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Accelerating the Delivery of Water, Sanitation and Hygiene Services with Rural Communities using Real-Time Data and Rapid Response to Service Disruptions

Good practices and lessons learned in national systems strengthening using mobile technology in Zimbabwe

Author: UNICEF Information and Communication Technology Division and the Water, Sanitation and Hygiene Section, UNICEF Programme Division, UNICEF Headquarters

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The lead authors of this document are Rose Shuman, Andy Narracott and F. Mita Paramita of BrightFront Group.

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The lead writers of this document are Rose Shuman, Andy Narracott, and F. Mita Paramita of BrightFront Group for the UNICEF Information Communication Technology Division and the Water, Sanitation and Hygiene Section, UNICEF Programme Division.

Design by: Salvavge Communications, LLC.
Edited by: Alexis Martin

For any questions on the Rural WASH Information Management System in Zimbabwe, please contact Moreblessing Munyaka mmunyaka@unicef.org.

Contents

Acronyms

MNO	Mobile network operator
RWIMS	Rural WASH Information Management System
SMS	Short message service
SNR	SMS Notification Response
WASH	Water, sanitation and hygiene
UNICEF	United Nations Children's Fund

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Introduction

Zimbabwe is experiencing an economic crisis characterized by hyperinflation and compounded by recent and ongoing natural disasters (floods, drought and cyclones). These crises have eroded capacities across all social sectors, including the water, sanitation and hygiene (WASH) sector.

Access to safe water and sanitation is a major challenge in Zimbabwe. On any given day, 40 per cent of water points are down, and 31.3 per cent of the rural population is practicing open defaecation.[1] The poorest quintile is even less likely to have access to improved sanitation. As the need for water and sanitation services rises and resources dwindle, effective management of WASH information and data that supports decision-making and service delivery at all levels is vital to realizing the water and sanitation rights of all children.

[1] Zimbabwe National Statistics Agency and United Nations Children's Fund, *Zimbabwe Multiple Indicator Cluster Survey 2019, Survey Findings Report,* ZIMSTAT and UNICEF, Harare, Zimbabwe, 2019.

The United Nations Children's Fund (UNICEF) Zimbabwe WASH programme aims to improve equitable use of safe drinking water, sanitation and hygiene practices. With the support of development partners, including UNICEF, the Government of Zimbabwe has invested in the Rural WASH Information Management System (RWIMS), a planning and monitoring system that was successfully established in seven of eight provinces that aims to improve data reliability and equity analysis through enhanced use of technological innovations.

RWIMS is a national system that was entirely designed by and developed for Zimbabwe's rural WASH sector. RWIMS is an integrated platform that enables data management; information/knowledge generation and sharing; stakeholder connection; and enhanced service delivery. RWIMS has been deployed and piloted province by province since 2015. From its inception, RWIMS was developed as an integrated system designed to capture, manage and analyse WASH data generated at the sub-national level within one national system.

Based on national experience, lessons and internal reflections, the Government took the innovative step of integrating community-based informants at the village level into the RWIMS data collection process. These informants provide real-time feedback on the quality of WASH services in the rural communities where they reside, through the short message service (SMS) notification response (SNR) – mobile technology that uses the open-source solution RapidPro. Rights-holders in hard-to-reach rural communities are now able to demand improvements in WASH services from local governments, and this information is immediately and transparently reflected in national databases and ultimately provides for faster repair of WASH services through well-established accountability structures.

As of December 2020

- **5.4 million children** have been reached with water and sanitation services supported by near real-time data generated through the RWIMS
- **1.8 million children** have been reached thanks to real-time community feedback on WASH service functionality and delivery generated through RapidPro

Two years into the implementation of the integrated RWIMS SNR, the Government and external partners report that the system has strengthened planning and accelerated the delivery of WASH services for hard-to-reach rural communities.

Numerous partners have supported the Government's real-time WASH initiative: UNICEF Zimbabwe with funding form UKaid, the Embassy of Sweden and WASH global thematic funding; the UNICEF Eastern and Southern Africa Regional Office and UNICEF Headquarters. Although the initiative started in 2014, the UNICEF Regional Office and Headquarters launched the National Real-Time Monitoring Systems Strengthening initiative in 2018 to provide dedicated technical assistance, quality assurance support and catalytic funding to sectoral real-time monitoring initiatives. This initiative served to strengthen the Zimbabwe RWIMS by supporting the inclusion of the SMS component in the system.

The National Real-Time Monitoring Systems Strengthening initiative also has a strong knowledge management component. This component aims to document lessons as UNICEF and partners design and implement digital programming solutions with the interdisciplinary support of programme, planning, operations and information and communication technology personnel. Following two years of experience, stakeholders agreed that the time was right to formally document Zimbabwe's experience. In November 2019, at the closing of a meeting of the Insiza District Water and Sanitation Sub-Committee, Mr. Zacharia Jusa, Insiza District Administrator, requested that UNICEF tell the story of Insiza.

This report tells the extraordinary and not well-known story of Zimbabwe's RWIMS, which has been strengthened by community-informed real-time data and reporting using mobile technology known as the RWIMS SNR. It presents good practices and lessons learned from the experience.

Snapshot of RWIMS to RWIMS SNR development

First phase: Paper to office desktop system

Originally Zombabwe's RWIMS consisted of a paper-based system. Ward-based government extension staff collected WASH infrastructure data in the field, using paper-based forms, which they had to fill and carry. At the end of data collection, these papers had to be physically sent to the district office from each ward for electronic entry into Microsoft Excel on desktop computers. The informationm was collected at the provincial level and then sibmitted to the national level. The paper-based system was not liniked to any web platform. An inventory report was produced, printed and distributed. Other line ministries at district and provincial levels also had their own systems for collecting data, which included WASH data.

The data generated were riddled with errors and omissions, as there was no way to validate data collected at the source on paper. Consolidating files from districts and provinces became a tedious task. Stakeholders could not view or obtain the data directly. Some papers were lost or misplaced before data could be electronically captured.

Second phase: Mobile to web-based RWIMS

The limitations of paper-based data collection led to the development of RWIMS, which continues to serve as the core national system. Ward-based extension staff were equipped with mobile devices for electronic data capture and mapping at the source. WASH data were sent to a central national geodatabase in near real-time. Users can access and view information via the web.

This version worked well as a data collection and data management system. After deployment to five provinces, a nationwide central database facility with automated real-time synchronization of data at the source was established.

