

BUILDING EFFECTIVE DRINKING WATER MANAGEMENT POLICIES IN RURAL AFRICA: LESSONS FROM NORTHERN UGANDA

CHRISTOPHER OPIO

KEY POINTS

- National governments should develop strong rural drinking water quality monitoring and surveillance programs to ensure that uncontaminated water is available in rural Sub-Saharan African communities.
- Governments and non-governmental organizations (NGOs) need to educate well users on proper transportation and storage of water in order to ensure their efforts to provide reliable sources of clean drinking water to rural areas are not being jeopardized.
- Communities must be engaged in the planning, installation and management of wells to foster a sense of local ownership.

INTRODUCTION

The importance of providing clean, safe drinking water and sanitation to rural inhabitants of developing countries is widely recognized. The United Nations (UN) General Assembly, for instance, declared 2008 the International Year of Sanitation, and the World Bank has been increasing financial assistance to developing countries in support of water supply and sanitation improvements (Cho, Ogwang and Opio, 2010).

Despite the Millennium Development Goal (MDG) to reduce, by half, the number of people without sustainable access to clean and safe drinking water and basic sanitation by 2015 (Cho, Ogwang and Opio, 2010; Opio, 2010), most countries in

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ACRONYMS

| | |
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| MDG | Millennium Development Goal |
| NGO | non-governmental organization |
| NUDF | Northern Uganda Development Foundation |
| PACN | Pan Africa Chemistry Network |
| UN | United Nations |
| UNDP | United Nations Development Programme |
| UNESCO | United Nations Educational, Scientific and Cultural Organization |
| UNICEF | United Nations Children’s Fund |
| WHO | World Health Organization |
| WRI | World Resources Institute |

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Sub-Saharan Africa are not on track to meet the widely adopted deadline (Harvey, 2007; United Nations Children’s Fund [UNICEF], 2012; Abenaitwe, 2012).

Globally, the MDG target is to raise drinking water’s global coverage of 77 percent in 1990 to 88.5 percent in 2015 (World Health Organization [WHO], 2012a). In 2012, the UN announced that the MDG on safe drinking water had, in fact, been met well in advance of the 2015 deadline (WHO, 2012b). But while, on average, the target has been met globally, Sub-Saharan Africa lags behind in terms of development towards the target. Only 61 percent of Sub-Saharan Africans have access to clean water supply sources, compared with 90 percent or more of the populations of Latin America, the Caribbean, Northern Africa and large parts of Asia (WHO, 2012b). Just under half of all people globally who lack access to drinking water live in Sub-Saharan Africa.

This is a serious concern, as contaminated drinking water and poor sanitation have been shown to adversely affect the health of a country’s population (United Nations Development Programme [UNDP], 2006; United Nations Educational, Scientific, and Cultural Organization [UNESCO], 2006; Van Koppen, Giordano and Butterworth, 2007). Inadequate access to safe drinking water and sanitation also has direct and immediate consequences for quality of life, food security, long-term socio-economic development and the eradication of poverty (UNESCO, 2006; Klink, 2007).

Meeting the MDG goal on safe drinking water in Sub-Saharan Africa requires policy action informed by sound evidence. Unfortunately, little data derived from rigorous, empirical studies on water quality is available and much of the literature on the quality of Africa’s drinking water is based on very limited field and laboratory tests.

Rural Sub-Saharan Africa varies in geology, climate, weather, infrastructure, government policy, land use practices, poverty, levels of education and many other socio-economic conditions that affect the quality and management of drinking water in the region. Specific, country-by-country empirical studies of water quality are needed, therefore, in order to generate reliable scientific data that can be used to formulate a sound, realistic and meaningful drinking water management policy.

This brief advances this discourse, offering practical policy recommendations on keeping the drinking water in rural areas of Sub-Saharan Africa clean and safe on a sustained basis. These recommendations are based on insights gained from field research in rural Uganda, where empirical testing was conducted on water samples from bore wells and storage containers in private households. Because bore wells and household storage are common in rural Sub-Saharan Africa, these recommendations are applicable across national jurisdictions, and address the role policy makers, NGOs and individual well users can play in keeping water clean and safe.

