

WaterTRACS

Testing, Research, and Capacity
Strengthening Initiative

With funding from the Conrad N. Hilton Foundation, the Aquaya Institute has been coordinating longitudinal water quality monitoring in two target districts in Ghana since 2022. In February 2025, Aquaya conducted a sixth round of surveys and water quality testing at households, water points, schools, and healthcare facilities in Wassa East District.



WATER QUALITY IN WASSA EAST DISTRICT, GHANA

A FOCUS ON PIPED AND PACKAGED WATER

February 2025

SUMMARY



Packaged water consumption has increased substantially in Wassa East from 2022-2025, while use of piped water for drinking has remained constant.



Just 8% of stored household piped water samples had sufficient FCR to protect against recontamination.



In early 2025, *E. coli* was found in 17% of piped system tap samples and 81% of stored household piped water samples, showing significant quality loss after storage.



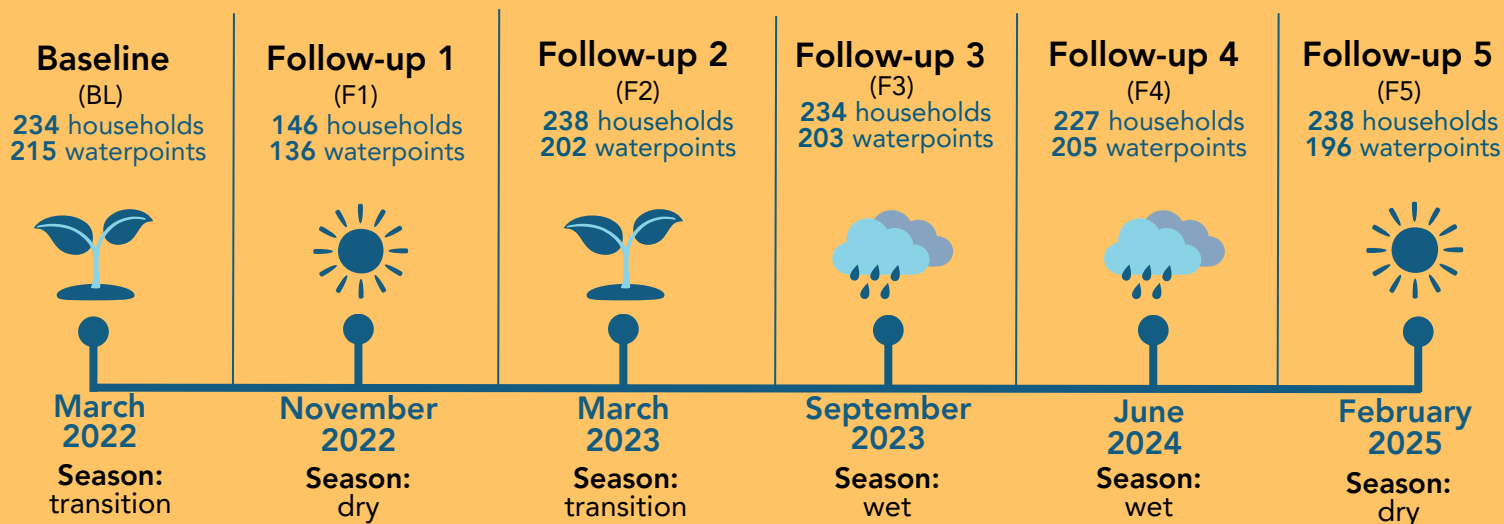
Sachet water consistently had low levels of microbial contamination, presenting a safer alternative for drinking water until piped sources are more consistently chlorinated.



While 60% of tap samples had detectable total chlorine, only 20% met the minimum recommended free chlorine residual (FCR), with healthcare facilities having the highest chlorination rates.



DRINKING WATER SAMPLES TESTED IN WASSA EAST



Across all sampling events, we tested *E. coli* presence in a total of 749 piped water samples. This included 412 from public standpipes, 73 from private (on-plot) taps, and 264 from stored household drinking water. Additionally, we tested 313 packaged water samples, primarily sachet water.

BACKGROUND

This research brief focuses on **piped water and packaged water**, the two most common sources of drinking water in Wassa East district, which were collectively used by 60% of households in February 2025. While the use of piped water for drinking has remained fairly constant since 2022 (17%-23%), **packaged water consumption has increased substantially**, from <15% in 2022 to 37% in early 2025 (Figure 1).