However, ward-based enumerators were becoming overwhelmed with maintaining up-to-date data for each village water point and institution in their wards. This led to many enumerators falling behind in updates. WASH sector decisions, and interventions, could not be based on out-of-date data.

Third phase: The integrated community-informed real time monitoring RWIMS platform (RWIMS SNR)

Stakeholders recognized that RWIMS could also become a useful tool for mobilizing community feedback in real-time through engaging rural communities in requesting improvements to WASH services.

The RWIMS SNR was designed to be an automated system that can interface and communicate directly with the enumerator, community key informants, local level WASH service providers and district administrators.

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The history of Zimbabwe's RWIMS and the integrated, community-informed real-time monitoring approach

The first pilot of the RWIMS was conducted with support from the SNV Netherlands Development Organization in Mashonaland, East Province, Zimbabwe. SNV contracted Integral Edge, a private technology firm, to pilot the shift from a paper-based WASH data collection system to an online system. The pilot was limited to water point functionality and later extended to sanitation. UNICEF provided technical support during the pilot phase and after the pilot, helped scale the system up in five provinces.

The Village Based Consultative Inventory – the paper-/spreadsheet-based WASH data collection system – was abandoned for a variety of reasons. In particular: (1) it was based on a one-time data collection survey conducted every five years; (2) conducting the inventory was costly; and (3) the information was not real-time. Due to lack of funding, the final Village Based Consultative Inventory was concluded in 2004.

Due to the high demand for data, in 2010, development partners supported the Government to update its WASH database. The initial idea was to support the Government to conduct a Village Based Consultative Inventory since the sector was overdue for another round. However, given the proliferation of mobile technology and Internet coverage, the Government and development partners (including UNICEF) realized that technological advances presented new opportunities. With support from UKAid and GRM Zimbabwe, the Government participated in a study tour to Zambia and the United Republic of Tanzania to observe other national digital monitoring systems.

After considering other online water point mapping tools and applications, the Government and development partners decided to develop a homegrown national system with a local consultant who would be on-hand to maintain it and troubleshoot as needed. This decision was largely driven by the limited resources to maintain an external application and the Government's inability to pay consulting fees associated with system changes.

The first mobile-to-web application for rural WASH was named the Rural WASH Information Management System (RWIMS). The system was piloted in 2013 and 2014 and rolled out in five of eight provinces. Government partners were responsible for reviewing information and deciding on corrective actions at all levels. UNICEF provided technical support and information and communication technology equipment, including for the server, biometric security, mobile software, solar power banks for charging mobile software and live casts. District users also received desktop computers to access the data. UKAid and the Swiss Development Cooperation provided funding support

In this version of RWIMS, thousands of enumerators – government extension workers who check on the status of WASH infrastructure – visited all WASH infrastructure in person and inputted data using their mobile phones. As these enumerators required transportation and fuel, which were not always available or affordable, the data collection process was time-consuming and the data were often out of date. In addition, community members lacked the incentive to report the data because no action was taken to rectify reported breakdowns. The result was reporter lethargy.

Despite the early success of the RWIMS, the Government identified an important gap: the absence of community input, feedback and involvement in WASH services. Such information would enable rapid corrective actions based on real-time, up-to-date data and information on the status of WASH facilities. For example, if a water borehole stopped working, it would take one to three months for the borehole to be fixed until the enumerator physically travelled to the village to inspect the borehole. With the introduction of RWIMS SNR powered by RapidPro – the community feedback and real-time monitoring component – community key informants were able to provide feedback to the Government on water disruptions as they happened, and these disruptions were immediately reflected in the national database.

UNICEF conducted the first localized pilot of RWIMS SNR as part of the emergency drought response in 2014–2015. At the time, the national RWIMS was not used for the emergency response because it was considered out of date and did not reflect accurate information on the status of WASH infrastructure. UNICEF introduced the concept of a community-informed real-time monitoring component, which evolved into the RWIMS SNR, to the National Coordination Unit of the National Action Committee for WASH. A small UNICEF team visited three affected districts to register the phone numbers of community key informants for individual water points. With government partners, UNICEF designed and implemented a RapidPro survey. Community key informants responded to questions about WASH infrastructure functionality and shared messages about hygiene practices in real time, which enabled the prompt response of government partners.

Piloting real-time community feedback in Insiza District in 2018

Why Insiza?
Insiza District was chosen for the SNR pilot for a few reasons: The district was already committed to the use of the RWIMS; Insiza enumerators functioned well; the system was routinely updated; WASH data were well managed; the District Water and Sanitation Sub-Committee was very engaged; there was a high level of feedback and participation; the District Administrator was very supportive; the district was active and responsive in providing support related to WASH infrastructure disruptions; and connectivity in Insiza was decent.

Information and data flows for decision-making
Community key informants at the village, water point and institutional levels sent unsolicited text messages to the system to report a WASH infrastructure failure. To ensure the quality of community-provided information, ward-based enumerators verified, validated and then approved the information for eventual posting to the RWIMS SNR. This involved checking the data for reliability and accuracy or calling the community key informant to verify the information.

Once the demand for WASH infrastructure support was recorded via SMS and verified, the data were reflected in the RWIMS database. If a fault was reported, a message was automatically transmitted to the relevant service provider. Each of the service providers was expected to take action within three days. Every month, a message was sent to all community key informants to update the status of village WASH infrastructure. District, provincial and national system administrators were able to view, in real-time, all of the unsolicited messages sent by community key informants, and those messages and infrastructure repairs that had not been attended to.

In Insiza, there were 22 enumerators in a district with 23 wards. The additional ward was urban and so not covered by the system. Only five of the enumerators had motorbikes. Without the community-based SMS updates, updating the RWIMS database via enumerators to reflect accurate information took a very long time.

> "Fuel is hard to come by in this current economic climate. Now our staff [enumerators] do not need to travel. It's easy for them now. They pick up the phone, call the [village pump mechanic] and ask why has this borehole been broken down for two days?"
>
> *– Mr. Malandu, Chairman of the Provincial Water and Sanitation Sub Committee*

Early results from Insiza

In July 2018, a message was sent to community WASH informants in Insiza requesting updates on the status of WASH infrastructure, including the functionality of water points and the number of households benefiting from the infrastructure, among other information. The message went out to 53,000 people, including 8,000 children under 5 years, and the response rate was over 70 per cent. In addition to solicited updates, 427 unsolicited messages – messages sent by community members without prompting – were received by community WASH committees at the district level.

