

Report on the participation of the team from Uganda's Ministry of Water and Environment and the National Planning Authority in the University of North Carolina Water and Health Conference: Science, Policy, and Practice

October 23 – 27, 2023



REPUBLIC OF UGANDA
MINISTRY OF WATER AND ENVIRONMENT



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The photo in the publication is a courtesy photo shared by Prof. Pamela Mbabazi.

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1. Introduction

The Conrad N. Hilton Foundation (CNHF) is supporting a number of organizations in Uganda to implement water and sanitation projects and is interested in scaling up its support to Uganda. Discussions were held with the Conrad N. Hilton Foundation regarding direct funding to the Ministry of Water and Environment. Based on these discussions, a grant was provided to fund activities for implementation of the outcomes and commitments of the UN Water Conference through national and international conferences, implementation of the pledge to end lead in water and installation materials, and support to scaling up of WASH master planning through the National Planning Authority (NPA).

As part of the above support, a team of three Government of Uganda officials was able to participate in the 2023 Water and Health Conference at the University of North Carolina (UNC), USA from 23 to 27 October. The team comprised of Prof. Pamela Mbabazi, Chairperson National Planning Authority, Dr. Callist Tindimugaya, Commissioner, Water Resources Planning and Regulation and Ms. Lillian Idrakua Commissioner, Water Quality Management. The team also held discussions with CNHF officials and the Water Institute of UNC regarding funding and collaboration opportunities.

The UNC Water and Health conference was introduced in 2010. It is an annual event that takes place at Chapel Hill (USA). Over 100 countries were represented at the 2023 conference through live and virtual attendance. Virtual participant numbers varied between 1,500 and 2,000 daily. The conference was attended by a total of eight Ugandans from both government and civil society.



Photo: The authors at the University of North Carolina Water and Health Conference in October 2023. From left to right: Prof Pamela Mbabazi, Executive Chairperson, National Planning Authority; Dr. Callist Tindimugaya, Commissioner Water Resources Planning and Regulation, Ministry of Water and Environment and Lillian Idrakua, Commissioner Water Quality Management, Ministry of Water and Environment.

2. Opening Remarks by Aaron Salzberg, Director of the Water Institute, UNC

In his opening remarks, Dr Aaron Salzberg, the Director of the Water Institute at UNC emphasized the uniqueness of the UNC Conference as the world's largest annual international conference exclusively dedicated to Water and Health, and a platform where science, policy and practice come together. He noted the importance of the Conference as a safe space where people can collectively interrogate the latest science and evidence to improve policies and practices to achieve universal access to WASH services. "Today's sound science and evidence matter more than ever, not just in laboratories of academia, but from the field, indigenous knowledge and experience of workers. A better understanding is required of the behavioral prejudices and systematic inequalities that impede equality of access. The UNC Conference creates an environment where people can sit and share firsthand learnings and experiences across the divides of race, culture, history, wealth and opportunities", Dr. Salzberg added.

3. Summary of the UNC Conference programme

Dr. Salzberg outlined the major events such as plenary sessions, verbal presentations, side events and poster presentations. He further indicated that the week was the 'International Lead Poisoning Prevention Week' and mentioned that at the 2023 UN Water Conference in New York, USA, a number of governments and partners pledged to stop lead in drinking water through among others eradicating use of lead containing pipes and parts in the construction of new water supply systems by 2030. He summarized the plenary sessions as follows:

1. Monday: WASH in 2050: What Does the Future Hold?
2. Tuesday: Focus on Fragility: Accelerating Progress for WASH Services in Fragile Environments.
3. Wednesday: The 2023 UN Water Conference: Supporting Commitments with Evidence.
4. Thursday: First, Do No Harm: Dismantling Unhelpful Power Dynamics in WASH.
5. Friday: Investing in WASH - An Interview with Mr. Saroj Jha, Global Director, Water Global Practice, The World Bank.

The UNC Water and Health Conference therefore contained very interesting sessions and many of these were of interest to the Uganda team. Key highlights of the sessions the Uganda team participated in are presented below.

