Effect of Water Quality and Treatment on Health Outcomes in Siddharthanagar

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Abstract

We exploit the issues of water quality in Siddharthanagar by comparing health outcomes based on water treatment methods and water quality. Our results show that water treatment has an effect on health outcomes and sickness. This shows that by increasing water treatment methods and water sourcing, can reduce the amount of illness in a community, which will ultimately increase the level of productivity as well as education of the community due to less frequent illness.

Literature Review

Studies in the Kathmandu Valley have shown that bacteria such as E. coli has high prevalence in many water sources including municipal taps, dug wells, shallow-aquifer tube wells, and public tap that capture ground or surface water (Warner, et. Al, 2007). As a result, people in the community become sick with diarrhea, jaundice, typhoid, worms, and cholera because they use the water for numerous activities such as cooking, bathing, washing, and waste dumping. These behaviors contribute to and perpetuate a cycle of poor water quality and sickness.

Hypothesis

- The water quality based on the source and the lack of water treatment increases the chance of becoming ill.
- One goal is to analyze which water sources are a higher health risk.
- Another goal is to analyze and understand how water treatment affects the health outcome of the population.

Variables

Independent Variables:

Water Source - A categorical variable indicating the primary source of water for the household, as indicated in a survey.

Treatment - A categorical variable tracking how each household in the study cleans their water, if at all.

Water Quality- A composite variable based on whether or not the water looks, smells, or tastes unusual. A value of one indicates that all three are true.

Always Hand Wash - A boolean variable, where one indicates that the survey respondent always washes their hands

Dependent Variables:

AnySick - A binary variable representing whether or not any member of the household has gotten sick in the past 30 days.

Methods

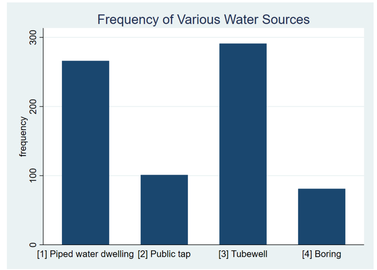
The overall process of this study is analysis of survey data collected in Siddhartanagar, Nepal. The primary method of analysis is logistic regression based upon categorical and boolean variables - this is because the variable we are interest in predicting is effects on the likelihood of illness, which is a binary outcome.

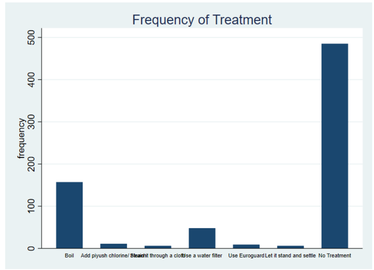
In order to complete this process, sections of the data had to be dropped. All regressions displayed and compared here are over the same subset of the data- which was all respondents who had replied to all of the questions that these statistics were derived from.

The reference category for all of the regressions is a house that gets most of its water from a tubewell, and does not treat the water in any way.

Data / Observations

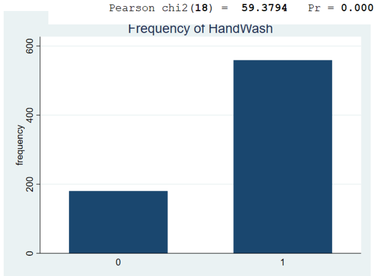
Below is a collection of charts and tables that illustrate the shape of the data that went into the regression.

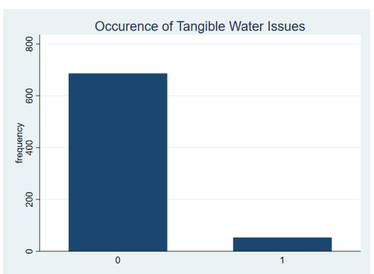




What is the main source of drinking-water for members of your household?	Treatment							
	Boil	Add piyus	Strain it	Use a wat	Use Eurog	Let it st	No Treatm	Total
[1] Piped water dwell	87	5	0	14	2	3	148	259
[2] Public tap	19	1	1	6	2	3	67	99
[3] Tubewell	37	1	4	23	4	0	216	285
[4] Boring	14	4	1	5	1	0	54	79
Total	157	11	6	48	9	6	485	722

Pearson chi2(18) = 59.3794 Pr = 0.000





Results

	(1) AnySick	(2) AnySick	(3) AnySick	(4) AnySick
AnySick				
Boil	-0.851***	-0.848***	-0.806***	-0.801***
Chlorine	-0.746	-0.821	-0.672	-0.738
Cloth	-0.351	-0.407	-0.0109	-0.0649
Filter	-0.823*	-0.824*	-0.698*	-0.701*
Euroguard	-1.953	-2.060	-1.588	-1.688
Pipe	0.507**	0.504**	0.471*	0.466*
Tap	0.586*	0.558*	0.507*	0.478
Boring	-0.644*	-0.635*	-0.550	-0.540
Quality1		0.450		0.433
AlwaysHand~h			-1.293***	-1.290***
_cons	-0.353**	-0.381**	0.602**	0.575**
N	722	722	722	722

* p<0.05, ** p<0.01, *** p<0.001

The above is a table summarizing the logistic regressions performed with this data.

It appears the factors associated with the most significant reduction in the odds of a household having someone get sick are boiling the water, and always washing hands. Water piped to the house and public tap water, both significantly increase the odds of getting sick relative to water from a tubewell, and water from boring reduces those odds.

A ceramic water filter is also correlated with a significant reduction of the odds of getting sick.

Conclusion

- The data and regressions, do support our hypothesis that water quality affects the chances of becoming ill. We also discovered that by using certain methods of water purification, and sanitation there can be a reduction in illness.

Solutions

- Based on the regression results, some potential solutions that could be enacted, would be to help educate people on how beneficial washing hands is in preventing illness.
- By also raising awareness on the unsanitariness of their drinking water, and displaying the results of this research. showing that by simply boiling, or purifying their water through a ceramic filter, they can reduce the likeleyhood of illness.

Works Cited

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- Warner, Nathaniel R., et al. “Drinking Water Quality in Nepal’s Kathmandu Valley: a Survey and Assessment of Selected Controlling Site Characteristics.” *Hydrogeology Journal*, vol. 16, no. 2, 2007, pp. 321–334., doi:10.1007/s10040-007-0238-1.