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HILTON AFRICA WATER QUALITY TESTING FELLOWSHIP PROGRAM

WATER QUALITY IN KABAROLE DISTRICT, UGANDA

(APRIL-MAY 2022)

With funding from the Conrad N. Hilton Foundation, the Aquaya Institute is coordinating longitudinal water quality monitoring in two target districts in Uganda. ***In April - May 2022, Aquaya conducted surveys and water quality testing at households, water points, schools, and healthcare facilities in Kabarole District,*** *in collaboration with Stanford University and International Growth Research & Evaluation Center (IGREC).*

DRINKING WATER SAMPLES TESTED IN KABAROLE DISTRICT

226 **Households**

229 **Water points**, including:

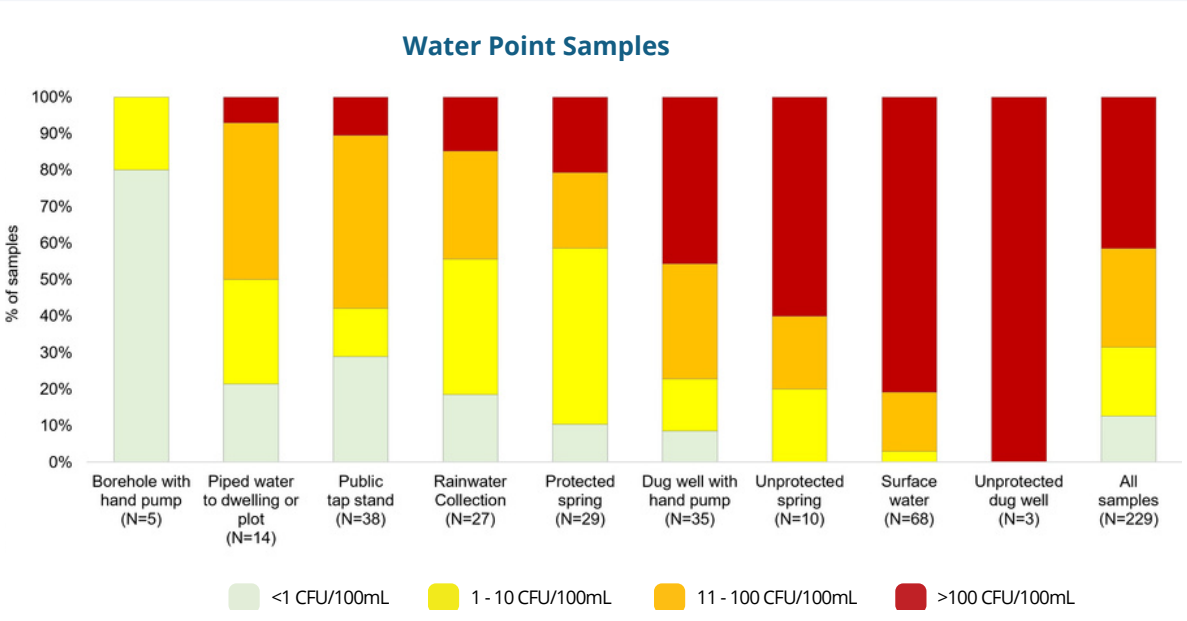
161 in **Communities**

51 at **Schools**

17 at **Healthcare facilities**

WATER POINTS

We conducted surveys and tested *E. coli* at 229 water points, including improved and unimproved types. Only 13% of water point samples were free from *E. coli* contamination (<1 CFU/100 mL), and *E. coli* was present across all source types (Figure 1). **Water was slightly safer from piped system taps stands, rainwater collection, and boreholes with hand pumps** (27% free from *E. coli*), **and less safe from springs, surface water, and dug wells** (4% free from *E. coli*).



E. coli is an indicator of fecal contamination in drinking water. Increased E. coli concentrations suggest an increased risk of diarrheal disease – particularly for children under 5 and immunocompromised people.

Figure 1. *E. coli* levels in Kabarole District, displayed as percentages of samples by water point type (N=229).

Analyzing **physical-chemical parameters** in 229 water point samples showed that:

- All samples met the Uganda National Drinking Water Standard for electrical conductivity (<1500 µS/cm for treated water and <2500 µS/cm for natural water). High electrical conductivity alters the taste of water.
- 69% of samples from piped system taps met the Uganda National Drinking Water Standard for turbidity (<5 NTU), and 83% of the natural water samples met the standard (<25 NTU). If turbidity is too high, water is aesthetically less acceptable to people, and chlorine is less effective.
- 98% of treated water samples met the Uganda National Drinking Water Standard for pH (6.5-8.5) and 94% of natural water samples met the pH standard (5.5-9.5). Others were below the range, which indicates potential for corrosion but is not dangerous to health.
- 31% of piped system taps (N=52) met the Uganda National Drinking Water Standard for free chlorine residual (FCR) (≥0.2 mg/L), meaning the water was protected from re-contamination during transport and storage. Our results showed that **chlorinated piped water was microbially safer than non-chlorinated piped water**: 50% of samples with sufficient FCR were free from *E. coli*, versus 17% of samples without sufficient FCR.