4. A global initiative towards making all drinking water lead free by 2040

About the Initiative:

The UNC Conference enabled the Uganda team to engage in discussions and deepen their understanding of the global initiative towards making all drinking water lead free by 2040 and how to prepare for its implementation in Uganda. The goal of the initiative is to work collectively towards preventing lead-leaching from drinking water systems by 2030 and to make all drinking water lead free by 2040. The Global Pledge to Protect Drinking Water made at the 2023 UN Water Conference was launched as a global partnership to catalyze political action to address the lead issue.

The World Health Organization (WHO) has listed lead among the 10 priority chemicals of major public health concern that require priority action by all UN member states. See figure below.

Presentations on lead were made during the sessions on Monday 23 November 2023 and Wednesday 25 November 2023 which highlighted the sources of lead in drinking water, health impacts and magnitude of the problem globally.

Results from a survey of rural water systems in Ghana, Mali, and Niger were also shared during the sessions, which indicated that nearly 80% of the systems were contaminated with lead. In 9% of these systems the levels of lead contamination exceeded WHO guideline values. The results were the same across all system types across all countries. Perhaps most surprising was that the source of lead contamination was the leaching of lead containing parts and materials in water systems including brass, galvanized iron and some PVCs.

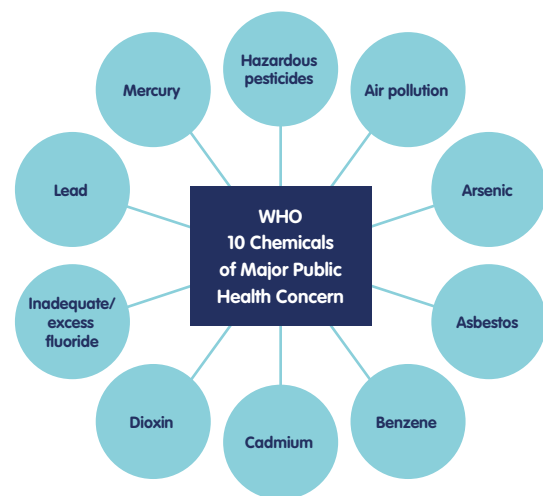


Figure 1: WHO's 10 chemicals of major public health concern

The survey results further indicated that in the majority of systems tested, at least one or more parts/fittings contained lead levels exceeding international guidelines/standards for lead in drinking water components. The UNC Water Institute demonstrated that a tank used in a handpump system that was certified by the manufacturer as being lead free has over 1 % of lead. It was reported that out of two million annual deaths, from chemical exposure globally, 0.9 million is from lead exposure. The most vulnerable groups being children and women of childbearing age. The impact of early childhood exposure to lead lasts a lifetime. The meeting noted that **No level of lead exposure is considered safe for children**, even small amounts cause reduced IQ, attention difficulties, and underperformance in school.

Relating the survey findings to Uganda

Based on the findings from other countries, it is strongly suspected that water systems in Uganda also contain lead at levels of concern. There is therefore a need to establish safe levels of lead exposure. Lead exposure is linked to cardiovascular, heart and chronic kidney disease in adults. It is particularly dangerous to children who absorb lead at greater rates. Elevated blood lead levels can reduce IQ, contribute to impulsivity and learning deficits, and is perhaps the leading cause of cognitive impairment in children worldwide.

Some simple precautions, like preventing the use of lead-leaching parts and components in the construction of new water supply systems, could be an important first step in protecting children's health. This would require working with agencies responsible for constructing water supply systems and those responsible for setting standards for materials used in water supply systems. Understanding this phenomenon and raising awareness need to be given priority and this could lead to developing a national strategy or plan to reduce lead exposure for submission to Cabinet for consideration.

Addressing lead in drinking water should, however, be considered as part of broader efforts to improve the safety of drinking water and public health. Some filters may remove lead in drinking water. However, significant gaps have been identified across the globe for regulation of water fittings and water filters.

During the lead sessions on Monday 23 November 2023 and Wednesday 25 November 2023, the Uganda team provided inputs on a number of questions related to lead.

