

# Bigger Data : Water For People's Lessons, Doubts and Experience of Mapping Rural Water Supply Systems In Malawi

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## Abstract/Summary

In the last 20 years or so, as mobile technology evolved and big data became more accessible than ever, monitoring and evaluation (M&E) has grown in prominence as a distinct discipline (Nhlema,2014). Rather than being an add-on at the end of the traditional project cycle, M&E is now a central tool, not just for assessment of achievement or progress, but also for long-term planning, resource allocation, and improvements and innovation in program design. And M&E isn't just for data crunchers who spend their days hunched over Excel spreadsheets— everyone from graphic designers, communicators, educators, and program officers are using numbers to tell or show a story, teach a concept, or achieve strategic organizational or business goals. This paper will share Water For People's 6 years' worth of experience, successes, lessons and doubts around using the monitoring application, AkvoFLOW, to collect over 40000 lines of WASH data since 2010 in Malawi.

## Introduction

Traditionally, international development organizations and other nonprofits have stuck to a select set of data to report on to their donors, board, and community, based on their mission. They're tracking dollars raised, vaccines purchased, schools built, or lives saved. But as donors have become more critical of the philanthropy sector and demand more data to explain their progress, nonprofits, including Water For People, have realized they need to step up their M&E game.

In the last couple of years as we shaped our mission to provide access to clean water for Everyone Forever, Water For People has made monitoring and evaluation a top priority, in line with our promise to be transparent about our work and our financials. To that end, data and reporting has become integrated into nearly everything we touch—from our Head Quarters and field office operations and program planning, to marketing campaigns and events and fundraisers. We're not just looking at data for data's sake; we're using it to make decisions about whom we support, why, and how we do it. The numbers are our foundation, but the real innovation comes with how we use them to change the game. Our Malawi country office is a great example of how data is being used to inform decision-making around investment allocation at local government level.

Malawi is a Southern African country nestled between Zambia, Tanzania and Mozambique and has a population of close of 16 million people. Even though, government records show a national coverage figure of between 83% - 85%, making it one of the few Sub-Saharan African countries to achieve the MDG target for water supply before the 2015 deadline, such statistics belie a dire non-functionality situation whereby 30% of water supply systems are not functioning at any one time (Ministry of Agriculture, Irrigation and Water Development, 2012). More systematic M&E processes are vital to isolating and addressing such bottlenecks, prioritizing efforts and tracking progress toward better WASH services for communities. Though there are both institutional frameworks to guide M&E on paper and political acknowledgment of the importance of M&E for informing decision making and investment, this

has not translated into increased production and use of development data. This has been mostly due to inadequate financing, bureaucracy, human resource gaps and poor institutional capacity which have hampered the collection, analysis and effective use of WASH data resulting to erratic/protracted data collection, inaccurate/outdated records and waste. In a post-2015 era, where timely and easily accessible data is “*an indispensable element of the development agenda*” (United Nations, 2015), more emphasis, commitment and increased resources will be needed to meet the data demand for the new development agenda: the SDGs; but such an essential endeavor must be a joint responsibility and collaboration between governments, non-governmental organizations, the private sector and civil society, where possible.

It is within this context that Water For People Malawi partnered with the local government in the districts of Chikhwawa, in the south, and Rumphu, in the north, and the public utility company, Blantyre Water Board in the commercial city of Blantyre, to implement the AkvoFLOW monitoring application to help fill the data collection gap to guide problem-solving and development planning.

### **Description of the Case Study – Approach or technology**

There are currently a number of open source monitoring platforms designed to capture and analyse WASH and health data from the field, these include, to name a few, [www.mwater.co](http://www.mwater.co) and a Malawi-based platform still at beta stage, [madzialipo.org](http://madzialipo.org), which are all free and accessible to sector practitioners.

The AkvoFLOW system has been the primary monitoring platform since Water For People first developed and introduced it in 2010. Initially developed to address errors and problems inherent in paper-based surveys, AkvoFLOW has been proven in use around the world to be easy to use, adaptable and makes it easier to gather, store and share data.

For the past six years Water For People Malawi has been using AkvoFLOW as its primary tool for assessing its impact in reaching Everyone with water and sanitation services Forever in all the target locations we work in. AkvoFLOW is a smartphone app that collects, manages, analyses and displays geographically-referenced data by using:

- Internet-based management tools: design surveys and manage how they are distributed to smartphones
- Akvo FLOW app: field staff can conduct surveys using the app on smartphones and submit the data to online databases;
- Maps and dashboards: make it easy to manage phone users, create surveys and generate online maps to view, explore and share survey data

With an institutional commitment to carry out annual mapping exercises for up to 10 years, Water For People Malawi has worked with local governments in rural districts of Chikhwawa and Rumphu and the public utility in Blantyre City to successfully collect and analyze data.