A village pump mechanic attended to the 68 water points that were reported as non-functional. As a result of these interventions, 46 per cent of the non-functional water points were restored to full functionality, 10 per cent became partially functional, 12 per cent were confirmed by the village pump mechanic as "collapsed" and 32 per cent remained non-functional within a two-week period.

Following a review of the first pilot and results achieved, the Government concluded that real-time monitoring using RapidPro could provide a viable solution to improving the response of service providers to community reports of breakdowns in rural WASH services. Plans were initiated to scale up the RTM service to additional districts.

Real-time data and response roles at the village level

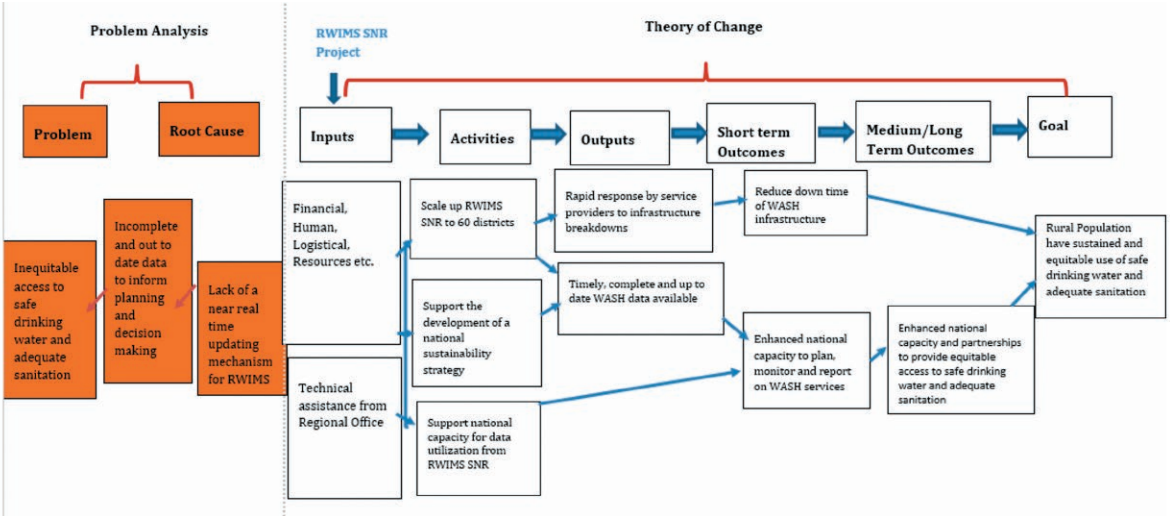
Enumerators: Enumerators are ward-level government extension workers selected from a range of ministries and existing government structures. For example, sanitation and hygiene enumerators are usually health extension workers; school enumerators are from the Ministry of Primary and Secondary Education; and water point enumerators are village pump minders. Provincial trainers train enumerators on the RWIMS SNR component.

Community key informants: Community key informants are community members selected to report on certain infrastructure in their local villages. There is a community key informant for each site in the database. For example, for water points, the community key informant is selected from the existing water point committee. The majority of community key informants are women and they must have a mobile phone. Successful community key informants tend to be active in the community and the water committee and live near the water point.

Pump mechanics: Pump mechanics are community members who have been trained on the maintenance of local water infrastructure. Pump mechanics are found in most wards across the district. The role of pump mechanic had already been established prior the RWIMS SNR; upon the adoption of RWIMS SNR, existing pump mechanics were registered and given refresher training.

Community-based feedback using mobile technology: How RWIMS SNR works

The RWIMS SNR theory of change proposes that the combination of real-time WASH information and data, coupled with rapid government response to WASH service disruptions, enhances the capacity of the Government to plan for WASH improvements and reduces WASH service down times. This ultimately enables hard-to-reach rural populations to access life-saving water and sanitation services.



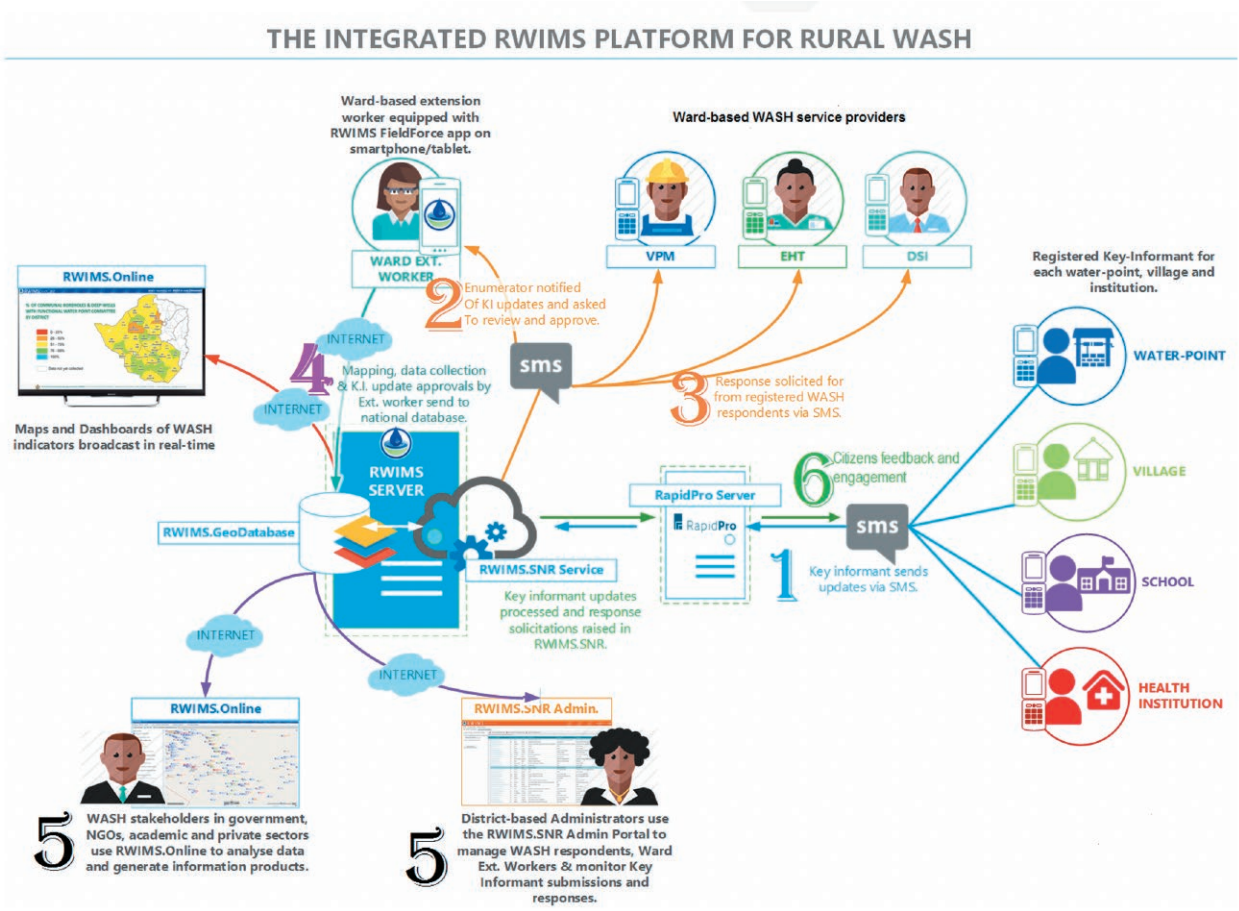
What information is captured through the RWIMS SNR system?