On the question regarding what prompted Uganda to be a founding partner and a leader of the Global Lead pledge, Uganda's inputs were as follows:

- Access to clean and safe water in Uganda is a fundamental human right as enshrined in the Constitution of Uganda. The country therefore gives a lot of priority to the provision of adequate water that is fit for human consumption.
- Uganda noted that environmental exposures to lead threaten the healthy development of children, and that controlling these exposures is essential to achieving safely managed water services.
- Uganda noted that lead is an invisible, odorless and tasteless chemical contaminant that could be present in our water supply systems. Uganda has many old water supply systems constructed with different materials whose composition is not known and which could leach lead into the water. The country decided to be part of this pledge so as to improve understanding of the status of lead in water sources and the old and new water supply systems and be able to address the problem early enough. It was noted that human exposure to lead in the environment, including to lead in drinking water can be prevented through dedicated early actions. Getting baseline information will therefore help the country to prevent lead exposure from old and new drinking water systems and to make all drinking water lead free.
- Uganda noted that the problem of lead cannot be addressed by one country but requires collaborative action including technical support using internally agreed standards.
- Uganda therefore decided to be a founding partner and a leader of the Global Lead pledge because of the above concerns.

Regarding the main challenges Uganda faces in addressing lead in drinking water, Uganda's inputs were as follows:

1. **Monitoring:** Uganda has limited human and institutional capacity to monitor lead in the water but also in the products that contain lead. While the Ministry of Water and Environment has four regional laboratories in various parts of Uganda and a National Water Quality Reference Laboratory in Entebbe for water quality testing, the capacity to test for lead in water is only available in the National Water Quality Reference Laboratory in Entebbe. This therefore limits monitoring of lead in water in the rest of the country. The in-country capacity to test for lead in various products such as pipes or pumps that come into the country does not exist.
2. **Regulations:** While there exists a water law that is used to regulate the activities and operations of the water and sanitation sector, there are no regulations to address challenges of lead in drinking water. These regulations will have to be developed to facilitate implementation of the pledge.
3. **Enforcement:** Realizing the objectives of the pledge on lead will require availability of strong enforcement capacity in terms of well-trained staff; high awareness among the government ministries and agencies, private sector and various enforcement agencies; necessary field and laboratory equipment and adequate financial resources.

On how the members of the coalition for making drinking water lead free by 2040 can support Uganda's efforts towards achieving lead-free drinking water by 2040, Uganda's inputs were as follows:

- Train staff to test and monitor lead in water and in various products.
- Provide field and laboratory equipment for testing for lead in both water and various products.
- Develop training modules and have them implemented through the Water Resources Institute so that they can be accessed by various stakeholders. Opportunities for conducting virtual training can also be considered.
- Support Ministry of Water and Environment and Uganda National Bureau of Standards to develop technical regulations to address challenges of lead in drinking water.
- Provide support to raise awareness among the government ministries and agencies, private sector and various enforcement agencies on the provisions of the pledge, the benefits and costs associated with the pledge.
- Support research to better understand and identify sources, impacts, and effective prevention and remediation methods and approaches to minimize harm from lead in drinking water.
- Provide general support to build human and institutional capacity to address challenges of lead in Uganda.

At the end of the meeting some solutions were proposed:

1. Primary prevention for new systems: Test and use lead-free materials. May establish third party verification of materials used in water systems.
2. Take progressive remedial actions: Whatever the findings in existing water systems, do not stop the flow of water.
3. All potential sources of lead in drinking water should be identified and quantified. Other significant sources may be lead in paint, informal waste management or industrialized pollution.

Way forward for Uganda

For Uganda, follow-up of the lead problem will be undertaken as part of the financial support from CNHF. This will involve among others; organizing training workshops for staff to test and monitor lead in water and also in the various products; procuring equipment (mobile or stationary) for testing lead; organizing awareness raising meetings for government ministries and agencies, private sector and various enforcement agencies on the provisions, benefits and costs associated with the pledge; reviewing water quality standards in Uganda related to lead in drinking water in coordination with partners; and undertaking research to better understand and identify sources, impacts, and effective prevention and remediation methods and approaches to minimize harm from lead in drinking water.

