Determinants of Household Drinking Water Quality in Rural Ethiopia

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Background

- Lack of access to safe & adequate water supply, & the health risks associated with water- related diseases are major public health problems in many developing countries.
- In Ethiopia, only 49% rural households have access to 'improved' water sources (WHO/UNICEF 2015).
- This definition of access to 'improved' water source does not consider the quality of the water; consequently, it does reliably predict neither the microbiological nor the physiological quality of the water being consumed.

Study Objective

- To investigate the key drivers of poor quality of stored household drinking water and community water sources in rural areas of Fogera and Mecha districts.

Study Areas
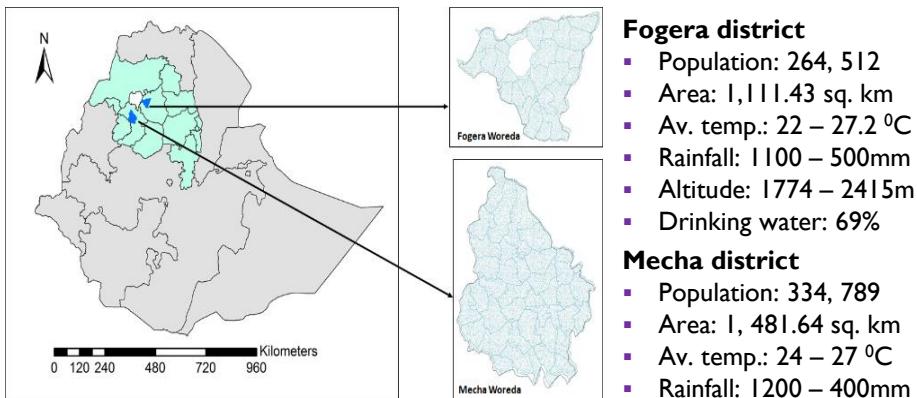
Figure 1: Map of the study areas

Fogera district
- Population: 264, 512
- Area: 1,111.43 sq. km
- Av. temp.: 22 – 27.2 °C
- Rainfall: 1100 – 500mm
- Altitude: 1774 – 2415m
- Drinking water: 69%

Mecha district
- Population: 334, 789
- Area: 1, 481.64 sq. km
- Av. temp.: 24 – 27 °C
- Rainfall: 1200 – 400mm
- Altitude: 1700 – 2300m
- Drinking water: 35%

Data and Methods

- A stratified two-stage cluster sampling was used to selected 454 sample households (277 hh from Fogera & 177 hh from Mecha district).
- A household survey conducted between February and June 2014
- Water samples quality testing conducted for
  - 454 stored household drinking water, and
  - 61 community water sources for the presence of Escherichia coli (*E.coli*) bacteria (CFU/100ml water) using membrane filtration method.

Results and Discussion

- Based on the JMP definition, 50% of our sample households have access to improved drinking water sources.
- 58% of the water samples from household's drinking water storage is contaminated with E.coli (at least 1 *E.coli* CFU/100ml water).

Table 1: Community water source sample test results

| Source type | N | Contaminated water sources | | Mean *E.coli* per 100ml |
		Column percentage	Row percentage	
Protected wells/spring	29	37.78	58.62	6.83
Unprotected wells/spring	26	48.89	84.62	34.46
Surface water sources	6	13.33	100	61.33

Source: Authors' computation using survey data.
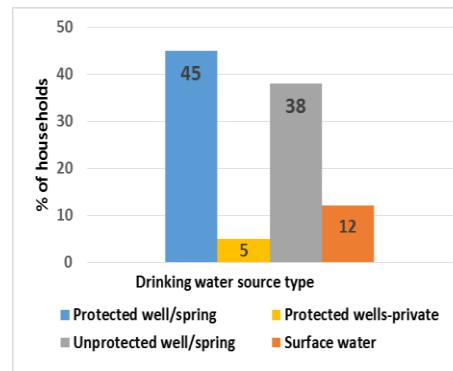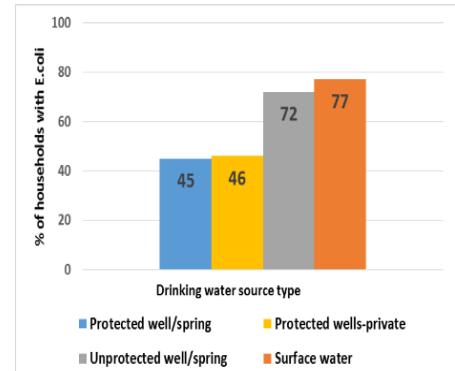
Figure 2: Drinking water source types and stored drinking water contamination

Table 2: Multivariate regression for stored household quality

VARIABLES	Odd ratio	SE	OLS	SE
Primary water source (ref. protected well/spring)				
Unprotected well/spring	1.889**	0.532	0.315**	0.155
Surface water	1.111	0.419	0.235	0.233
Water collection time (1=30min/less)	0.372**	0.155	-0.911***	0.220
Container (*1=Jerry can*)	3.570***	1.291	1.086***	0.186
Highest education completed	0.899***	0.036	-0.051*	0.026
Household size	0.878	0.085	-0.120**	0.056
Household density	1.490***	0.175	0.351***	0.066
Handwashing with soap	0.373***	0.112	-0.611***	0.162
Livestock units	1.288***	0.096	0.166***	0.040
Irrigation farming (*1=yes*)	1.507	0.407	0.439***	0.137
Water user group (*1=yes*)	0.146***	0.051	-1.419***	0.177
Pit latrine (*1=yes*)	0.847	0.234	-0.510**	0.243
Water source location (*1= on premises*)	0.607	0.244	-0.446**	0.037
Pit latrine X water source location	1.418	0.768	0.567**	0.267
Pseudo/R-squared	0.35		0.45	
Model Chi2/F-Test	185.81		68.18	
Model p-value	0.000		0.000	

Robust standard errors adjusted for clustering at the village level;
Significance level *** p<0.01, ** p<0.05, * p<0.1
The OLS model predicts the natural log of *E.coli*.
The models are also controlled for proportion of adult women & garbage disposal behaviors.

Conclussions and Policy Implication

The study suggests that there is a need to promote water safety along the POS to POU to advance the SDG6 of ensuring access to clean water for everyone.

- Water source points should be adequately protected & ad hoc water quality testing & quality control mechanisms need to be in place to ensure safety of rural water supply.
- Promoting household water treatment practices (only 8% of the surveyed households practice water treatment irregularly).
- Providing safer & convenient storage containers/promoting how to clean jerrycan properly would avoid substantial risk of water contamination.
- Building the capacity of WUA is critical in the provision of sustainable rural water supply.

Reference: WHO/UNICEF (2015): Progress on drinking Water and sanitation: 2014 update and MDG assessment. New York, NY, USA, United Nations Children's Fund; Geneva, Switzerland (UNICEF), World Health Organization (WHO).