The RWIMS SNR methodology is based on the Village Based Consultative Inventory process in which the Village is the basic unit of enumeration. The Village Based Consultative Inventory process ensures that all WASH-enabling facilities and services are documented. A network of government extension workers is responsible for data collection and management. RWIMS is active in five provinces, including two provinces that operate the extended RWIMS SNR.

RWIMS captures a range of WASH data and information, including the:

- Specific location of facilities;
- Nature of the pump installed or latrine or hygiene-enabling facility constructed;
- Functionality status;
- Distribution of facilities by ward and village;
- Age of facilities vis-à-vis performance;
- Reasons for non-functionality;
- Coverage vis-à-vis access;
- Existence of WASH management structures (e.g., water point management committees);
- Water source type;
- Protection status;
- Water source functionality;
- Water source seasonality;
- Presence of a functional water point committee;
- Number of households using the water source;
- Village sanitation coverage;
- Number of households using any type of sanitation facility (disaggregated by type);
- WASH infrastructure downtime;
- Response time by service providers to community reports.

How does information move through the RWIMS SNR system?



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Step 1: The community key informant sends a WASH infrastructure update via SMS.

- **The community key informant either:**
  - Receives a solicited message each month from the Government requesting responses to a set of questions about the water point / village sanitation / school / health institution; or
  - Sends an unsolicited message if there is an issue with the water point / village sanitation / school / health institution that should be reported.
- The community key informant sends messages to a short code (33800) and responds to all of the questions received via the RapidPro flow.

Step 2: The enumerator is notified of the updates sent by community key informants and is asked to review and approve.

Step 3: A response is solicited from registered WASH respondents (e.g., the village water pump mechanics used in this example) via SMS.

- Pump mechanics are registered and receive SMS notifications about broken water points.
- Once an SMS related to a broken water point is received, the pump mechanic goes to the water point and checks the infrastructure.
- The pump mechanic makes an assessment. If parts are unavailable, the mechanic goes to the District Development Fund – the government department responsible for rural water supplies – for spare parts.

Step 4: Enumerator mapping, data collection and community key informant update approvals are sent to the national database.

- The enumerator reviews community key informant updates and accepts or rejects the inputs.
- If accepted, community key informant data are sent to the RWIMS GeoDatabase.
- If rejected, community key informant data are not sent to the GeoDatabase. The enumerator can call the community key informant to verify the information reported via SMS.
- Data collected directly by the enumerator are sent to the RWIMS GeoDatabase

Step 5: WASH stakeholders use RWIMS Online to analyse data and generate information products.

- The Chief Executive Officer of the Rural District Council, the District Administrator and others log into RWIMS Online to monitor WASH service functionality.
- Anyone can register for an account by going to NCUwash.org and clicking RWIMS.
- District Water and Sanitation Sub-Committee stakeholders prepare district reports every month using RWIMS Online data.

Step 6: District-based administrators use the RWIMS SNR administrative portal to manage WASH respondents and enumerators and monitor community key informant submissions and responses.

- Those with administrative rights review the messages sent by community key informants and can check to see if any enumerators have not approved them or if there are any reports of breakdowns that have not been attended to within the stipulated timeline.
- In Insiza, the Rural District Council Social Services Department houses the RWIMS project, and the Rural District Council Executive Officer is the focal person. The focal person is responsible for:
  - Providing online monitoring and validation and generating reports;
  - Presenting reports to the Chief Executive Officer and the Social Services Committee;
  - Liaising with heads of government departments;
  - Keeping records of field hardware;
  - Ensuring District Water and Sanitation Sub-Committee members and department heads engage with their RWIMS accounts.

Design and implementation of the RWIMS SNR pilot

The RWIMS was integrated at the village, district, provincial and national levels. The District Water and Sanitation Sub-Committee has demonstrated strong commitment to and ownership of the system. The Sub-Committee is passionate about WASH and ensuring the delivery of quality WASH services to rural communities. The real-time monitoring vision has kept the Sub-Committee energized and involved. The Sub-Committee is also widely supported: District-level line ministry staff are often seconded to it; it has the support of traditional leaders from the community; and it has the approval of the cabinet as an institutional coordination mechanism.

Planning and programme design

The design of the RWIMS SNR was led by the cross-cutting National Action Committee for WASH Information and Knowledge Management Taskforce. UNICEF presented the real-time monitoring concept to the Taskforce sub-committee and the Taskforce used the cascade approach to introduce the project to local governments. The aim was to replace the separate WASH data collection systems with a single national system – the RWIMS SNR.

Stakeholders were initially reluctant. "Before, there were many passengers but few drivers," admitted one stakeholder. Actors were uncertain about the introduction of real-time monitoring and the use of new technologies, preferring to carry out activities as they always had. Stakeholders preferred to support the project only if it proved successful. Government actors distanced themselves from the RWIMS SNR while it was still in the pilot stage. Only after it was deemed a success did the RTM initiative gain the support of a range of government institutions.

It was also difficult to get stakeholders to agree on the indicators/data that RapidPro should capture. Once the specifications were agreed on, the Ministry of Information and Communication Technology supported the design of training materials. The national team received a one-day sensitization in which they agreed on training material content. All training materials were standardized and then distributed for cascade training.