UNDERSTANDING CLEAN VS. CONTAMINATED WATER

Clean and safe drinking water is defined by the World Resources Institute (WRI), a global environmental think tank, as water “that is free from disease-causing organisms, toxic chemicals, colour, smell, and unpleasant taste” (2009: 17). In Uganda, safe drinking water is more particularly defined by WRI as “water from a tap and piped water system, borehole, protected well or spring, rain water, or gravity flow schemes” (2009). Conversely, unsafe water in Uganda is typically drawn from “open water sources including ponds, streams, rivers, lakes, swamps, water holes, unprotected springs, shallow wells, and water trucks” (WRI, 2009: 17).

More than three-quarters of Africa’s drinking water comes from groundwater. The quality of this water is declining as it increasingly becomes contaminated with biological and potentially toxic substances (Pan Africa Chemistry Network [PACN], 2010). Possible biological contaminants include bacteria (e.g., *E. coli*, fecal coliform), viruses (e.g., hepatitis) and parasites (e.g., hookworm) that are harmful to humans and animals. Poor sanitation practices, such as pit latrines without slab (open pit) and open defecation are major sources of these contaminants (WHO/UNICEF Joint Monitoring Program [JMP], 2008). Contaminated drinking water can have devastating effects on health outcomes. In developing countries, the diseases causing diarrhea are most commonly attributed to dirty water. Such diseases result in the deaths of 1.4 million children annually (mostly in Africa) — a figure that is more than AIDS, malaria and measles combined (WHO/UNICEF JMP, 2006).

Bore wells are common sources of water throughout rural Sub-Saharan Africa and are part of many governments’ programs to meet the MDG to provide clean and safe drinking water to their rural populations by 2015 (WRI, 2009). In recent years, many NGOs, such as the Northern Uganda Development Foundation (NUDF) that works to provide clean water in the Oyam District of Northern Uganda, have also become involved in drilling these wells.

TESTING TO ENSURE WATER QUALITY IN SUB-SAHARAN AFRICA

Unlike urban water supplies, which are regularly tested for contamination by national authorities, rural water supplies are rarely tested in Sub-Saharan African countries. The widely held assumption that water from bore wells and protected springs is clean (and therefore safe to drink) results in the water supplies not being checked for contamination. As such, it is not known whether these wells contribute to, or detract from, the UN clean water

goal; moreover, the quality of water stored in households, which also goes untested, is unknown.

Water testing for harmful bacteria is rarely done in rural Sub-Saharan Africa because the standard methods involved in such a test “require materials and facilities which are either not available or are unaffordable” (Klink, 2007: 3). However, Metcalf (cited in Klink, 2007) showed that Colilert® MPN and E. coli count Petrifilm™ biological tests for point source testing for E. coli successfully worked in Tanzania and Kenya. Colilert® MPN and E. Coli Petrifilm™ biological tests¹ are simple, require no laboratory and provide clear results within one day. Villagers can be trained to test their own water for E. coli.

In November 2011, in response to the health concerns raised by residents in the Oyam District, the NUDF conducted tests to determine the quality of the region’s water, from samples taken directly from wells and stored in the households. The aim of the tests was to establish whether the wells provided clean and safe water fit for domestic consumption and if the water stored in the households remained clean and safe for use. Water samples from the wells and from the households were collected and analyzed by the National Water and Sewerage Corporation laboratory located in Uganda’s capital, Kampala.

DISAPPOINTING RESULTS OF WATER TESTING IN UGANDA

Test results from the samples drawn directly from the bore wells closely conformed to Uganda’s potable water quality standards and were considered safe for human and livestock consumption. It was concluded that a well-constructed and properly situated bore well can be a reliable source of clean

¹ These tests are done as follows: “Colilert tubes and petrifilms are inoculated and incubated at 35 degrees Celsius for 24 hours. Second, Colilert tubes, which fluoresce blue under a long wave UV (ultra violet) light, indicate the presence of E. coli; and the blue colonies with gas bubbles on the petrifilms provide a specific quantification and a permanent record” (Klink, 2007).

water. Results from samples collected from water stored in households, however, showed poor biological quality. Harmful bacteria colonies, such as fecal coliform and E. coli, were detected in almost all the samples drawn from the households. This is a key insight for water policy and recommended storage practices.

