans leaked.
2. Whether the hose filling the jerry cans was lying on the ground.
3. Whether the reservoir tank lid was open or closed.
4. Whether the reservoir tank had cracks.
5. Whether the pipeline from the borehole to the reservoir tank was detached.
6. Whether electrical connections for the pump, in the pump house, and/or any other systems requiring wiring were adequately protected.

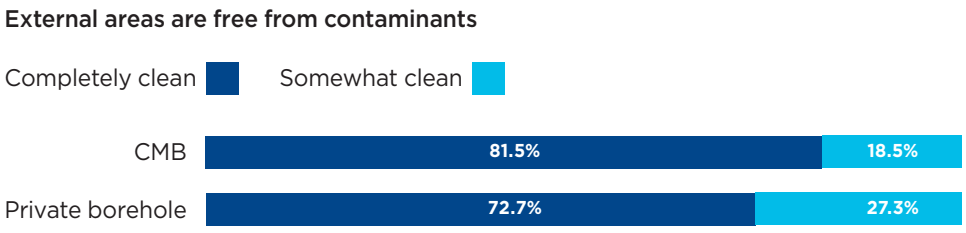
Despite there being more safety issues observed among private boreholes than community-managed boreholes initially, the safety procedures among private boreholes improved over time (see Table 6).

Table 6: Safety procedures followed by boreholes over time

Borehole type and data collection period	% of boreholes reporting safety procedures not followed					
	Hose that fills jerry cans leaks	Hose that fills jerry cans is on the ground	Reservoir tank lid is open	Unprotected electrical connection	Reservoir tank has cracks	Pipeline not always fixed from borehole to reservoir tank
Community managed						
Oct 2021	0	0	0	0	33.3%	0
Nov/Dec 2021	0	0	0	0	75%	0
Feb 2022	No data collected	No data collected	No data collected	No data collected	No data collected	No data collected
Mar 2022	0	0	0	0	25.0%	0
Private						
Oct 2021	25%	12.5%	0	25%	0	50%
Nov/Dec 2021	0	0	0	60%	0	20%
Feb 2022	0	0	0	0	28.6%	0
Mar 2022	0	0	0	0	14.3%	0

Private borehole owners on average had cleaner compounds that were free from external contaminants, than the community-managed water points, with 81.5% of private borehole compounds on average considered 'completely clean' compared with 72.7% of community-managed boreholes (Figure 6).

Figure 6: Compound condition



Despite this, there was a slight difference between community-managed and private borehole operators on how long they waited before cleaning the water storage tank, with community-managed boreholes waiting an average of 2.53 months, and private boreholes an average of 3.32 months.

<u>Key finding 4:</u> Private borehole owners were investing significantly more in the maintenance and operations of their boreholes than the WATCOMs of community-managed boreholes. Engaging the private sector offers the potential to increase sustainability and ensure continued operations of boreholes after NGO support ends.

Private borehole owners invested significantly more in the continued O&M of their boreholes, spending an average of 121,680 Naira per month to run their borehole, whereas community-managed boreholes spent just a tenth of that at 10,158 Naira (Table 7).

On average, private borehole owners spent 94,097 Naira per month on fuel/electricity to run their borehole, compared with 125 Naira for community-managed boreholes (only one of the four community-managed boreholes sampled was spending anything on fuel/electricity, likely due to the solar-powered systems provided by NGOs). Private boreholes also spent an average of 27,583 Naira per month on operations and maintenance, compared to 10,028 Naira for community-managed boreholes (with three of four community-managed boreholes using some resources on O&M). This investment correlates to the higher output in terms of water volume per month as outlined under Key Finding 1 (suggesting that PBO investments in O&M may have contributed to higher output.

Table 7: Average borehole expenses per month by type

	Fuel/electricity		O&M		Chlorine/treatment		Monthly total	
Borehole type	**Naira**	**USD**	**Naira**	**USD**	**Naira**	**USD**	**Naira**	**USD**
CMB	125	0.3	10,028	24	0	0	**10,158**	**25**
Private	94,097	227	27,583	67	0	0	**121,680**	**293**

Neither private nor community-managed boreholes were found to spend resources on chlorine or treatment. The largest share of costs among private borehole owners was on fuel and electricity (on average, 77% of their monthly costs).

All boreholes sampled were collecting some money from end users monthly; however, the money collected by community-managed boreholes was significantly lower than among private boreholes. Two of four community-managed boreholes were running at a loss[13] (i.e., the money they spent on running costs and O&M was greater than the money they collected from end users each month).