One issue that arose, and that is still unresolved, is that local government authorities ultimately have to pay for the system's ongoing costs. Stakeholders in Zimbabwe wanted a local solution – not a solution that was designed and built internationally and that required international experts to maintain it at great cost. A local consultant was hired to manage local repairs and upgrades as and when required. However, building a local system has not been simple. Some elements from the initial specifications are being removed and some are being added.

UNICEF and national partners already had experience with RapidPro, and given the ease of use, did not consider other systems when responding to the emergency drought. Integral Edge developed a questionnaire that could be answered through SNR and shared it with UNICEF and the Government. Some of the standard indicators initially proposed were not suitable for community key informants to answer, such as "how deep is the well?"

Integral Edge, UNICEF and the Information and Knowledge Management Taskforce reviewed and agreed upon the real-time monitoring questions together, and had the questions translated into three of the most common languages spoken in Zimbabwe: English, Shona and Ndebele. They shared the initial questions with the districts for feedback and the districts made several revisions. The flow of questions in RapidPro were designed in consultation with the Taskforce.

For RWIMS Online, stakeholders wanted a design that facilitated user-friendly access to data. There are various ways to extract data from RWIMS Online: using the dashboard, via maps and from Microsoft Excel tables. Users can also generate standardized reports developed by the Taskforce. A mini-RWIMS Online application was created to make it easier for enumerators to access and use the system on their tablet/smartphone.

The first community data generated through the RWIMS SNR via the RapidPro platform was received only three to six months after the cascade trainings – a remarkably fast turnaround. After the data were collected, all levels of the Government conducted RWIMS reviews, in which they discussed challenges, reviewed the data, and reviewed government responses to the demands raised by communities.

Technical partnerships

RapidPro is hosted by Nyaruka, a company with expertise in RapidPro that also provides support to development teams. Integral Edge is the designer and maintainer of the RWIMS system.

Giko is the aggregator and interfaces with the mobile network operators (MNOs). Giko had a significant amount of work to do upfront to set up the agreements with the MNOs and connect SMS to RapidPro. While this was a learning experience for Giko, the UNICEF brand and UNICEF's knowledge of the technology helped push the process forward. UNICEF met with the company's senior management, as well as the Ministry of Information and Communications Technology, to support the process.

As the biggest MNO in Zimbabwe, EcoNet was also a key actor. EcoNet faced several internal hurdles to approving the provision of the service delivery platform, including 18 separate internal signatures. For the smaller MNOs, including NetOne, this same process took 9 to 10 months as the resources needed to commit to establishing a new service delivery platform far outweighed the commercial value of the partnership.

UNICEF's National Systems Strengthening through Real-Time Monitoring Multi-Country Initiative

Like many promising new approaches, shifting from individual uses of digital tools to mainstreaming and integrating real-time monitoring into national development and data and information systems is challenging. Often, the demand for the capabilities promised by digital technologies outpaces the maturity of the technical and organizational systems that can meet this demand.

UNICEF's National Systems Strengthening through Real-Time Monitoring Multi-Country Initiative is helping to bridge this gap by generating invaluable insights based on experience into the generation and use of real-time data and information linked to existing administrative and data systems, and scaling up these approaches across contexts and programmes. The initiative:

1. Serves as a country and regional demand-driven effort to help national governments track, course correct, deliver and accelerate results for children in line with with national priorities and the UNICEF Strategic Plan;
2. Provides integrated technical support and quality assurance through regional and headquarters offices to countries as they design and implement programmes that leverage innovative mobile technology such as RapidPro to address programme bottlenecks;
3. Aims to capture lessons to support the efficient and effective scale-up of innovative digital technology, such as RapidPro; and
4. Supports the identification of pathways to scaling and mainstreaming digital innovations into national programmes.

As part of this Initiative, UNICEF is facilitating the use of RapidPro for real-time monitoring to support digital health, WASH and social protection programme delivery and national systems strengthening in 12 countries and territories. Between November 2017 and March 2018, participating countries received an integrated package of technical assistance and seed funding. Zimbabwe's RWIMS SNR received a US$230,000 grant and technical assistance from UNICEF's WASH and technology for development teams.

Short codes and mobile network operators

A short code was registered with all three MNOs (33800) with an annual renewal fee. The SMS from the community key informant was passed from the MNO to the aggregator. The message passed through a Gateway on the aggregator's server to RapidPro, which was hosted externally by Nyaruka. RapidPro forwarded the message to RWIMS. Giko used InfoBip as the backend software. Once the approvals were in place with the MNO, it took three weeks to set up RapidPro and configure InfoBip to integrate with RapidPro.

As it took some time to establish an MNO agreement, the team focused on the largest MNO first – EcoNet – knowing that once an agreement was established, the pilot could begin while the other two MNOs were brought on board. The links from the MNO to the aggregator and from RapidPro to RWIMS only needed to be established once.

The text messages were sent to the short code, and from the MNO back to the community key informants, through reverse billing. Each MNO charged the aggregator, which then charged UNICEF (and in the future, the Government) for the SMS on a monthly basis. A billing account was required to process this.

Timing:

- **EcoNet:** The project was initiated in August 2017 and the first flow was received in October 2017.
- **NetOne:** The project was initiated in August 2017 and the first flow was received in June 2018.
- **TeleCel:** The project was initiated in August 2017 and the contract was signed in June 2018.

When EcoNet was approved and the system was up and running, community key informants were trained and registered, but only those on the EcoNet network were able to begin sending SMS.

Technical procurement considerations

There were challenges with the procurement and contracting processes. The Government required vendors be paid in local currency, but with the devaluation of the currency, payments were made in United States dollars.

Because aggregators are country specific and do not fall under global long-term agreements, local contracts were required. MNOs generally have a preferred list of aggregators that they work with, but none of the aggregators under consideration were on all three MNO lists. The RWIMS SNR implementation team chose to work with an aggregator that was a preferred supplier for the largest MNO with the most coverage. The selected aggregator worked to arrange contracts with the other MNOs

Stakeholder engagement with RapidPro architecture

A server system administrator within the Ministry of Environment, Water and Climate – which will eventually house the RapidPro server – was trained on RapidPro. It was not necessary to train additional government stakeholders on RapidPro, as the system was managed by a local consultant. The Chief Executive Officer of the Rural District Council, the District Administrator and other responsible persons were able to log in and check on functionality. However, as a sustainability measure, government system administrators should have capacity to carry out this function to reduce maintenance costs.