According to the tests conducted by NUDF, uncontaminated water drawn from clean wells became contaminated during household storage. Possible causes of contamination include: the use of contaminated plastic jerry cans or clay pots to carry water from clean wells for household storage; the use of contaminated storage containers that are rarely cleaned or disinfected; uncovered storage containers; and the use of a common (but contaminated) household cup to draw water from the containers (since there is no tap system on most storage containers).

RECOMMENDATIONS FOR MAINTAINING CLEAN AND SAFE DRINKING WATER ACROSS THE CONTINENT

The results indicate that efforts to ensure sustainable clean water supplies should not end with the construction of a well; rather, efforts must be made to ensure that water is also safely stored. Governments, NGOs, communities and individuals all have a stake in ensuring that clean and safe drinking water is available for everyone, thus a number of recommendations for each of these stakeholders are proposed.

ACTIONS FOR NATIONAL GOVERNMENTS

Poor water quality is often the result of a combination of many factors, including poor site selection, contaminated extraction and delivery facilities, dirty collection containers and improper storage. It is recommended that the following

steps be taken by national governments to ensure that water is fit for human consumption:

- Develop strong rural drinking water monitoring and surveillance programs to ensure that water quality is maintained. The goal of such a strategy would be to guarantee that all water sources are free from human, industrial or farm wastes and that wells are properly situated away from sewer lines, pit latrines and areas with a history of flooding. Measurable potable water standards should be included and water from new wells should conform to those standards prior to being declared fit for consumption. Water test results with fecal coliform colonies greater than 1 for every 100 ml of water indicate contamination. The national program should include regulations that ensure water is purified prior to consumption, most commonly achieved through chlorination and shock chlorination (Oram, 2012a, 2012b).
- Implement education programs that promote sound water management practices, with an emphasis on proper sanitation in the handling of water containers and storage facilities. Such educational programs should be designed to appeal to different learning styles. Workshops should emphasize the relationship between drinking water and health; demonstrate, through testing, whether or not the water in the villagers' homes is contaminated; show villagers how to avoid contaminating drinking water sources and how boiled or safe water gets re-contaminated during handling and storage; and explain methods to make water safe for drinking (Klink, 2007). The public should also be made

aware that all water sources, including bore wells, can be contaminated with disease-causing micro-organisms.²

- Engage communities in the planning, installation and management of bore well drinking water delivery systems and sanitation programs. Drinking water and sanitation technology used in rural Sub-Saharan African communities should be simple, reliable, low-cost and easy to maintain (PACN, 2010).

ACTIONS FOR NGOS AND OTHER NON-STATE ACTORS

In their efforts to improve health standards and living conditions, many NGOs and other non-state actors have supported government initiatives to provide drinking water and have helped to improve sanitation facilities throughout the developing world. To ensure that such support continues to bring about positive changes, the following measures should be undertaken by the NGO community:

- Consult technical staff, public health authorities and a hydrogeologist when siting new wells.
- Test newly constructed wells regularly to ensure the water is fit for consumption. Any indication of contamination should be reported to the responsible authorities for prompt action. Great care should be taken when informing the public of such results as it may lead to the community's rejection of the water source.
- Support government initiatives to educate the rural public. Radio programs, videos and pamphlets are excellent methods of disseminating such information.

² A lack of education is not necessarily a factor. For example, individuals may knowingly choose to not take steps such as boiling water due to the time required to do so properly. To address these cases, education programs should also emphasize the value of taking the time to ensure clean drinking water relative to the potential health consequences.

- Plan the digging, site selection, installation and management of new wells in close consultation with the villagers who will use them.³ It is important that villagers have a sense of ownership and are involved throughout the planning, implementation and management stages. Once the installation is completed, the organization should formally transfer the ownership and management of the well to the villagers and encourage the establishment of a community-run system to manage the well. In the NUDF's experience, water projects are most effectively managed and sustained with deep involvement from local women. The organization personnel should then take on the role of advisers to the villager owners.
- Depending on available resources, check bore wells annually to determine whether or not they are working and to identify what is wrong with those that are not. This information should be documented and shared with relevant stakeholders.
- Organize and facilitate workshops that involve water testing by villagers and communities. Villagers can test the water they have brought from their home for E. coli contamination and see the results the next day (Klink, 2007).