In contrast, **piped water has been consistently used by about half of schools in Wassa East**, with very few using packaged water (n=49). **Healthcare facilities have consistently reported using either piped water or packaged water**, though packaged water varied from 5%-55% and piped water from 45%-85% at various visits (n=20). The majority of packaged water used in Wassa East is sachet water, while bottled water is much less common.

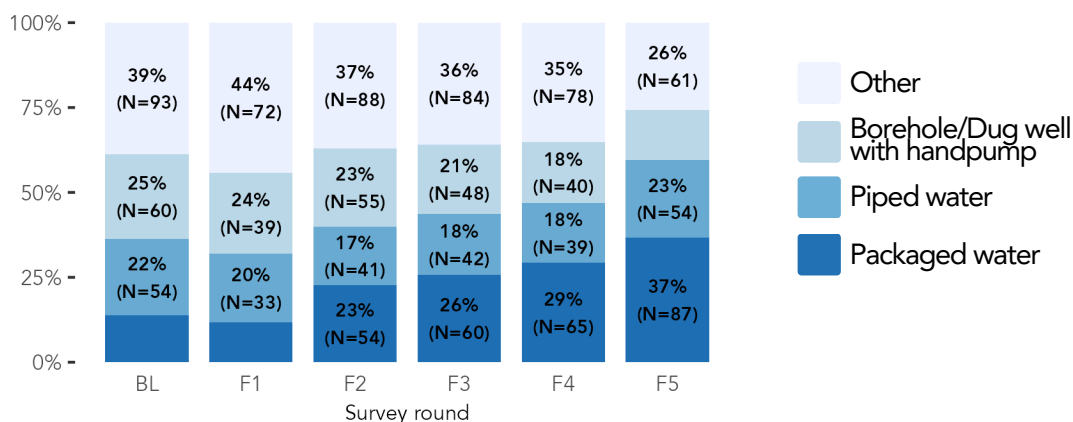


Figure 1: Current drinking water sources of surveyed households at each sampling time in Wassa East, including packaged water (sachet and bottled), piped water, and other source types.



PIPED WATER SYSTEMS

MICROBIAL WATER QUALITY

In Wassa East, piped water supplies have been among the safest waterpoint types at all sampling times, though microbial presence varied between sampling events, from a low of 17% and a high of 53% of samples with *E. coli* present. In early 2025 (F5), **17% of piped samples collected directly from taps had *E. coli* (n=70)** and **80% of piped samples collected from household storage containers (n=54) had *E. coli*** (Figure 2). This represents a large deterioration of piped water quality after household storage.

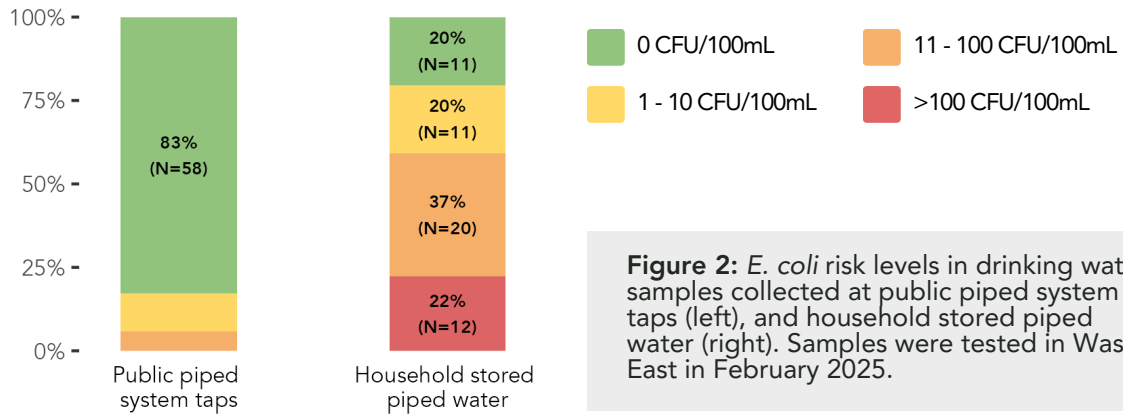


Figure 2: *E. coli* risk levels in drinking water samples collected at public piped system taps (left), and household stored piped water (right). Samples were tested in Wassa East in February 2025.