In a side meeting held during the Conference, it was agreed that the UNC Water Institute and the International Association of Plumbing and Mechanical Officials (IAPMO) will provide technical support (selection of sampling points, sampling, interpretation of analysis results, training of staff etc.) to Uganda to address the lead problem in drinking water. This collaboration would start with identifying water sources for sampling and testing them for lead as a way of establishing a baseline for the lead problem in drinking water and materials which will guide further actions. Engagements between and among the parties would continue online and later physically when an opportunity arises.

5. Professionalizing rural water services: perspectives from Ethiopia, Ghana and Uganda and implications for external funders

The Uganda team at the UNC Conference also participated in a 90-minute session organized by the CNHF to discuss findings of a review of the relevance, effectiveness, and sustainability of different Service Delivery Models (SDMs) supported in Ethiopia, Ghana, and Uganda. The discussion focused on the key findings in relation to broader sector trends in each country, alignment to government-led efforts to professionalize rural water and the implications for the Conrad N. Hilton Foundation as a funder along with other external support agencies. The session was moderated by Julia Boulenouar and Harold Lockwood of Aguaconsult and brought together government representatives from Ethiopia, Ghana, and Uganda. It consisted of four main parts namely:

- An initial introduction on global trends on rural water professionalization
- Perspectives from government on trends in Ghana, Ethiopia, and Uganda
- Overview of CNHF's review of its Safe Water initiative
- A facilitated panel discussion on the implications of the review findings and the ongoing pathways to professionalization in all three countries.

The following overarching questions were identified based on ongoing efforts to professionalize rural water services in Ethiopia, Ghana, and Uganda. These questions formed the basis of a discussion around governments' perspectives on these trends, findings from the review of the Safe Water initiative and implications for leveraging changes through the Conrad N. Hilton Foundation's partners.

Each country had formulated a number of questions:

a) Ethiopia:

- What are the current efforts to **reform** rural water management, expand the rural public utilities, support Water, Sanitation and Hygiene Committee (WASHCO) transition into Water User Associations (WUAs) and address the major water safety issues that surround self-supply?
- What are the government's reflections on the **consolidation** of services for increased financial viability?
- What are the current efforts to involve the **private sector** in rural water provision and develop **micro-finance** solutions?

b) Ghana:

- In arrangements based on service provision by the Community Water and Sanitation Agency and Safe Water Enterprises, what role do you think municipal and district assemblies should play?
- What is the Government of Ghana's approach to regulation of Safe Water Enterprises (SWEs) in Ghana?
- Once the Community Water and Sanitation Agency's role as a service provider is formalized, what role do you think that donors or foundations such as the Conrad N. Hilton Foundation should play in supporting the arrangement of effective operationalization?

c) Uganda:

- What are the current critical bottlenecks to operationalizing the Operation & Maintenance (O&M) framework and establishing Community Based Management Systems (CBMS+) in practice? What support is needed to overcome these?
- What role will the Rural Water and Sanitation Regional Centres play in the roll out of CBMS+, and how will this interact with the role of districts and district water boards.
- What options are there for de-risking the role of Area Service Providers (ASPs), including through subsidies?

Some cross-cutting questions were also addressed as follows:

- What are the main innovations that you have seen under the Conrad N. Hilton Foundation portfolio in Ghana that you feel should be pushed for upscaling?
- What role do you see for a Foundation in support of government-led efforts to professionalize the rural water sector?

To answer some of the above questions, each country made a PowerPoint presentation. A presentation on operationalization of the national framework for O&M of rural water infrastructure in Uganda was made and it highlighted the following:

- The framework focuses on professionalizing management of water facilities in rural areas through a model that brings on board new aspects to address the gaps that are in the current Community Based Management System.
- In the new approach the District Water Authority works through the Water Supply Service Board (WSSB) that formally outsources the operation & maintenance function to an entity called Area Service Provider (ASP) that operates on a contract management arrangement.
- The National Framework provides the overall guidance in the management of rural water systems outside the jurisdiction of the public water supply utilities.
- The National Framework for Operation and Maintenance of Rural Water infrastructure (CBMS+) was developed in July 2019 after a protracted consultative process and focuses on areas not gazetted to National Water Sewerage Corporation and Umbrella Authorities.
- The National Framework for O&M was launched nationally and in the regions in 2020.
- Supporting manuals for operationalizing the framework, that is the District Water Supply and Sanitation Board (DWSSB) Manual and the Area Service Provider (ASP) Manual were developed in 2021.
- Most of the civil society organizations/implementing partners embraced the new National Framework for O&M.
- Real efforts of implementation are ongoing in all the six Rural Water and Sanitation Regional Centres (RWSRCs).