Table 8: Average cost recovery by borehole type

	Average money collected per month		Average 'profit' (income minus running costs)	
Borehole type	**Naira**	**USD**	**Naira**	**USD**
CMB	8,013	19	293	0.7
Private	187,821	453	66,141	160

More in-depth study is needed on the business case for private borehole owners and community-managed boreholes, considering affordability. Although the water market assessment conducted in 2019 highlighted that private borehole owners tended to provide the poorest community members with water free of charge (thus ensuring affordability and access), the operational research monitoring did not track prices charged for water to enable a comparison.

13. However, it should be noted that only one of the CMBs kept records of money so these figures are based on self-reported data.

<u>Key Finding 5:</u> Pushcart sellers continued to practice safe water-handling and storage behaviors, and in fact these improved well beyond the end of the initial pilot interventions. In the last round of data collection in March 2022, 100% of pushcart sellers were using cleaned and sealed jerry cans to transport water to end users. This was a significant improvement on the initial rounds of data collection in July and October 2021. On average, 80.23% of pushcart sellers were using clean jerry cans, and 74.58% were using sealed jerry cans over the monitoring period. This improvement was likely related to the refresher health sessions conducted with them on topics such as cholera prevention, COVID-19 prevention, and safe water handling. House-to-house hygiene promotion also continued in the target locations throughout the monitoring period, which may also have contributed to an increased demand for water from clean and sealed containers.

Table 9: Pushcart sellers with clean and sealed jerry cans

Data collection period	% of pushcart sellers observed with clean jerry cans	% of pushcart sellers observed with sealed jerry cans
July 2021	54.84%	45.16%
October 2021	64.52%	54.84%
Nov/Dec 2021	73.33%	56.67%
Feb 2022	96.36%	98.18%
March 2022	100.00%	100.00%
Average over project period	**80.23%**	**74.58%**

Similarly, with the exception of the last round of data collection, there was a gradual increase in the number of pushcart sellers practicing safe water handling (for example, hand-washing with soap and water before fetching water and before discharging water to end users, and telling end users to clean their water storage containers if they were dirty).

Table 10: Pushcart sellers practicing safe water handling

Data collection period	% of pushcart sellers practicing safe water handling
July 2021	45.2%
October 2021	58.1%
Nov/Dec 2021	60.0%
Feb 2022	94.5%
March 2022	80.0%
Average over project period	**67.56%**

During the focus group discussions held during the last round of data collection, pushcart sellers said that the demand for chlorinated water in the Gwange area was high. One said, "*98% of our customers do not buy unchlorinated water… so people here know the importance of chlorinated water,*" suggesting customer demand influenced pushcart seller behaviors. Despite increased demand for chlorinated water, the data from CMBs and PBOs shows that chlorination rates were still low, indicating a continued need to find solutions to treat and chlorinate water across borehole types.

This also indicates that people—including the pushcart sellers themselves—may perceive that water is chlorinated when it may not actually be treated or safe.

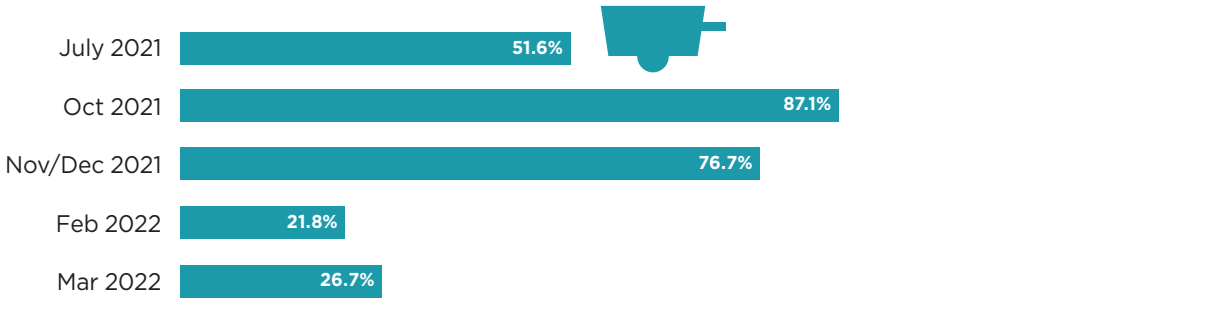
Pushcart sellers also reported a noticeable increase in their customer numbers, with one saying *"because our water containers are clean, and even our personal hygiene has improved*." They also used improved techniques to clean their jerry cans, i.e., no longer using sand to clean them.[14] This also suggests the importance of multiple interventions being implemented to improve the water market system, including influencing end-user demand, improving handling practices among intermediaries, and addressing issues of quality at source. Pushcart sellers reported that the demand for chlorinated water had pushed borehole owners to chlorinate in order to enhance their business; however, the data from PBOs under Key Finding 2 shows that chlorination was still not common.