CHLORINATION

The presence of total chlorine residual (TCR) indicates that water was treated with a sufficient dose of chlorine to overcome the water’s initial chlorine demand, while free chlorine residual (FCR) is the part that remains available to prevent further contamination. **Across all sampling times, free chlorine residuals were relatively low – with 6% to 21% of sampled taps having the minimum recommended value of 0.2 mg/L set by the Ghana national drinking water standard (Figure 3).** Adequate free chlorine was more likely in the dry season compared to the wet season (22% vs 13% with FCR ≥ 0.2 mg/L), possibly due to lower levels of organic matter creating chlorine demand in the dry season.

DEFINITION

Chlorine demand is the amount of chlorine required to disinfect a water supply to the desired level. Organic matter and other dissolved substances increase the chlorine demand: they react with chlorine, leaving less available to inactivate pathogens, which means that a larger chlorine dose is required to achieve the same amount of disinfection.

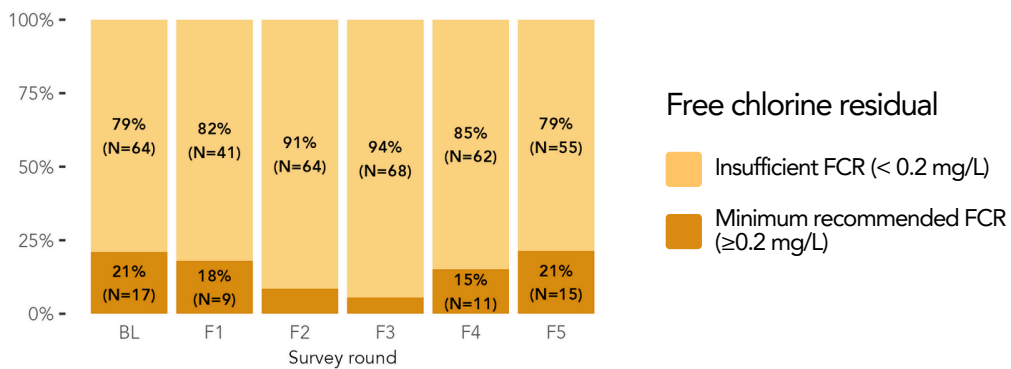


Figure 3: Free chlorine residual (FCR) of piped water taps at each sampling time in Wassa East (n=416 across all visits).



In February 2025 (F5), six-in-ten piped water samples had detectable total chlorine (TCR ≥ 0.1 mg/L), indicating those piped supplies were being treated with sufficient chlorine for some disinfection to occur. However, **only 20% had the minimum recommended FCR (≥ 0.2 mg/L), indicating that most had insufficient chlorine for continued protection** (n=70). The highest rates of chlorination were at healthcare facilities. Further, at households with stored piped water, **only 8% of stored household samples had FCR ≥ 0.2 mg/L** (n=52) (Figure 4). This indicates **most households' stored water was no longer protected against recontamination**. This explains the increase in *E. coli* contamination in stored household water as compared to samples collected directly from taps, as seen in Figure 2. Importantly, **water with the recommended FCR levels was safer**; no waterpoints with sufficient FCR (≥ 0.2 mg/L) had *E. coli*, while 22% of samples with insufficient FCR (< 0.2 mg/L) had detectable *E. coli* (n=70).

The World Health Organization's Guidelines for drinking-water quality for small water supplies recommends a free chlorine residual of 0.5 mg/L at the tap for public water supplies that will be transported and stored. Only 10% of samples met that recommended level in February 2025.