With AkvoFLOW’s adaptability and flexibility, surveys range from basics on WASH conditions at the household level to customized surveys gauging consumer satisfaction with more desirable sanitation products, e.g. ceramic toilet pans, and pit latrine emptying services. We initially employed a team of expat volunteers from the United States called World Water Corp© to collect the survey data, but this proved an unsustainable model that undermined the capacities of local institutions. So in 2012, the data collection responsibility was shifted to local partners, i.e. local government and NGOs, in the target areas. Since then, Water For People has consistently worked with the same team of enumerators which has helped strengthen the capacity of local institutions, reduces the need for technical training on the technology which saves valuable time to focus on the survey questions and what they require.

Additionally, rather than offering a remuneration based on number of days in the field i.e. a per-day rate, Water For People Malawi introduced a merit-based payment system based on number of quality surveys

collected, as an incentive for enumerators to collect data quickly. To ensure quality control, the data is meticulously reviewed to search for outliers, errors and logical mistakes; any bad dataset found is not paid for which further incentivizes enumerators to collect as much quality data as possible. To inform quality control, a Data Clean-Up Guide is used whereby outliers, errors or logical mistakes are isolated, deleted or re-verified and any major changes to data are recorded for future reference. Depending on the type and quantity of surveys required as per sampling plan, the cost per survey ranges from US\$0.50 to US\$3.00. Comparatively, a mapping assignment in the District of Chikhwawa, covering 2000 waterpoint, 1800 households and 151 schools or clinics, would cost US\$7,140 if a per-day rate was used, while, with the per-survey rate, such an assignment would cost US\$ 7,951, which 11% more expensive than the former payment option. This is the inherent trade-off regarding incentivized data collection: collecting more data in the least amount of time costs more money.

Another plus for the AkvoFLOW system is that by using mobile phones to collect data in the field, the teams save time and reduce errors and bias risk usually associated manual data collation (paper-based). Despite these positive outcomes, there are still challenges with this type of data collection process in Malawi, and we continue to conduct our own surveys and analysis for the most efficient process possible for the districts we work in.

### **Main results and lessons learnt**

The main result of our mapping model has been the significant increase in the quantity and quality of surveys collected between 2012 to date, standing at 43460 lines of data at the time of abstract submission (see figure 1 below). This volume of data has helped provide a comprehensive picture of the state of WASH in the areas we are working and has helped inform and improve development planning for local governments in Rumphi and Chikhwawa. Annually, Water For People Malawi brings together state and non-state actors in the WASH sector to share the results of the field mapping in an open forum. Besides critiquing the validity of the data, the forum helps stakeholders:

- Gain an understanding of the district-level WASH situation and deliberate on potential causes of problems; ,
- Identify emerging trends in key performance indicators, e.g. level of infrastructure functionality, to inform prioritisation of
- Plan for future interventions to address emerging trends/problems

Rather than showing Water For People’s impact, the data illustrates the district-wide progress, thus emphasizing the cumulative impact of incumbent WASH players and approaches.

Another example of how the data has been used to inform planning was in Rumphi district, where the local government previously assumed they had approximately 1000 water supply systems and the district was undersupplied. However, following the mapping, over 3000 water supply systems were discovered and the district was over-supplied, despite a non-functionality rate of 35%. Added to this, it was discovered there were still small pockets of remote communities without any access to an improved water supply system within walkable distance. This data was later shared with local leaders and local government officials as a focus of a productive discussion that brought to question the process of investment planning, data management and infrastructure maintenance. Using a simple GIS maps showing location and functionality of water systems, the district water office re-allocated and altered the number and allocation of 80 new water points scheduled under a an African Development Bank project slated for the district. Additionally, the Rumphi data has been utilised to trigger conversation around enhancing coordination between the various stakeholder interests around the water resources in the districts; thus the data has provided an objective and apolitical basis for the local government to engage and challenge destructive behaviours around water infrastructure allocation that has proven difficult in the past.

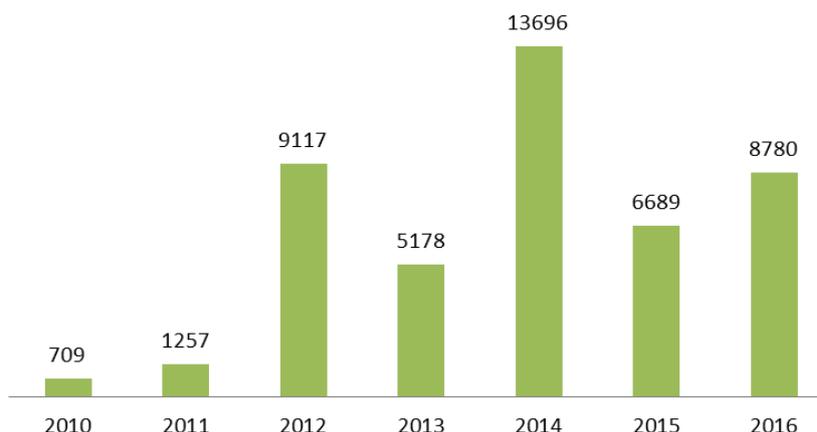


Figure 1: Number of surveys collected by year

Some summarised lessons learnt of our experience include:

