CAN SANITARY SURVEYS REPLACE WATER QUALITY TESTING?

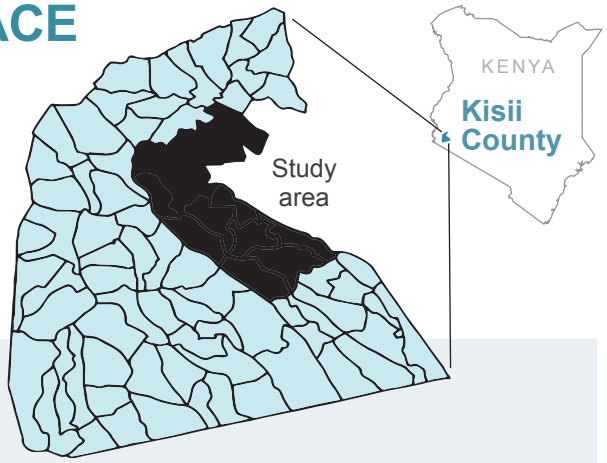
Monitoring for Safe Water (MfSW) is an action-research program that promotes drinking water safety through improved monitoring. The Aquaya Institute (Aquaya) launched MfSW with a grant from the Bill & Melinda Gates Foundation. Partners have included the African Water Association (AfWA), the International Water Association (IWA), and the World Health Organization (WHO).

INTRODUCTION

Developed by the World Health Organization (WHO), sanitary surveys are observational checklists to assess hazards present at water sources. Sanitary surveys are cheaper and faster to conduct than microbial water quality tests, as they require no special equipment. To assess whether sanitary surveys can be a substitute for microbial water quality tests, Aquaya researchers published a comparison of sanitary risk scores and fecal contamination levels in water sources in rural Kenya.

Misati, A. G., Ogendi, G., Peletz, R., Khush, R., & Kumpel, E. (2017). Can sanitary surveys replace water quality Testing? Evidence from kisii, Kenya. International journal of environmental research and public health, 14(2), 152.

This brief summarizes the results of their analysis.



Key Findings

1. The study found no association between sanitary survey risk scores and measured levels of thermotolerant coliforms
2. Dug wells had the highest sanitary risk scores, followed by springs and rainwater harvesting systems
3. Although they cannot substitute for microbial water quality testing, sanitary surveys may still be useful for identifying potential hazards

Figure 1: Map of Kisii County in Kenya showing the study areas

METHODS

The study took place in Kisii county, which is located south-east of Lake Victoria (Figure 1). Sixty-one water sources, made up of 25 springs, 20 dug wells, and 16 rainwater harvesting systems were selected for sampling. The water sources that were most commonly used by community members were given priority in the sampling process. Each water source was sampled twice within one month in order to capture variability in the quality of water.

Thermotolerant coliforms (TTC), which are indicators of fecal contamination, were quantified using membrane filtration. Sanitary survey checklists from the WHO Guidelines were customized for each water source type (example for dug wells in Table 1). Risk factors were scored on a binary scale (0 or 1) and summed up to derive a risk score (calculated as a percentage). Water sources were sorted into four categories based on their risk score: low (<30%), medium (30-50%), high (50-70%) and very high (>70%).

	Risk factor	Question
1	Unprotected by masonry	Is the well unprotected by masonry or concrete wall?
2	Nearby latrine	Is there a latrine <10 m of the well?
3	Lack of cover	Does the well have a cover?
4	Nearest latrine higher	Is the nearest latrine on higher ground than the well?
5	Pollution	Is there any other source of pollution (e.g., animal excreta, rubbish) <10 m of the well?
6	Stagnant water	Is there stagnant water<2 m from the well?
7	Inadequate parapet	Is the wall (parapet) around the well inadequate, allowing surface water to enter the well?
8	Floor <1 m	Is the concrete floor <1 m wide around the well (applicable for protected wells)?
9	Walls unsealed	Are the walls of the well inadequately sealed at any point for 3 m below ground?
10	Cracks	Are there any cracks in the concrete floor around the well that could permit water to enter the well?
11	Unsafe rope and bucket	Are the rope and bucket left in such a position that they may become contaminated?
12	Unfenced	Does the installation lack fencing?
13	Animal grazing	Were animals grazing around the well <2 m at the time of visit?
14	Clothes washing	Were people washing clothes <2 m around the wel at the time of visit?
15	Open defecation	Is there open defecation uphill of the site <2 m?
16	Flooding	Is the site unprotected against flooding (located in a depression or along storm water pathway)?
17	Dirty environment	Is the environment around the well dirty?

Table 1: Sanitary survey for dug wells, adapted from the WHO Guidelines for Drinking Water Quality.

RESULTS

Dug wells had the highest sanitary risk scores (58% on average), followed by springs (45% on average) and rainwater harvesting systems (32% on average). 45% of dug wells that were sampled were categorized as very high risk, compared to 4% for springs and 0% for rainwater systems. The most common risk factors varied by source type as follows:

- Dug wells: lack of fence, unsealed walls, and unsafe rope and bucket
- Springs: lack of fence, lack of diversion ditch, and presence of human activity
- Rainwater systems: lack of cover and roof contamination

Levels of fecal contamination were generally high: 100% (n=34) of dug wells, 95% (n=41) of springs, and 61% (n=31) of rainwater systems tested positive for TTC. Furthermore, TTC levels in springs were higher after recent rainfall.