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The added value of RWIMS SNR and key results

Rights holders were able to demand WASH services directly from the Government

RWIMS SNR empowers communities to improve their environmental health and well-being. With community-based monitoring and reporting, rights holders are encouraged to demand water and sanitation services and thereby realize their rights. The use of SMS – which is common among local stakeholders – means almost everyone can get involved. The participation of community key informants in the management of WASH infrastructure in Zimbabwe has improved WASH service delivery in hard-to-reach areas.

Water point repairs were faster and borehole management improved

A major benefit of RWIMS and RWIMS SNR is that data and information are available in real-time, which has enabled faster corrective actions. National stakeholders can monitor any infrastructure downtime, request that water boreholes are repaired, and ask why a borehole is not working. The system informs government stakeholders as to whether the challenge is a seasonal problem – e.g., a well has run dry – or a mechanical one that requires an on-site response. With an overview of seasonal patterns, government authorities can plan and prepare in advance.

With RWIMS SNR, the repair response is quicker. Pump mechanics respond as soon as the community key informant sends an alert that the pump is not functioning. If the water pump can be fixed without spare parts, it will be repaired quickly.

Evidence-based planning of WASH infrastructure requirements improved

During the multi-sectoral WASH planning and budgeting process, the RWIMS SNR enables complete transparency on what work needs to be done. Having agreed to government data sources ahead of time helps to prevent bias and direct limited resources to the areas most in need. Stakeholders can go online at any time to see which boreholes are not functioning and can plan more accurately for the budget allocations required to fix them. "It has solved a lot of our conflicts," said one community key informant.

The RWIMS SNR has also changed how WASH monitoring is conducted, and made it more streamlined and ubiquitous. For example, RWIMS SNR is being used to monitor the open defaecation-free status of villages – an approach that the Government recently introduced. As a result, fewer baseline WASH surveys are needed at project inception. Stakeholders hope that RWIMS SNR will also reduce the need for post-project surveys

The Government gained insight for Sustainable Development Goal planning

The Government is committed to meeting Sustainable Development Goal 6 – "Ensure the availability and sustainable management of water and sanitation for all" – and has produced detailed estimates of how to get there (e.g., it would cost an estimated US$5 per person per year until 2030 with all partners working together). RWIMS has helped with the budgeting process by providing concrete evidence for donors.

RWIMS data supported decision-making across sectors

When there is a disease outbreak, the Ministry of Health and Child Care normally requests information from different ministries to inform the response. With the RWIMS, the Ministry can now go online to access WASH-related information from the outbreak area and contribute an informed decision on what action to take. For example, if the data indicate that water access is not an issue, the Ministry might recommend actions related to poor hygiene practices or contaminated water supplies.

RWIMS data can also be used in conjunction with other ministries and their systems. For example, it could be used with the Ministry of Health and Child Care District Health Information System 2 to facilitate more informed priority setting and response planning; and with Ministry of Lands, Agriculture, Water, Climate and Rural Resettlement systems to support livelihood planning. The Ministry of Finance and Economic Development is using the newly launched RWIMS Live Cast system to streamline the WASH budget allocation process and make it easier to request funds for the WASH sector.

How RWIMS SNR enabled a more effective and efficient response to Cyclone Idai

RWIMS was employed to support the emergency response to Cyclone Idai. Following the hurricane, severe flooding in eastern Zimbabwe led many households to disperse. The Government and development partners needed to know how many people had been affected by the disaster and how many WASH facilities had been affected or destroyed. Using the data available in RWIMS, the Government and partners made an accurate estimate without having to verify the numbers in person, which would have been more time consuming and costly. This real-time information provided by the RWIMS SNR helped improve WASH planning in the emergency response.

RWIMS facilitated evidence-based emergency response

Humanitarian partners will often spend time and effort undertaking baseline assessments following a disaster, but with RWIMS, the information is already available and updated in real-time. A benefit of RWIMS SNR is having community key informants and enumerators in place to report on infrastructure changes to enable real-time analysis and immediate action.

Results achieved

As of December 2019, nearly 5.4 million children have been reached through water and sanitation services delivered based on RWIMS data. Of these, 1.8 million children were reached via RWIMS SNR data. More than 10,000 water points; over 3,400 villages; nearly 1,100 schools and over 220 health centres have been captured in the RWIMS SNR system. More than 419,000 households are covered by the RWIMS SNR in both the pilot district of Insiza and the target province of Manicaland. Nearly 15,000 community key informants are registered on the RWIMS SNR and provide regular monthly updates via SMS on the status of WASH infrastructure. In one village, stakeholders noted that thanks to real-time community feedback and response using mobile technology, repairs to water points take place in three days rather than three months, providing life-sustaining access to water more rapidly for hundreds of households.

"The burden of scavenging for WASH data is a thing of the past. Our stakeholders can now easily go online and access district WASH data. Most exciting is the ability of the system to be accessed on the go through smart phones. The initiative has also rejuvenated the interest of communities in the management of their WASH services." –Fires Manombe, Chief Executive Officer of Insiza's Rural District Council

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Good practices

1. The system fostered government leadership

The Government of Zimbabwe led the design and implementation of the RWIMS SNR. Once the concept was approved by the Government, it was responsible for managing the system, with clear accountabilities established at all levels.

2. The approach aligned with existing governance structures

The RWIMS SNR was conceived within existing WASH governance structures at all levels, rather than as a new and separate structure. The National Action Committee for WASH – a well-established inter-ministerial coordinating forum – championed the design and roll out of all aspects of the system, including its initial concept, training design, implementation, etc.

3. Good programme planning enabled quality results

The Government planned the RWIMS SNR well from the start. The Government worked with multiple stakeholders to develop a theory of change and establish clear objectives, baselines and expected results, which enabled access to progress reports and benchmarks and kept the project on track. Good planning helped enable strong results.

4. Community engagement kept the Government accountable

Using mobile technology to report on WASH service deficiencies, communities – including hard-to-reach communities – actively engaged in improving the environmental health and well-being of themselves and their surroundings. Stakeholders at all levels felt that the community key informant component worked well.

5. The technology was appropriate for users

RapidPro and SMS were easy to use, widely accessible and enabled the provision of feedback via mobile phones.

6. Community key informants were already engaged in community services

Community key informants were selected based on their existing roles within their communities. For example, a community key informant for water was often also on the water point committee.

7. Transparency and accountability were built into the WASH system

All subscribers to the RWIMS SNR could access a real-time overview of water and sanitation infrastructure service outages across the country. National and sub-national government staff were able to view this data and immediately inquire as to why a given service had not been repaired.