HOUSEHOLDS

Overall, 13% of stored household samples had undetectable *E. coli.* Despite measured differences at water points, household contamination levels were consistent across all reported source types except surface water and unprotected springs, which had lower quality (data not shown).

Household water was microbially safer when stored in a covered container with a narrow opening and when it was boiled.

- Safely stored samples had significantly lower *E. coli* concentrations than water not stored safely (23% versus 8% free from *E. coli*) (Figure 3).
- Boiled water had significantly lower *E. coli* concentrations than water not treated (28% versus 9% free from *E. coli).*

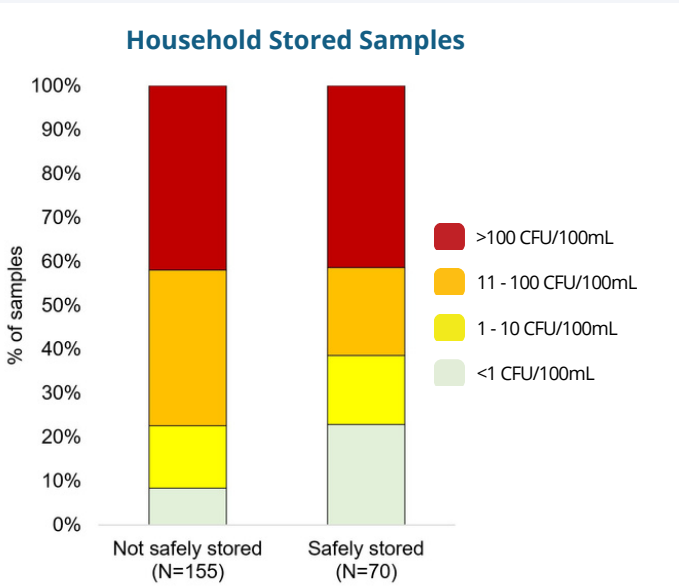


Figure 2. *E. coli* levels in household samples in Kabarole District, sorted by safe storage status (N=225).

SCHOOLS AND HEALTHCARE FACILITIES

We conducted surveys and tested *E. coli* from water points at 51 schools and 17 healthcare facilities. **About one in five institutional water points (22%) had undetectable *E. coli*.** Results were similar between the two types of institutions (Figure 3), though water point types varied; schools had the most rainwater collection systems (47%), while healthcare facilities used mostly piped systems (65%).

Nearly all schools and healthcare facilities (93%) had improved water points like tap stands, rainwater collection, and wells with hand pumps, though some were located off-site.

Seven-in-ten institutions had basic water service: an improved water point on premises with water available.

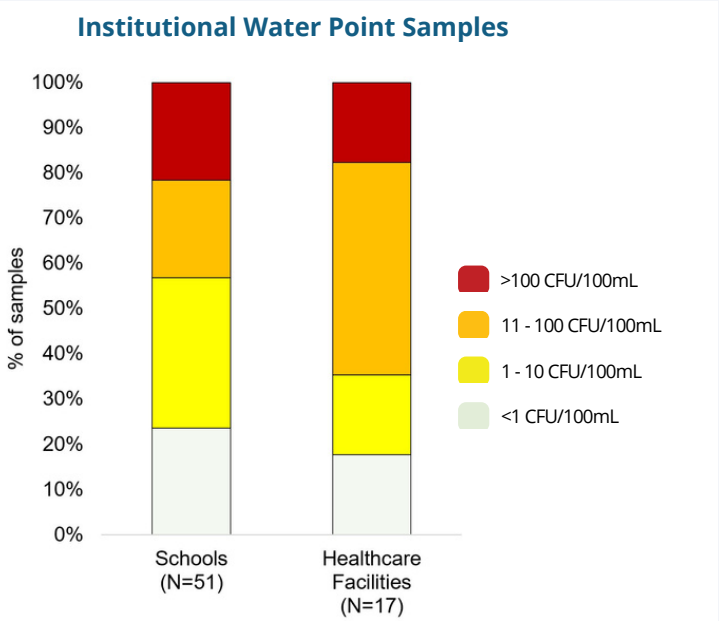


Figure 3. *E. coli l*evels at schools (N=51) and healthcare facilities (N=17) in Kabarole District.

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