- The key features of the framework are:
 - All users pay for water monthly or per volume of water (households and institutions).
 - Area service providers contracted to operate and maintain all water systems in an area defined by Water Supply and Sanitation Board.
 - Framework introduces entrepreneurial and public-private partnership arrangements for water supply facilities in rural area.
 - ASP will take responsibility for collecting user fees and bank them.
 - ASP will be responsible for availing quality spares while RWRCs will undertake due diligence.
 - O&M Framework disseminated in all Regional Centres/Districts.
 - The supporting implementation manuals were completed and disseminated.
 - The Regional Centres are supporting District to implement framework.
 - Some funding to support about two Districts per Regional Centre provided.
 - 23 Districts have already formed the subcounty and District Water Supply and Sanitation Boards.
 - Most Boards are at approval level by the Ministry of Water and Environment.
 - Some Districts have "ASPs" that in reality are not but could transition into ASPs if all provisions of the framework are adopted.
 - Stakeholder review meeting was held in July 2023 and an action plan to accelerate implementation was drawn up.
- Actions to accelerate implementation of the framework:
 - Coordinate and enhance the capacity of stakeholders at the national, regional, district and sub-county levels to implement the framework.
 - Establish and strengthen the management structures of rural WASH facilities in 30 District Local Governments (DLGs) by the end of FY 2023/2024.
 - Fast track the establishment of Water Authorities in the 30 DLGs by the end of FY 2023/2024.
 - Identify, attract and train at least 10 ASPs in each of the six respective regions (total of 60) by the end of FY 2023/2024.
 - Ensure adequate and effective stakeholder engagement and communication about the framework at the national, regional, LG levels by the end of FY 2023/2024.

The session was very well attended and from the discussions held and the questions raised, it was clear that professionalizing rural water services is a priority and is long overdue. Reflections and wrap up were made by Mr. Nabil Chemaly, CNHF Senior Water Programme Officer, who reaffirmed the commitment of CNHF to continue supporting professionalization of rural water services in the three countries.

6. Adoption of point-of-use chlorination for household drinking water treatment: A systematic review

This session focused on how point-of-use chlorination has been used for household drinking water treatment. Centralized chlorination of urban piped water supplies has historically contributed to major reductions in waterborne illnesses. In locations without effective centralized water treatment, point-of-use (PoU) chlorination for households is widely promoted to improve drinking water quality and health. However, realizing these health benefits requires correct, consistent, and sustained product use, but real-world evaluations have often observed low levels of use.

A systematic review of household PoU chlorination interventions or programmes from 1990 through 2021 that reported a quantitative measure of adoption, conducted in low- and middle-income countries, revealed that on average, adoption declined over time and was positively associated with frequency of contact between respondents and study staff. The session concluded that although prior research has shown that PoU chlorine products improve health when correctly and consistently used, **a reliance on individual adoption for effective treatment is unlikely to lead to the widespread public health benefits** historically associated with pressurized, centralized treatment of piped water supplies.

7. Emerging trends in rural water management

A presentation on emerging trends in rural water services delivery in 12 countries including Uganda indicated the following trends in WASH delivery:

- The recentralization of services since the 2000s.
- Several countries have taken steps to broaden the responsibilities of existing regulatory mandates to rural water supply.
- Community-based management (CBM) remains the dominant management arrangement and usually involves the formation of a committee that receives limited training, some spare parts, and then a handover of infrastructure for O&M.
- “Supported” CBM (CBM+) which includes help from government service authorities, services procured from area mechanics or skilled artisans when needed, and formal contracts with (usually small) commercial operators.
- In some countries, private sector participation in rural water supply has been formalized at regional and even national scales, via extended contracts issued through competitive tenders.
- Direct public sector participation in management of utilities either through municipalities or a national or sub-national utility manages water supply infrastructure directly e.g., in Ghana, Tanzania, the Philippines, Uganda, and Zambia.
- Consolidating small services into larger service areas to be managed by a dedicated rural utility established to assume the management of existing piped water facilities previously managed by other service providers (usually the community). This is the case in Ghana (via the Community Water and Sanitation Agency), Uganda (via its Umbrella Authorities), and Tanzania (via the Rural Water and Sanitation Agency [RUWASA]).