8. Data quality assurance checks were vital

Having enumerators provide quality assurance checks on data and information reported by community key informants ensured that the data reflected in the national WASH database were correct.

9. The data and information generated by stakeholders were used frequently

Data and information generated by the RWIMS SNR were frequently accessed by multiple stakeholders for multiple purposes and corrective action was taken based on the information reported. Data and information also helped inform the planning and budgeting of WASH services, including priority setting. In the event of natural disasters, the data and information were used as the baseline for WASH infrastructure, and the community-based feedback SNR component facilitated quick and efficient updates on infrastructure without the need for time-consuming travel.

10. Local firms were engaged to provide technical support

The engagement of a local firm to develop the RapidPro-integrated real-time monitoring component gave the Government the flexibility to test new approaches and work with the local team to make adjustments as needed.

11. Piloting, assessment, scale and iteration were embedded in the system design

Systems strengthening using new real-time approaches takes time. The Government used each step of the implementation process to reflect on results, learn from experience and iterate before further scaling.

Challenges

While the RWIMS and RWIMS SNR systems were ultimately successful, they also faced significant challenges.

Mobile and Internet connectivity and device management

- Internet connectivity is poor in rural Zimbabwe. This means that community key informants were not always able to send a message, and in some cases, had to walk a long way to access a network. Often, the community key informants found it more convenient to wait for the monthly solicited prompt to report the non-functional water points. In some cases, the monthly solicitation for community updates did not arrive due to connectivity issues.
- The mobile network was affected by frequent power outages. In some cases, community key informants sent message that were not received by pump mechanics.
- Some connectivity issues were not related to infrastructure. The data/airtime used by enumerators was included in local budgets, but may not have been disbursed due to cashflow issues. Sometimes data bundles were only sporadically available.
- When there is no network, community key informants and enumerators opted to look for a pump mechanic on foot rather than report the need via SMS, which meant that the problem was not reported in the RWIMS SNR.
- Many government offices were unable to generate reports from RWIMS due to poor Internet connectivity.
- RWIMS SNR requires data bundles and devices need maintaining and replacing. Mobile devices bought locally and used by enumerators were old and ran out of memory. In some cases mobile phone batteries died and were abandoned. Some local administrators struggled to sustain the information technology needs of the system.

System issues

- RapidPro was hosted internationally and relied on Nyaruka for support. The RapidPro server sent messages in batches, which was slow. With thousands of scheduled solicited messages each month, it could take six to seven hours for RapidPro to send all of the messages. This time could be reduced if RapidPro was hosted locally.
- The enumerators rejected about 3 to 5 per cent of solicited messages per month. A message was usually rejected because community key informants had provided incorrect data on the number of people using a water point. When this happens and data must be corrected, the enumerator should call the community key informant; but enumerators were reluctant to absorb the cost or airtime of a call.

Lack of local funding for WASH infrastructure parts

- Even when RWIMS and RWIMS SNR are working as planned, there may be external reasons for service delivery interruptions. For instance, in Insiza, in November 2019, 142 boreholes (24 per cent) were non-functional because there was no money to buy spare parts or because the well had run dry due to drought. If spare parts are needed and the district is required to pay for them, a repair may not happen promptly. With the current economic challenges, districts often failed to stock replacement parts.

Costs

Given the current economic crisis, without external support, the Government's capacity to cover the costs of the RWIMS SNR remains constrained.

- Data is the most expensive component of the RWIMS SNR. Currently SMS costs US$1,000 per month per district. This translates to US$7,000 per month and US$84,000 per year for the province.
- The Government hosting the RWIMS SNR server only budgeted for half of the Internet cost for 2019 and continued to rely on UNICEF to support server costs. The Government is committed to hosting the server but given the current economic climate, its ability to pay is an obstacle.

Lessons learned

1. Agree to and establish a monitoring framework

Partners reported that it would have been helpful to have agreed to and established a WASH monitoring framework for developing the data and information collection system. Without agreed indicators, in some cases, too much information was collected via SMS, which increased costs. The Government later recognized the need to trim the type and quantity of the data being collected; however, this task became complicated without a monitoring framework agreed to by all national partners. This challenge is compounded by the need to revise indicators in line with the new WASH Sustainable Development Goals indicators.

2. Enable sub-national ownership and stakeholder engagement

The RWIMS SNR system was developed at the national level. Administrators, enumerators and respondents at the provincial and district levels were not as involved in the design phase, which made it difficult for these actors to gain ownership of the system. Some government departments that are affected by WASH, such as the agriculture and veterinary departments, were also not a part of the initial system design.

3. Provide ongoing motivation for community key informants

There are 120,000 community key informants and 40,000 respondents using the SNR system, and some require continuous engagement and energizing. This could be done through a combination of feedback and motivational messages built into the SNR system, as well as re-training. One community key informant for sanitation said she was encouraged when she received the monthly solicited message from the Government. However, she never received a response to her feedback or encouragement for her work.

4. Provide quality training at the sub-national level

Training should be available to people in various leadership positions in the community so that the roles and responsibilities of community key informants are widely understood. When the pilot scaled up to two provinces, not all trainings could be conducted at the district level and training quality suffered as a result. In the future, training should be provided in each district and as many people as possible should be involved.

5. Conduct periodic re-training following roll out

Continuous advocacy is needed to sustain the demand for and use of the RWIMS SNR. Key informants, enumerators and all institutional stakeholders should be re-trained periodically to reacquaint them with the system and re-energize participation. In addition, given that attrition remains a problem, additional enumerators and community key informants will need to be trained.

6. Partner with MNOs

The project needs to be appropriately positioned with MNOs at the outset and MNO senior leadership need to be included in discussions about its implementation. One approach would be to position the project as a corporate social responsibility initiative. Be open with the MNO about the lack of revenue potential and the significant public relations potential. Then consider how to make good on the public relations promise to pave the way for future collaboration. Whenever possible, choose a pilot area where there is good coverage by the largest MNO.

7. Build awareness of the project across ministries

Despite the inter-ministerial relationships integral to supporting the RWIMS SNR, it has been difficult to get some national ministries to use the RWIMS instead of their own systems. To improve inter-ministerial understanding and use of RWIMS, the Information Knowledge Management Taskforce has installed Live Cast television screens in ministry leadership offices to support joint government and inter-ministerial ownership and accountability.