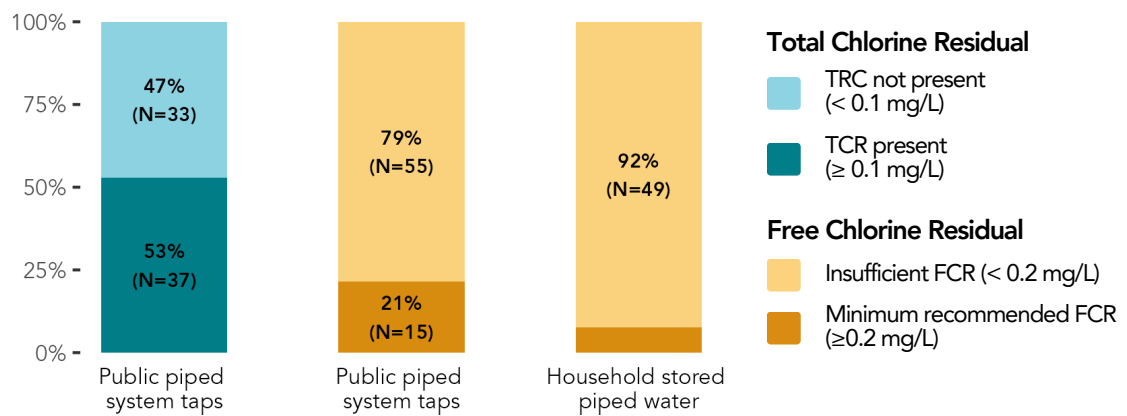


Figure 4: Public piped system tap samples with detectable total chlorine (TCR ≥ 0.1 mg/L, left) and minimum recommended free chlorine residual (FCR ≥ 0.2 mg/L, center), along with minimum levels of free chlorine residual (FCR ≥ 0.2 mg/L) in stored household piped water (right). Samples were tested in Wassala East in February 2025.

ON-PLOT PIPED WATER

Across all sampling times, few households (7%) had an on-plot piped water connection and even fewer (3%) stated that was their current drinking water source. The vast majority of households drinking on-plot tap water (84%, n=31) still stored their drinking water in the home. This may be because piped systems don't always provide water at all times (23% of taps were reported to have intermittent supply) or that households find having water inside the home more convenient.

Storing on-plot piped water had a noticeable effect on microbial quality: presence of *E. coli* increased from 47% at on-plot taps to 61% in household stored drinking water. Households with on-plot piped connections had lower water quality at the tap than households relying on public standpipes (47% vs 17% with *E. coli*), though stored water was of higher quality for households with on-plot taps.



SACHET WATER

MICROBIAL WATER QUALITY

Packaged water consistently had the lowest *E. coli* levels among all water sources, with only 1% of packaged water samples in February 2025 (F5) having detectable *E. coli* (Figure 5). However, across all sampling events, 16% of sachet samples had detectable *E. coli* (n=269). Contamination was present across many different sachet water brands. Of 12 sachet water brands with more than five samples tested since 2023 (when we started collecting the brand names), eight brands (67%) had at least one sample with *E. coli* (Table 1).

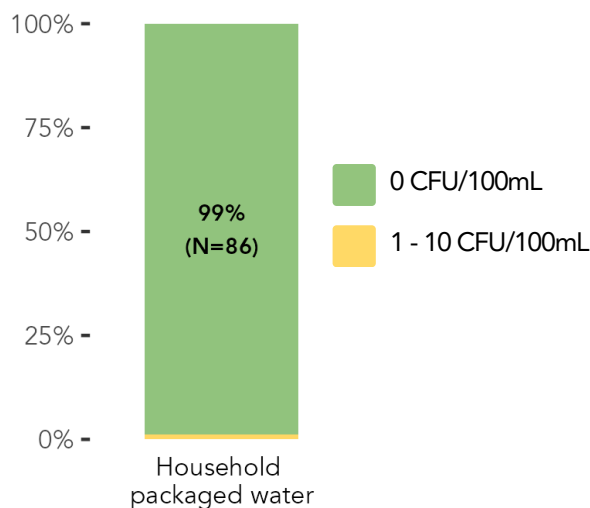


Figure 5. *E. coli* risk levels in packaged water samples (sachet and bottled water) collected from households. Samples were tested in Wassa East in February 2025.

Table 1: *E. coli* results from sachet water samples collected from households in Wassa East district from 2023-2025. Results are presented for brands with over five samples.

Sachet water brand	Number of samples	% samples with positive <i>E. coli</i> (>0 CFU/100mL)
Evergreen Splash	8	0%
Glory Filled	6	0%
NUMA	14	0%
Still	13	0%
Franmay	30	10%
Say More	25	12%
Mozac	17	18%
Global Splash	28	21%
M Rock	42	21%
Manna	8	25%
7 Stars	22	27%
Psalm 51	8	38%

RECOMMENDATIONS



All piped water supplies should be chlorinated.



Chlorination should be done more consistently and at higher levels to ensure free chlorine residual stays above 0.2 mg/L throughout piped networks.



Unless chlorination of piped supplies improves substantially, sachet water is the safest option to preserve water quality during household storage.