Figure 2 shows TTC levels for each risk category and for each water source type. The study found no association between TTC concentrations and sanitary risk scores.

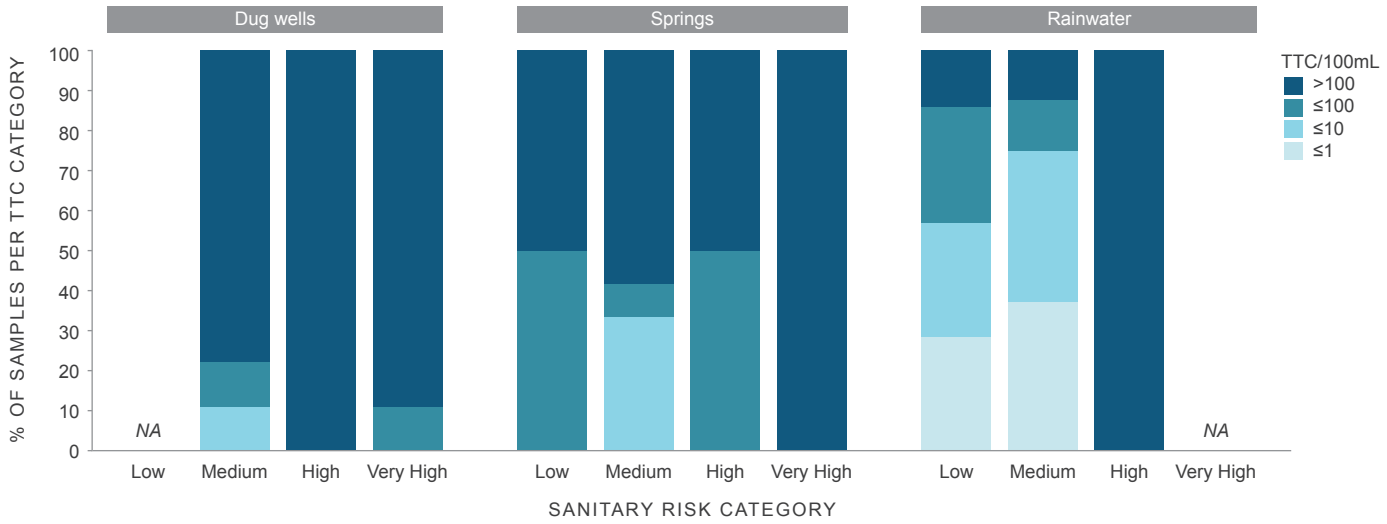
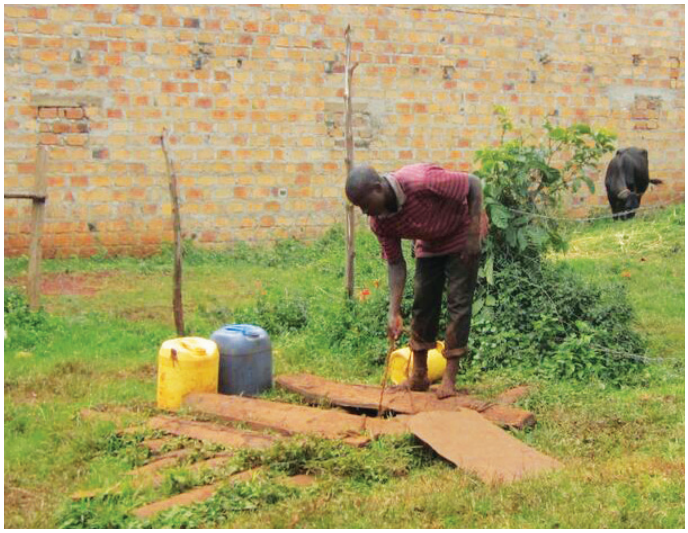


Figure 2: Thermotolerant coliform (TTC) concentrations per risk score category for dug wells, rainwater harvesting systems and springs.

DISCUSSION

This study found no correlation between sanitary risk scores and TTC concentrations, corroborating results of two prior studies in Uganda and Ireland. These findings suggest that sanitary surveys cannot substitute for microbial water quality testing. In fact, contamination levels in Kisii county appeared to be more dependent on source type and recent rainfall than on sanitary risk score. However, sanitary surveys are useful tools for identifying hazards at water sources and could be incorporated in water safety management approaches such as Water Safety Plans.



The full text can be found at: http://www.mdpi.com/1660-4601/14/2/152

Brief prepared by Joan Kones, Joyce Kisiangani, Caroline Delaire, Rachel Peletz, Emily Kumpel, and Ranjiv Khush, the Aquaya Institute, April 2018. For more information, please email us at info@aquaya.org or visit www.aquaya.org