Key finding 6: Supporting pushcart sellers to improve the quality of the water they were delivering had an additional impact of improving their livelihoods; however, more could be done to strengthen their livelihoods.

Providing support to pushcart sellers—including engagement in appropriate jerry can cleaning campaigns, hygiene promotion and training sessions, and material support for clean jerry cans, cart maintenance and general operations—had a positive impact on their operations. As noted above, in focus groups, pushcart sellers reported a notable increase in the number of customers buying their water as a result of the project interventions. As one said, "*Most households do not want to buy water from someone who does not look clean. The health session helped us improve on our hygiene*."

Despite these benefits, pushcart sellers reported challenges in sustaining some of them. This was mainly related to: a) the high cost of replacing jerry cans, with some noting that lids could not be bought separately; and b) most carts are rented by pushcart sellers and there is little willingness among pushcart owners to repair or improve carts and it is very costly for the pushcart sellers to do this themselves. As a result, the monitoring data showed an overall decline in the functionality of pushcarts during the monitoring period, despite initial increases (Figure 8).

Figure 8: Pushcart sellers with functional carts, by data collection period



14. Studies such as *Efficacy of locally-available cleaning methods and household chlorination at inhibiting biofilm development in jerricans used to store household drinking water* (String et al. 2021) document issues around using local materials such as sand and rocks for jerry can cleaning.

Pushcart sellers reported that additional support to enable them to buy their own pushcart and jerry cans, with cost-sharing, would improve their business considerably. Given the increase in demand from end users for pushcart sellers to have clean jerry cans, the sellers were concerned about their ability to maintain these practices without being able to afford to a) replace jerry cans, and/or b) buy their own cleaning supplies. It would be beneficial to understand the business model of pushcart sellers in more detail, to identify how they can best be supported to have a viable business in future. The water market assessment found that the majority of pushcart sellers were economically vulnerable, and many were IDPs. Providing more focused livelihoods support to pushcart sellers would therefore have a dual benefit of strengthening livelihoods and enabling the private water market.

It would be beneficial to understand the business model of pushcart sellers, to identify how they can best be supported.

E. Conclusions

The informal private sector plays a key role in the provision of water in Maiduguri, and CRS interventions improved its quality of service delivery. The results of this project point to a number of opportunities, including:

- There is considerable potential to engage and partner with the private water sector and support more sustainable access to water, especially in a protracted crisis setting.
- CRS and NGOs working in the WASH space should revisit present water governance approaches toward community-managed water structures. Most community structures using this model fail to flourish and instead result in communities remaining dependent on NGOs.
- NGOs could **optimize their water supply investment costs by reducing the amount invested in community-managed boreholes and increasing investment in supporting local government agencies and private water providers.** In addition, cost savings could be invested in more sustainable sanitation solutions and influencing end users on higher water quality demands through hygiene promotion.
- For access to chlorine, there is a dependence on RUWASSA and WASH sector partners among both private and community-managed water vendors. However, there is potential to develop a more sustainable market strategy for private borehole owners to buy chlorine. During the Gwange cholera outbreak in 2021, the private water sector was willing to provide safe drinking water to customers, demonstrating the potential for private sector water actors to buy and directly chlorinate their water.
- Engaging with intermediaries, such as pushcart owners and pushcart water sellers involved in the transportation of water to end users, is critical to ensuring access to water of sufficient quality throughout the delivery chain.
- When implementing market-based interventions in the WASH sector, it is critical to focus on multiple interventions targeting different aspects of the market system to achieve effective outcomes. For example, influencing end users to demand chlorinated water, fostering improved water-handling practices among intermediaries such as pushcart sellers, and addressing issues of a hygienic environment, and water quality and quality at source through compound upgrades.

F. Recommendations

General recommendations for WASH sector aiming to work with urban and peri-urban market actors

- When designing a water response plan for humanitarian, development or nexus responses, or for a protracted crisis, and particularly if the response is located in an urban or peri-urban area, always map the water sector, and identify the market actors—including public, private, civil society, formal and informal—to see whether there are opportunities to partner and/or support existing parts of the system.
- When implementing market-based WASH programs, plan for a portfolio of interventions that addresses constraints in the water market, including both demand and supply perspectives, and engage with multiple actors.
- If the market is informal or unregulated, work initially on a plan, ideally with government, on how basic quality standards can be ensured. Plan for frequent monitoring and support throughout the project, and explore how to better regulate these actors in future. If key indicators, such as water quality and handling, start showing signs of improvement, work more closely with the government to regulate and incorporate the market sector into the wider water distribution system.
- Engage the appropriate technical staff to monitor water supply activities to ensure data is accurate and of sufficient quality to inform programming.
- CRS and the WASH sector should explore the potential to support the creation of small businesses for chlorine production and kick start a local chlorine market. There are numerous successful experiences worldwide. For example, CRS has implemented chlorine production projects in Madagascar, Burkina Faso, Ghana and Liberia. Projects in Maiduguri could give grants to entrepreneurs who wish to sell chlorine, or engage in an intervention with the state entities responsible. It is highly recommended that a combined market analysis and feasibility study is conducted on the potential of such an endeavor.

