

# WATER QUALITY IN KABAROLE DISTRICT, UGANDA

JULY 2023



With funding from the Conrad N. Hilton Foundation, the Aquaya Institute is coordinating longitudinal water quality monitoring in two target districts in Uganda. In **July 2023** (the dry season), **Aquaya conducted surveys and water quality testing at households, water points, schools, and healthcare facilities in Kabarole District.** This builds upon prior monitoring done in April 2022 and in September 2022 in collaboration with Makerere University.

## DRINKING WATER SAMPLES TESTED IN KABAROLE



197

Households



245

Water points, including:



178

in Communities



47

at Schools



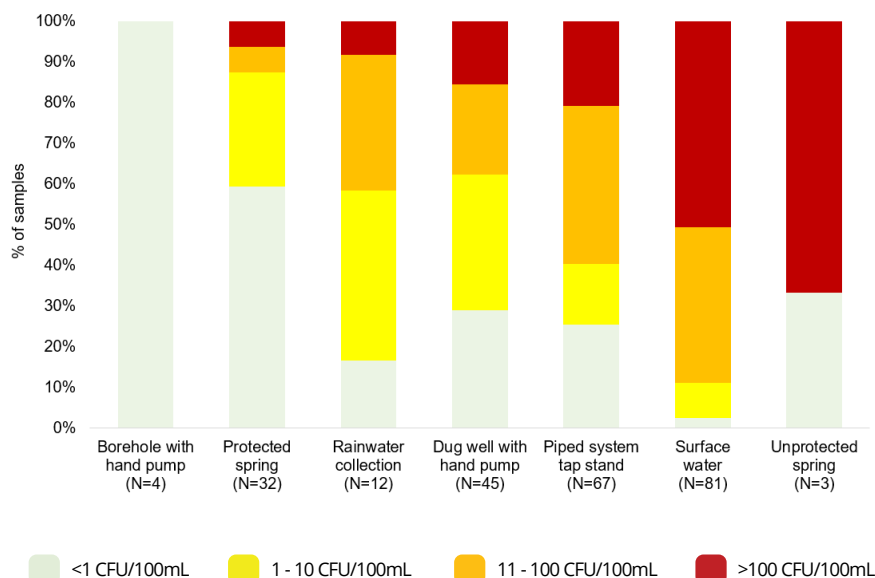
20

at Healthcare facilities

## WATER POINTS

We conducted surveys and tested *E. coli* at 245 water points, including improved and unimproved types. About a quarter of water points (24%) were free from *E. coli* contamination (<1 CFU/100 mL). **Water was microbially safest from boreholes with hand pumps and protected springs** (two-thirds free from *E. coli*) **and least safe from unprotected springs, unprotected dug wells, and surface water** (2% free from *E. coli*) (Figure 1).

## Water Point Samples



### Comparison to prior results

- Microbial water quality was highly consistent at the first two sampling times (April and September 2022), with 13-14% of samples free from *E. coli*. In July 2023, this improved slightly to 24%.
- The safest water points were consistently boreholes with hand pumps. Protected springs had better microbial quality in the dry season (July 2023) compared to earlier sampling times.
- Three-quarters of piped system taps had detectable *E. coli* at all sampling times. Adequate chlorination was variable (from 31% to 19% to 39% of samples with free chlorine residual  $\geq 0.2$  mg/L).

**Figure 1.** *E. coli* levels in Kabarole District, displayed by water point type (N=244, with one unprotected dug well not shown).

## HOUSEHOLDS

**Overall, 15% of stored household water samples were free from *E. coli* contamination (<1 CFU/100 mL), and about 3 in 10 were in the very high-risk category (>100 CFU/100 mL).**

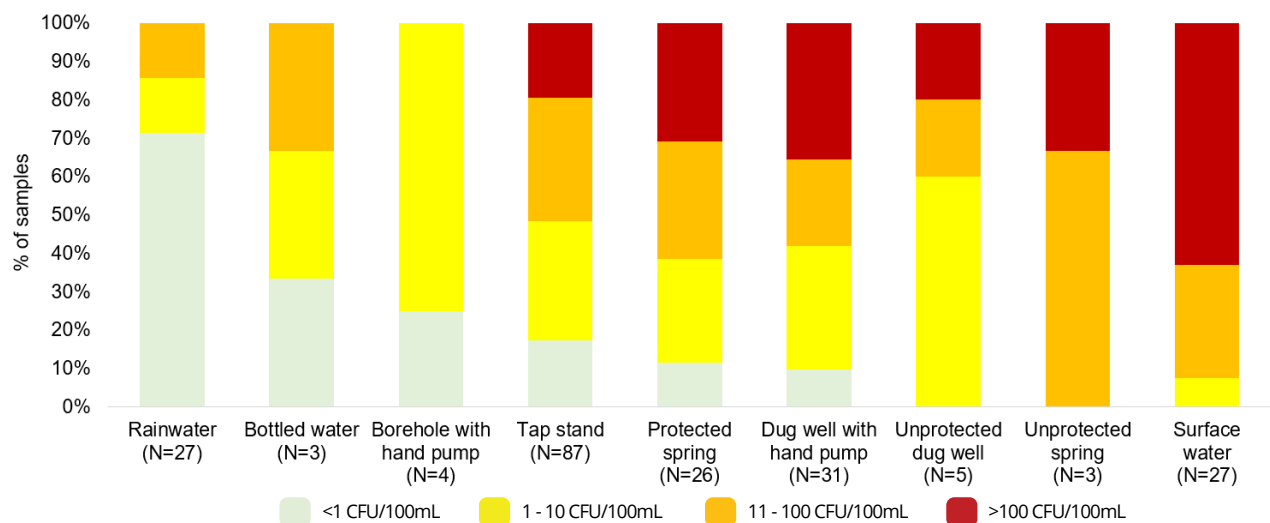
**Household samples from rainwater collection systems had the safest water (71% free from *E. coli*).** This is compared to water from other improved sources, such as piped systems, protected springs, and dug wells with hand pumps, of which only 16% were free from *E. coli* contamination (Figure 2).

