Awareness to Mitigation: The Impact of Public Awareness Initiatives on Water Filter Adoption

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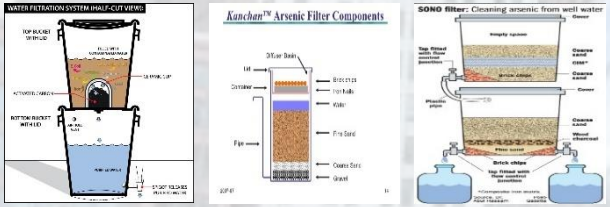
Abstract

Our study considers the water filter adoption behavior of households from two districts in Nepal with documented arsenic water contamination: Nawalparasi and Rupandehi. We examine the presence of socio-economic factors such as wealth and caste along with other notable factors including positive arsenic water tests and public arsenic awareness initiatives. The primary goal was to identify the sign and significance of these recent initiatives and extrapolate whether they had an effect on a household's decision to adopt a modern water filter ("modern" being defined as the following: Kanchan, Sono, Ceramic see Figure: A). Thanks to the data collected by the Nepal Study Center in coordination with Yale University, we created a robust logistic regression which indicates households who received knowledge about arsenic through media outlets such as radio and television were 11% more likely to adopt a modern filter (significant at the 1% level). In addition, positive results from arsenic testing (i.e. arsenic being found) and wealth were also significant factors (at the 1% and 5% levels).

Introduction

The problem presented in our research involves villagers' knowledge of arsenic and its effect on owning a modern water filter. Our models were constructed from a data set collected from two districts of Nepal: Rupandehi and Nawalparasi. Recent tests have shown areas of both districts to have considerably high levels of recorded arsenic in their drinking water. Past research focused on regions of India, and Bangladesh (two bordering regions of Nepal) demonstrate that villagers of each respected area face similar issues of arsenic contamination to those in our sampled population. Through these studies it has become evident that consuming high levels of arsenic can cause various health issues. Short-term issues include: vomiting, abdominal pain, and diarrhea. While long-term exposure to arsenic poisoning can result in more severe health problems including forms of cancer. The aforementioned studies have both: (a) developed a link between higher arsenic concentrations and prevailing health outcomes and (b) provided explanations as to why certain populations have a higher exposure to arsenic. In turn their work has led to the development of different forms of policy solutions, one of which being increased awareness. Our research aims to focus on the effect public awareness initiatives have on arsenic mitigation, particularly on household's propensity to adopt modern water filters.

Figure A:



Literature Review

George, Litvak, Khan et al. provided rigorous analysis on the intervention outcomes of an educational arsenic awareness program. Their findings show educational programs were highly significant in improving arsenic knowledge and identification. Our own model built on their analysis by illuminating the effect public awareness initiatives have on the adoption of water filters to mitigate the harmful effects of arsenic contamination.

Hypothesis

Existing literature has demonstrated the positive impact of knowledge intervention programs on both arsenic levels and water treatment behavior from populations that share many geographic similarities to population our data was collected from. In our work we would like to demonstrate the positive significance of public media awareness campaigns on increasing the likelihood of adopting modern water filters in the villages of Rupandehi and Nawalparasi.

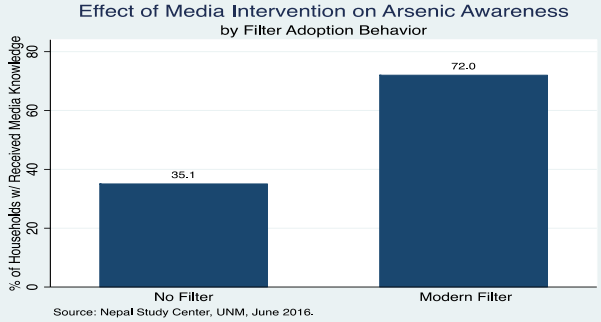
Empirical Results

	Model 1	Model 2	Model 3
ModernFilter			
ArsenicKnowledge	1.561***	1.272**	1.579***
	(0.473)	(0.512)	(0.580)
wealth		0.415***	0.375**
		(0.153)	(0.162)
ArsenicFound		1.361***	1.448***
		(0.503)	(0.519)
Madhesi			−0.779
			(0.634)
ArsenicosisAwareness			−0.781
			(0.549)
constant	−2.781***	−5.391***	−4.463***
	(0.389)	(1.050)	(1.304)
BIC	148.745	146.213	152.810
AIC	142.158	133.040	133.050
chi-sqaured	12.282	25.400	29.390
n	199.000	199.000	199.000

Standard errors in parentheses
* p<0.1, ** p<0.05, *** p<0.01

Table A: Descriptive Variable

Variable	Definition	Mean	Std Dev
Modern Filter	Reported yes to owning a modern water filer (Sono, Kanchan, Ceramic)	0.1256	0.3322
Wealth	Wealth index based on owned assets	4.9246	1.6481
Arsenic Found	Positive arsenic testing results	0.2964	0.4578
Caste Madhesi	Caste categorized in two sections: Madhessi or non-Madhessi	.88442	.32052
Arsenic Media Knowledge	Households reported gaining arsenic knowledge through media outlets (radio, TV etc.).	0.3968	0.4905



Data and Variables

The data was collected from Rupendehi and Nawalparasi, two villages in India, using proportional random sampling. The outcome variable was the adoption of a modern filter while the impact variable was knowledge of arsenic through various media outlets. Several control variables were used in the model including arsenic found, wealth, Madhesi caste, and awareness of arsenicosis illness. This data was collected from the Nepal Demographic and Health Survey, 2011

Model and Methods

The decision to adopt a modern water filter in our model was recorded as a response of either "yes" the household adopted the filter or "no" they did not, and due to the binary nature of this response we used a robust logistic regression. This enabled us to gauge statistical significance of certain factors and estimate the probability of adopting a modern water filter based on a set of qualitative independent variables. The equation below represents the framework of the logistic regression we used to test our hypothesis.

$$MFn = \beta 0 + \beta 1AMKn + \beta 2AFn + \beta 3Wn + \beta 4CMn + \beta 5\,KAn + Un \quad (1)$$

MFn displays modern filters of homes n can take on the ordinal values between 0 and 1, stating whether a filter is owned or not. MFn is explained by (AMKn) arsenic media knowledge, arsenic found (AFn), and wealth (Wn), along with a couple other control variables. $\beta 1$ is the parameter to be estimated as the error term follows a normal multivariate distribution.

Conclusion

Our result showed that the knowledge of arsenic through media outlets is significant on the adoption of the modern filter. Those who were aware through media were 11% more likely to adopt a modern filter for their home. In conclusion awareness campaigns can have a positive effect in adopting a modern filter.

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