8. Antimicrobial Resistance (AMR) monitoring in the environment

Presentations on this topic included 'Exploring the Use of New Generation Sequencing for Characterizing Environmental Transmission of AMR'.

AMR is a key threat to humans worldwide. The environment has been identified as a pathway of transmission to humans. In 2019, a report by CDC indicated 2.8million people in US contracted AMR infections, more than 35,000 of whom died.

E. coli in the environment has been found to have one of the highest rates of resistance. WHO has designated Extended-Spectrum-Beta-Lactase (ESBL) producing E. coli as a public health threat. WHO underscores environmental surveillance as crucial in combating the rise of AMR.

New surveillance tools are required to detect and characterize AMR pathogens such as ESBL-producing E. coli and their spread. Among the new tools being developed is genome sequencing which has shown great potential for epidemiological surveillance. Where culture-based methods identify the presence and concentration of the target microorganism, genome sequencing gives detailed genomic information that can be used to characterize the AMR of interest such as ESBL- producing E. coli. It can also be done in conjunction with wastewater surveillance. Through monitoring AMR in wastewater, new forms of resistance, undetected or unreported forms of AMR pathogen outbreaks can be detected.

9. Safe drinking water for all by scaling household water treatment

A session on safe drinking water for all by scaling household water treatment confirmed that two billion people worldwide still use water contaminated with faeces (WHO, 2022). That only 46% of water is safe at Point of Collection (PoC) and 22% is safe at Point of Use (PoU). When PoU is used as a primary intervention, it can reduce diarrheal diseases by up to 41% when products are used correctly, consistently and continuously (3Cs). Available technologies include:

- Physical removal through filtration, adsorption and sedimentation
- Use of chemicals: chlorine, iodine and silver
- Disinfection by heat: boiling and pasteurization
- Ultraviolet radiation
- Solar disinfection
- Combination
- Emerging technologies

How to select technologies that work:

- Need health-based performance evaluation.
- Gap: many countries do not have health-based regulations to guide evaluation, nor the technical capacity to implement WHO recommendations for evaluation.

A presentation was made on round three of a WHO scheme for evaluation of household water technologies by designated laboratories. The scheme uses three groups of microorganisms: Bacteria, Viruses and Protozoa cysts.

Findings on technology weaknesses:

1. Manufacturing quality is unreliable.
2. There are variations within the same technology type (membranes).
3. Chlorine is not simple to verify.
4. One needs to understand water quality and technology limitations.
5. User instructions need to reflect best practices.

The session concluded that the most cost-effective option to reach the goal of 'Safe drinking water for all' is Household Water Treatment Technologies.

10. Water treatment technologies at the lunch hour technology showcase

A series of presentations to showcase technology were made during lunchtime events from Tuesday to Thursday and these were found to be of great interest. These covered the following:

- The Folia water filter
- Human portable desalination system
- Virridy satellite-connected gateway
- Climate-smart solar photovoltaic systems
- Slow sand filtration in geomembrane tanks
- EAASI soap
- Nazava water filters
- EMAS and rope pumps
- Aquatabs ultra dosing systems

11. Conclusions

The Conference was very well organized and informative with many interesting and relevant presentations and discussions. It provided an opportunity for the Uganda team not only to meet other experts from the rest of the world for purposes of establishing linkages and identifying collaborative opportunities, but also for meeting the CNHF Team for final discussions on upcoming CNHF-supported projects for the Ministry of Water and Environment with a particular focus on implementing the lead pledge in Uganda. Opportunities to meet and discuss with the UNC Water Institute, IAPMO and CNHF were very productive with clear and practical recommendations for next steps.

The Uganda team wishes to thank the Conrad N. Hilton Foundation for making it possible for the three officials from Uganda to participate in the 2023 UNC Water and Health Conference.

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