8. Facilitate data review and visualization at the district and national levels

Though the RWIMS is available online, and dashboards are installed in ministerial offices to enable real-time review, the information is not easily accessible to those without computers or good Internet connectivity. A business centre is being established in Insiza that will allow community members to print reports, access information and utilize government services. It would also be useful to increase the number of registered administrators of the system, by district.

9. Enable qualitative feedback between community key informants and enumerators

It would be useful if enumerators were able to communicate with community key informants via a platform or system, free of charge. For example, in the event the enumerator identifies an error, instead of selecting "reject", there could be an option to "reject with query" with a short space to write an explanation of the issue. The system would then send the query to the community key informant and prompt them to correct or check the data and resubmit.

10. Integrate behaviour change communication into real-time monitoring systems at the community level

Community key informants, most of whom perform leadership roles in their communities, would be natural opinion leaders for sharing and disseminating WASH behaviour change messaging using inter-personal or digital channels. Incorporating behaviour change communication would also further reinforce the interest and motivation of community members in the environmental health and well-being of their village. There is also potential for using community-based monitoring approaches in urban areas of Zimbabwe, where a robust U-Report deployment (i.e., more than 177,000 U-Reporters) is functioning.

11. Integrate the RWIMS SNR and District Health Information System 2

Integrating RWIMS SNR with District Health Information System 2 – currently the world's largest health management information system – would make the system and its analytics more powerful. Such an integration would enable the inclusion of disease surveillance data, coupled with WASH infrastructure mapping in the RWIMS and community-based feedback component, further enhancing WASH surveillance and response at the national level.

12. Incorporate real-time information for WASH suppliers

There is interest in developing a module for local WASH suppliers so that they can be informed of WASH breakdowns directly from the RWIMS SNR system, and be prepared to respond more quickly with needed WASH parts and supplies.

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Annexes

Annex I: Deep Dive: RapidPro and the use of local capacity for national systems strengthening

RapidPro has been fully operational in Zimbabwe since July 2015. Given UNICEF Zimbabwe's experience with RapidPro, the tool was selected as the optimal platform to power the RWIMS SNR.

Integral Edge, a small local company, led the development of the RapidPro-integrated real-time monitoring component, known as the RWIMS SNR. As a local consultant, Integral Edge was able to provide long-term support to the Government, providing flexibility and testing capacity at no extra cost.

Integral Edge taught itself how to use RapidPro, studying the application programming interface and related documentation and participating in a two-day training from UNICEF Zimbabwe. Integral Edge staff noted that it took only two weeks to reach RapidPro competency. The ease of developing and using RapidPro "flows" was an important feature, as were RapidPro simulators. A member of the Integral Edge team with no programming experience was able to design the flows according to the agreed question set developed by the Government.

Integral Edge built the system, deployed it and then trained district administrators and enumerators to use it. The company also worked on the database, designed a mobile-lite application for RWIMS online for the enumerators to use in the field, and trained districts and enumerators to use RWIMS-SNR.

As a local company, Integral Edge was always on hand to manage any tweaks or adaptations. They worked with the team as the scope evolved. This built the Government's confidence in its ability to take national ownership of the system.

Integral Edge upgraded the RWIMS server to enable the real-time monitoring component. This involved building an application programming interface so RWIMS could communicate with RapidPro; setting up the server room in a government building; installing a firewall; and testing the server. Integral Edge also provided the Government with technical support as needed and developed administrative tools for the district water and sanitation sub-committees to maintain their own register of respondents and community key informants.

Annex II: List of persons interviewed

National level

Name	Ministry/Organization
Kundai V. Kangwena	Ministry of National Housing and Social Amenities
Lovemore Dhoba	Ministry of Lands, Agriculture, Water, Climate and Rural Resettlement
Nesbert Shirihuri	Ministry of Lands, Agriculture, Water, Climate and Rural Resettlement
Percy Mugwangwavari	Ministry of Lands, Agriculture, Water, Climate and Rural Resettlement
Charles Siachema	Ministry of Health and Child Care
Daison Rodrick	Ministry of Health and Child Care
Ruvimbo S. Mandebvu	Ministry of Health and Child Care
Lydia Manjoro	District Development Fund
Lufina Feresi	District Development Fund
Simba Musonza	Integral Edge Systems Design

Provincial level

Name	Ministry/Organization
Sithandile Ndumo Ncube	Ministry of Local Government, Public Works and National Housing
Moment Malandu	District Development Fund
Patrick Mirirayi	Ministry of Health and Child Care
Joseph Dube	District Development Fund
Ben Nyikadzino	Zimbabwe National Water Authority
Tichaona Makuza	Ministry of Mines and Mining Development
Ephraim Ndebele	ZimSTAT
Merjury Sikundla	Ministry of Women Affairs, Community, Small and Medium Enterprises
Lex Macharaga	Ministry of Local Government, Public Works and National Housing
Celestina Godzi	District Development Fund
Vusumuzi Dube	Department of Veterinary Services
Golden Mungove Mapanga	Ministry of Public Service, Labour and Social Welfare
Mkhunjulelwa Ndlovu	Ministry of Lands, Agriculture, Water, Climate and Rural Resettlement
Enat Mdlongwa	Department of Veterinary Services
Francis Gadzikwa	Ministry of National Housing and Social Amenities
Lifias Masukume	Ministry of Primary and Secondary Education

District level

Name	Ministry/Organization
Fidres Manombe	Insiza Rural District Council
Zacharia Jusah	Ministry of Local Government, Public Works and National Housing
Nkosikhona Mguni	District Development Fund
Hedron Ncube	Ministry of Health and Child Care
Siceco Gwayi	Ministry of Local Government, Public Works and National Housing
Zwelabantu Moyo	District Development Fund
Messie Mpofu	Insiza Rural District Council
Tipei Msipha	Ministry of Primary and Secondary Education
Majority Mkandla	Ministry of Lands, Agriculture, Water, Climate and Rural Resettlement

Community level

Name	Ministry/Organization
Soneni Mpofu	Ministry of Health and Child Care Ward 3
Rudo Nkomo	Village Health Worker Susapansi Village, Ward 3
Tryphine Gumbo	RWIMS Key Informant Esikwakweni Borehole Zamanjalo Village, Ward 3
Thenjiwe Malunga	Water Point Committee Chair, Green Valley b/h, Ward 1
Siphilisiwe Mlilo	Ministry of Health and Child Care, Ward 1
Herod Nhliziyo	Village Pump Mechanic, Ward 1