Drinking Water Quality in Improved Water Supplies in Burkina Faso

In rural Burkina Faso, the use of traditional wells is widespread. Through the WA-WASH programme of Winrock International, people could invest in upgraded water points. The Water Supply and Treatment group assessed the quality of the different water facilities used [1].

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Introduction

Under the SDG Target 6.1, the Joint Monitoring Programme defines "safely managed water" as an improved source located on premises and available when needed, as well as free of faecal contamination [2]. In Burkina Faso, between 2000 and 2015, the percentage of households with access to improved water supplies in rural areas increased from 54.5 % to 75.8 % [3]. However, whereas previous research has shown that improved water sources on premises have better water quality [4], little is understood about other water service attributes.

Data sources and methods

Winrock International, through the USAID-funded West Africa Water, Sanitation and Hygiene (WA-WASH) programme in Burkina Faso, used a demand-responsive, modified self-supply approach to deliver multiple-use water services (MUS) to rural households across a three-region area. Households were given the option to invest in an upgraded water point (upgraded well with rope pump), which was installed and maintained by the private sector.

In the study area, a total of 1 327 household surveys were conducted in 28 rural communities. Four household typologies were defined in the study: investors receiving upgraded wells through the programme, neighbours of investors (those who reported using an investor's upgraded well), non-neighbours (households within programme villages who did not invest or access investor's upgraded water points), and the control group (households outside of the MUS intervention areas). Investors and neighbours will be referred to as the "MUS group" and the non-neighbours and control group as the "non-MUS group".

The study made use of a strategic sampling approach. All investors were offered the opportunity to enrol, while investors identified neighbours who were then chosen at random and offered the chance to participate (snowball strategy). The non-neighbours and control households were mapped and every *n*th household could enrol (stratified random sampling strategy). The survey instruments collected, amongst other questions, information on water sources used and water service features.

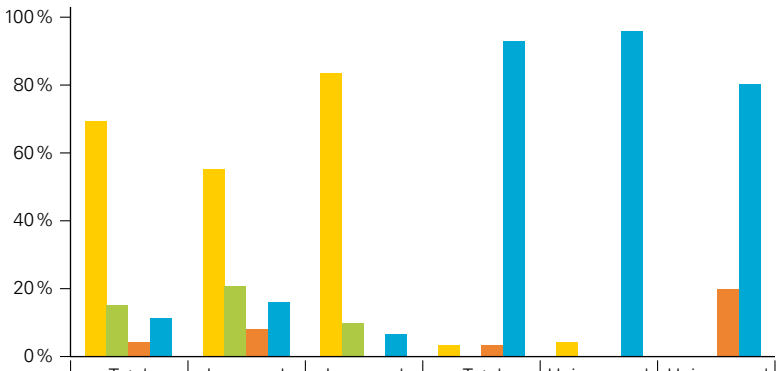
In addition to the interviews, water quality testing at the point of collection was conducted using compartment bag test (CBT) kits, indicating the microbial quality (*E. coli* concentration). Sampling took place in two of the programme regions. In total, 181 public and private water points were tested: 57 unimproved sources (traditional wells) and 124 improved wells.

Findings

Satisfaction. The survey revealed overall satisfaction in the MUS group. People were asked how satisfied they were with their current water supply situation and 47 % were "generally satisfied" and 47 % were "somehow unsatisfied", with only 5 % declaring being "very unsatisfied". In contrast, people in the non-MUS group were 26 % "generally satisfied", 58 % "somehow unsatisfied", and 16 % "very unsatisfied".

Resilience. Results showed two different trends with respect to the resilience factors. Resilience was assessed by probing the availability of the households' main drinking water source throughout the year, as well as the duration of recent interruptions. A greater proportion of MUS households (34 %) reported waiting at some point during the year for their main drinking water source to recharge, as compared to non-MUS households (19 %). However, MUS households typically waited half the time as the non-MUS households, approximately 60 minutes compared to 120 minutes. Furthermore, over 20 % of non-MUS households waited for 24 hours or longer, as compared to only 5 % of MUS households.