ACTIONS FOR COMMUNITIES AND HOUSEHOLDS

The results of the water tests conducted by the NUDF show that contamination of clean water frequently occurs in the household. Households and individuals should strictly observe the following:

- Regularly clean and disinfect water storage and collection facilities. Commercial bleach is relatively

inexpensive and readily available, at least in the area where this research was conducted.

- Always keep water collecting cans and storage pots closed when not in use.
- Assign a management committee (chairman, secretary and treasurer) for each water source. The committee would work to ensure that the well sites are kept clean and free from human, farm and industrial waste at all times.
- Take ownership of the systems and programs to increase the likelihood of long-term success in providing clean water.

CONCLUSION

A lack of access to safe drinking water in rural Sub-Saharan Africa can have serious effects on the health outcomes of local inhabitants. The efforts of governments and NGOs to provide reliable sources of drinking water are being jeopardized by poor handling and storage practices that contaminate the drinking water after it has been drawn from the well. Governments and NGOs should involve rural populations in the planning, installation and management of water projects, and the well users should be educated on proper handling and storage of drinking water. Depending on the available resources, rural water systems should be checked regularly for contamination and appropriate treatment programs to deal with contamination issues should be available.

³ More information is available at www.nudf.org.

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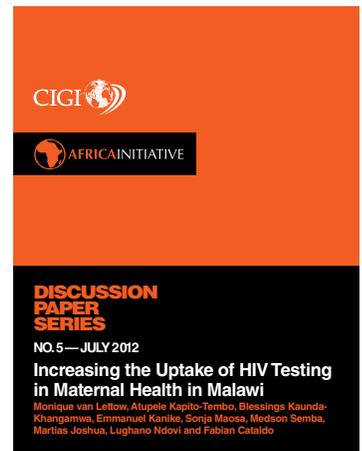
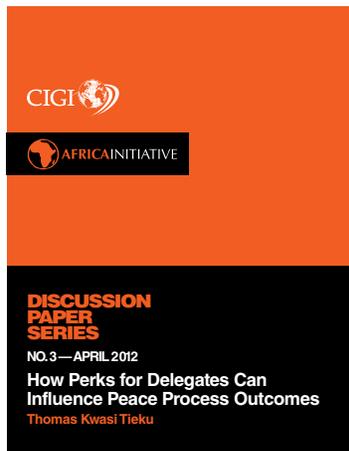
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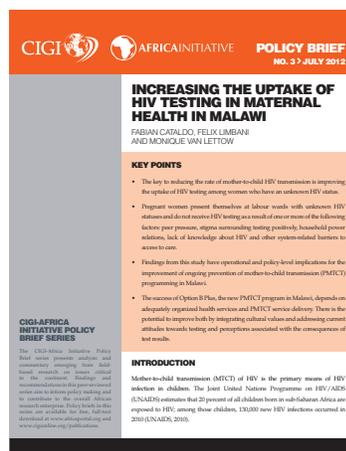
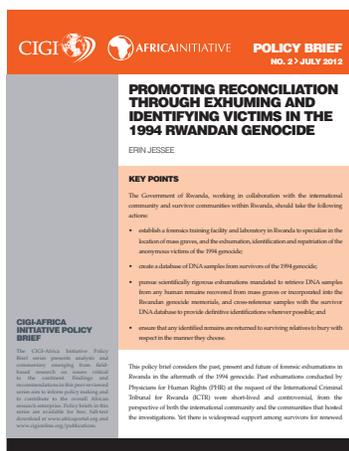
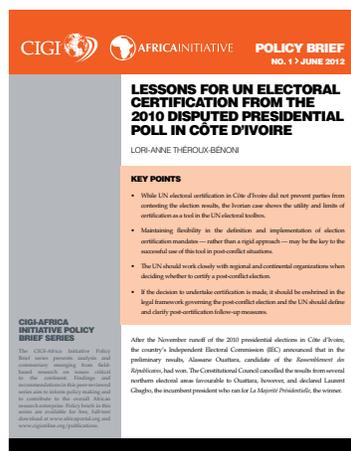
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