- Investing in good enumerators means investing in good data: working with the same team of enumerators has helped instil confidence in use of AkvoFLOW, which was a challenge in the initial stages, and strengthen critical competence for the local institutions we work with to depend on. With each passing year, concerns have shifted from the technology to understanding the questions and what they require. Recently, as part of the mapping methodology, enumerators are brought together to review, critique and revise the questions prior to data collection to alleviate any ambiguity pertaining to what the questions require.
- Good data isn't cheap. As previously highlighted the per-survey rate method costs considerably more money though it generates more quality data more quickly.
- Don't ignore the outliers in your data set. As part of quality control process, all data sets are checked and re-verified for errors, outliers and mistakes before subsequent trend analysis. As part of re-verification, enumerators are re-engaged in open discussion to clarify their data-sets before deletion and subsequent payment adjustments. However, enumerators have, on occasion, challenged the outcome of this verification process, especially when it was not in their favour. One specific case, a field verification team was deployed to validate a data-set that suggested an impossibly low water point yield of 0.003 litres per seconds which was tagged as an outlier. After field verification, it was confirmed that the dataset was accurate and a community, which would have otherwise been disregarded, was included for system rehabilitation the following year.
- Keep it relevant, visual and simple. By using recognisable WASH indicators and simple GIS maps showing water coverage and system functionality, we have seen marked difference in level of engagement with the data from government stakeholders. Particularly, this improved level of engagement has generated meaningful debate around the state of coordination within the WASH sector, as in the Rumphu example, and how best to improve it.
- Don't collect data for data's sake. You have to know, in advance of collecting the data, what you are going to use the data for.
- More thought has to be put into developing a more cost-effective, field-focussed and systematic data validation process.. Ideally, having a secondary source for comparison would be the easiest and fastest method for validating data. However, such a secondary source does not currently exist in the areas we work and those that come close are either inaccurate or outdated. Furthermore, the data-check process in-hand remains desk-based with occasional field verifications when the data quality justifies field validation. More field verifications are required that are informed by randomised samples of collected data-sets that could be assessed for validation. The trade-off of this approach would be added cost to an already costly mapping process and more time thus defeating the one of the reasons why mobile applications, like AkvoFLOW, were created in the first place: to save time.

- Lastly, but not least, with the increase in the volume and scope of data comes an added layer of complexity in terms of data analysis and interpretation. As such, more skills development is required in the areas of statistical analysis through the use of existing packages, e.g. SPSS and GIS, to enrich the level and quality of analysis beyond the standard water coverage and functionality across a district to understanding the granular water access issues at household level. Such added skills would also help further validate certain aspects of the data, e.g. GPS accuracy, which will help guide improvements to AkvoFLOW.

## **Conclusions and Recommendations**

There is a growing movement within the WASH sector that is pushing for the integration of mobile technology within government monitoring information systems to help optimise the data collection and analyses portion of development planning. Though the goal of our 6 years’ experience was not primarily to integrate AkvoFLOW within the government, this experience, and the lessons gained thereof, are relevant to providing a wealth of knowledge to this emerging development endeavour.

It is without question, more resources and commitment will be required, if Malawi is to meet the data demands of the Sustainable Development Goals. However, though NGO support is necessary in the medium term, the production and use of WASH data is, and should be, the responsibility of governments. The generation of actionable WASH data in Malawi’s case was a result of external financing and backstopping support to the local government through Water For People. With the low resource environment of local government, this calls to question whether such value-adding applications, like AkvoFLOW, can be sustainably integrated, owned, and paid for by local government themselves; especially when such platforms come at a cost which most local, or even national, governments would not be keen to pay for out of their already stretched budgets and amidst other pressing priorities.

The value-addition furthered by mobile phone innovations such as AkvoFLOW is evident due to the ease of use, efficient analysis and time-saving benefits as proven in use. That said, the cost of installing and implementing such innovations cannot be ignored and, in Malawi’s case, could outweigh the benefits. As such, any attempts aimed at integrating mobile-based monitoring systems/applications within governments must understand what the cost implications will be for governments and further concentrate on addressing the system-finance repercussions. Additionally, institutional inefficiencies, political self-interest and a laissez-faire culture, attributes of most local and national governments, have made existing lower-cost M&E frameworks in Malawi ineffectual, despite some notable attempts to re-invigorate their use. Again, integrating mobile-based monitoring systems/applications within governments must take these into account and, where practicable, address them.

Consequent to this, we would suggest that mobile phone innovations, including AkvoFLOW, must play a more complementary role to the national M&E system of the national government; and not be a stand-alone system operating in isolation. In line with this, the volume of data generated has been shared through AkvoFLOW has been shared with local government to help update existing paper-based monitoring systems which local government are using to inform decision-making and improve service delivery for the rural poor. Until the caveats with AkvoFLOW, abovementioned, are addressed, the use of mobile-based systems/applications to generate big data for development planning will remain limited.

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