In terms of water service availability, results show that a full-day interruption in water service within the past six months was a relatively rare occurrence for both groups. MUS households experienced fewer (16 %) interruptions in water service as compared to non-MUS households (23 %). In addition, less than 25 % of the MUS households ex-



	Total improved (n=124)	Improved on premises (n=63)	Improved community (n=61)	Total unimproved (n=57)	Unimproved on premises (n=47)	Unimproved community (n=10)
Low risk 0 (CFU/100mL)	69 %	56 %	84 %	4 %	4 %	0 %
Intermediate risk 1 – 9 (CFU/100mL)	15 %	21 %	10 %	0 %	0 %	0 %
High risk 10 – 99 (CFU/100mL)	4 %	8 %	0 %	4 %	0 %	20 %
Very High risk ≥ 100 (CFU/100mL)	11 %	16 %	7 %	93 %	96 %	80 %

Figure 1: Microbiological water quality (*E. coli* contamination).

periencing interruptions had to wait more than 10 days for repairs, whereas over 40 % of non-MUS households had to wait longer than 10 days.

Types of water points. The survey revealed key differences in the types of water points used by MUS and non-MUS groups. The majority of all groups interviewed used an upgraded well as their main drinking water source at the time of the survey (MUS group: 94 %, non-MUS group: 70 %), while the traditional wells were used by 29 % amongst the non-MUS group. Within the MUS group, the majority of investors used a private water point on premises at the time of the interview (93.2 %), as did 36 % of the neighbours, while 34 % of the neighbours used a private point not on their premises and 31 % used community points of collection. In the non-MUS group, most people (77 %) used a community water point and only 18 % owned a private water point on premises.

Microbiological quality. Water quality testing confirmed the relationship between an improved water point and better water quality, but revealed unexpected relationships regarding the households' category, the location of the water point, and microbiological water quality. The majority (69 %) of upgraded wells with rope pumps provided water categorized as low risk, according to the WHO standards at the time of sampling. By contrast, nearly all traditional wells (93 %) were highly contaminated with *E. coli* and categorized as very high risk. When examining the quality of the main drinking water source reported by households, most investors accessed a source categorized as safe (53 %) or probably safe (22 %), but 17 % still used unsafe water. However, the non-MUS group was evenly split across the categories of safe and very unsafe drinking water sources (47 % each). Finally, when comparing improved water points located on premises to community water points, we find a higher share of improved community wells meeting WHO standards (84 %) than improved wells on premises (54 %). Similarly, the share of samples categorized as posing a health risk was always higher for water points located on premises compared to community water points (Figure 1 and Table 1).

	MUS group	non-MUS group
Satisfaction	Equally generally satisfied and somehow satisfied	Majority somehow unsatisfied
Resilience	Interruptions more frequent but shorter in duration	Interruptions less frequent but longer in duration
Types of water points	94 % upgraded well	70 % upgraded well
	Majority private water points (neighbours group: their own or investor's)	Majority community water point
Microbiological water quality	Investors: 53 % low risk, 22 % intermediate risk	47 % low risk, 47 % very high risk

Table 1: Summary of findings regarding households' categories.

Conclusion

Greater satisfaction, improved resilience, a shorter queue time, more frequent but shorter service interruptions, and higher water quality were observed among households in the MUS group, most of whom used an upgraded water point on premises. However, safe water quality is not guaranteed based on water point type alone. 45 % of the samples taken from improved water points on premises did not meet WHO standards for safe drinking water. The results of this study confirm that not only the type of drinking water point is crucial, but also underline the importance of regular treatment and monitoring.

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Photo 1: Upgraded well with rope pump on premises.

[1] Data for this study were sourced from USAID, in partnership with Winrock and Eawag. Data are publicly available and subject to USAID regulations.

[2] www.wssinfo.org/fileadmin/user_upload/resources/JMP-WASH-Post-2015-Brochure.pdf

[3] www.wssinfo.org/data-estimates/tables/

[4] Shields, K.F., Bain, R.E., Cronk, R., Wright, J.A., Bartram, J. (2015): Association of supply type with fecal contamination of source water and household stored drinking water in developing countries: a bivariate meta-analysis. Environ Health Perspect *123(12)*, 1222–1231.

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