Always map the water sector, and identify the market actors—including public, private, civil society, formal and informal.

RECOMMENDATIONS

				
Map the water sector and identify market actors to see whether there are opportunities to partner and/or extend support	Plan for a portfolio of interventions that addresses constraints in the water market	Work with government on how basic quality standards can be ensured	Engage technical staff to monitor water supply activities to ensure data is accurate enough to inform programming	Explore the potential to support the creation of small businesses for chlorine production

General: INGOs should consider supporting private water sector actors and bring onboard RUWASSA and the Borno State Ministry of Water Resources with the intention of working toward the regulation of the private water market.

Private borehole owners: Better understand the incentives, interests, motivation and potential business models for private borehole owners, in order to effectively co-design market support interventions. This might include exploring options to increase investment in chlorination or other water treatment, exploring how to reduce fuel costs (e.g., through solarization of water supply systems), better understanding affordability, and facilitating the integration of private boreholes into a more regulated system.

Community-managed boreholes: Explore more viable cost-recovery models for community-managed water systems through WATCOMs, to ensure sustainability. NGOs must revisit current approaches when creating WATCOMs and especially rethink water governance approaches as these have not always succeeded. The current model—based on rapid water governance training and the delivery of repair kits to a selected group of community members that on a voluntary basis is supposed to look after and steward a community's water interests—requires a go/no-go model based on more in-depth studies. Only community structures able to reach self-sufficiency at an early stage should be approached using the present model. Looking for models in which WATCOMS could be transformed into small enterprises that create income and support local livelihoods while reducing dependence should be a way to transition out of the created dependence.

NGOs must revisit current approaches when creating WATCOMS.

Pushcart sellers, pushcart owners and other intermediaries:

- Continue to target pushcart sellers with interventions that improve water-handling practices and the quality of water and services they offer to end users.
- Explore opportunities to influence pushcart owners who rent carts to be more responsible for their maintenance, and the cleaning and replacement of containers, which could further strengthen the water supply chain.
- For any activity, but particularly for market-based interventions, continue monitoring beyond the immediate activities implemented to measure whether changes are sustained. For example, it is important to continue to monitor the knowledge and practices of pushcart sellers trained on safe water handling and hygiene practices after training activities end.
- Further investigation would be valuable to understand what the most critical enablers (and barriers) are for pushcart sellers to improve and sustain practices over time, i.e., whether these are related to consumer demand or whether continued monitoring by the CRS team also plays a role.
- Better understand the business model of pushcart sellers and provide more targeted interventions to improve their income. This would not only help sustain the water market but also improve outcomes for pushcart sellers who are themselves economically vulnerable. It would be beneficial to explore further: 1) how to facilitate financing for cart ownership and jerry can replacement; and 2) how pushcart sellers can sustainably cover the cost of buying cleaning supplies.

G. Areas for Future Research

We believe this operational research showcases the importance of working with WASH strategies that engage the private sector from the onset of a response, whether or not these are formal or informal or the response is humanitarian, nexus or development. CRS and other NGOs globally must conduct in-depth analysis of the WASH sector at much earlier stages of responses. The findings of this study show that this is possible. However, the potential of the private sector is still largely unexplored and we encourage CRS Nigeria and other NGOs in Maiduguri to continue this exploration. We therefore recommend that CRS Nigeria and/or other NGOs:

CRS and other NGOs globally must conduct in-depth analysis of the WASH sector at much earlier stages of responses.

- Ensure that the work continues by involving more PBOs and incorporating these into similar pilots measuring whether positive trends such as those found by this study can be sustained. However, we do recommend much more robust monitoring (twice a month rather than every two months).
- There is considerable opportunity to work with water governance aspects at all stages. One area for CRS Nigeria to consider is how we could help professionalize and regulate the private water sector.
- Help transform WATCOMS of community-managed boreholes into private businesses to see whether this is sustainable.
- Introduce electro-chlorinators (as done in CRS Ghana and Madagascar) to create chlorine production income-generating activities/businesses that could source and sell to private borehole owners and end users.

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