**Household water stored in a covered container with a narrow opening and treated water had slightly better microbial quality.** Three in ten households reported treating water by boiling and 29% stored water safely, which likely reduces recontamination during transportation and storage. Both practices were associated with slightly lower *E. coli* levels in stored water, and households doing both had even better microbial water quality (30% free from *E. coli*).

### Comparison to prior results

- Microbial quality of household stored water was highly consistent at the first two sampling times (April and September 2022), with 13-16% of samples free from *E. coli*.
- In July 2023 (the dry season), a similar 15% were free from *E. coli*, though fewer samples fell into the very high-risk level (>100 CFU/100mL).
- Household water handling was fairly consistent between sampling times. Fewer than one-third of households stored water safely in a covered container with a narrow opening (29-32%) or treated water in the home (22-32%).

### Household stored water



**Figure 2.** *E. coli* levels in stored household samples in Kabarole District, displayed by water source type (N=195, with two samples from protected dug wells not shown).

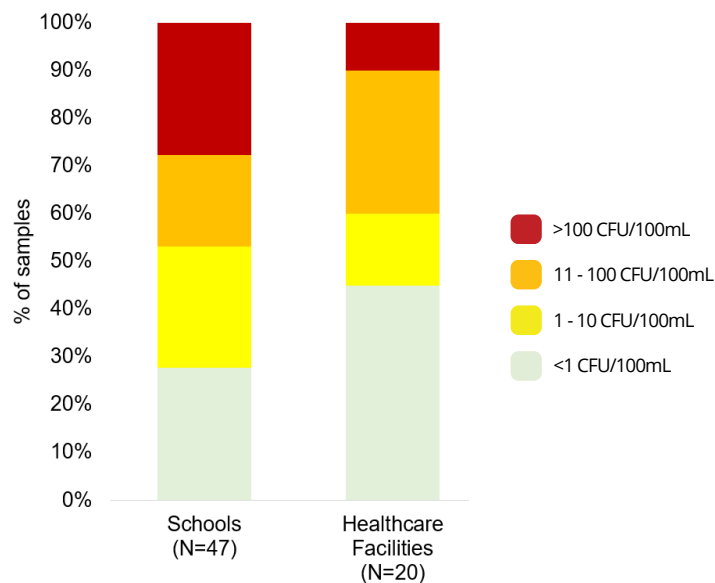


## SCHOOLS AND HEALTHCARE FACILITIES

We surveyed 53 schools and 20 healthcare facilities and tested *E. coli* from water points at 47 schools and all healthcare facilities. **Nearly all institutions (96%) used improved water points, and about two-thirds had a basic water service**, i.e., an improved water point on premises with water available.

**One-third of institutional water points were free from *E. coli* contamination**, including 28% at schools and 45% at healthcare facilities (Figure 3).

### Institutional Water Point Samples



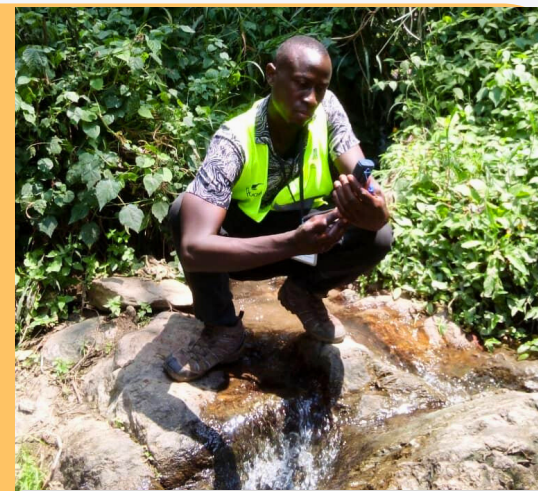
#### Comparison to prior results

- Institutions' primary drinking water points varied over time due to seasonality or functionality issues, especially at schools. Overall, 35% of institutions used different water points in July 2023 versus earlier visits.
- At the latter two sampling times, more institutions used piped water supplies and fewer used rainwater collection. New piped systems were constructed to serve five institutions within 2022.
- In July 2023, microbial quality of institutional water points was higher than at earlier sampling times (increasing from approximately one-quarter of samples with undetectable *E. coli* in April and September 2022 to one-third in July 2023).

**Figure 3.** *E. coli* levels at schools (N=47) and healthcare facilities (N=20) in Kabarole District.

## RECOMMENDATIONS

- 1** Piped water systems should be treated with an **adequate chlorine** dose to consistently maintain a **residual of  $\geq 0.2$  mg/L** at all tap stands in the water distribution system. The chlorine dose should be carefully monitored.
- 2** For households, education is needed to encourage:
  - Use of safer, improved water points such as **boreholes with hand pumps** for drinking water.
  - **Safe water storage** for household drinking water.
  - **Household water treatment** for any untreated source, particularly when drinking water is collected from unimproved sources.
- 3** **Implementation support is needed** to increase access to safer and reliable improved water sources at institutions and in communities.



**Image 1.** Allan Mutegeki (Senior Program Assistant) measuring the electrical conductivity of a water source in Kabarole District. Credit: Aquaya