

Water is Life but Leads to Arsenicosis: The Effect Of Arsenic Found in Wells on Women's Arsenicosis in Nepal

Carrie Adair, Jonathen Lee, Max Walla | Alok Bohara | University of New Mexico

Abstract

The purpose of this project was to examine the effect of arsenic found in water wells on women's health in Nepal with data samples taken from two villages: Nawalparasi and Rupandehi. We ran a logistic regression on the latent intensity to exhibit visual effects of arsenicosis for women in Nepal, with several independent variables, the most important of which was whether or not arsenic was found in the water wells. Throughout our research and findings, we concluded that there was a statistically significant impact of arsenic found in wells on the proclivity to exhibit visual effects of women in Nepal. Essentially, the conclusive evidence indicates that if water was found in the wells, the women in Nepal have a much higher probability of exhibiting arsenicosis.

Introduction

Peru, like Nepal, has extremely high levels of arsenic contamination in the drinking water sources. For the purposes of this project, we looked at data from Nepal to determine the health outcomes of arsenic found in well water. Research Question: Will the presence of arsenic in the well water lead to arsenic-related diseases?

Hypothesis

If a well is discovered to have the presence of arsenic, more women will have Arsenicosis.

Literature Review

We used five different journal articles to back up our own research. Arsenicosis negatively impacts health by causing issues such as skin lesions, cognitive impairment and death. Women are the most heavily impacted by arsenic-contaminated water due to cultural requirements on water collection. Income and knowledge about arsenic encourages avoidance through filter usage.

Models and Methods

Models

- $Arsenicosis_t^* = \beta_0 + \beta_1 ArsenicFound_t + u_t$
- $Arsenicosis_t^* = \beta_0 + \beta_1 ArsenicFound_t + \beta_2 Wealth_t + \beta_3 HSGrad_t + u_t$
- $Arsenicosis_t^* = \beta_0 + \beta_1 ArsenicFound_t + \beta_2 Wealth_t + \beta_3 HSGrad_t + \beta_4 Caste_t + \beta_5 Filter_t + u_t$

Methods

- Logistic regression with robust classification

Data and Variables

Table 1: Descriptive Statistics and Variable Definitions

Variable	Definition	Mean/Standard Deviation	Min/Max
<i>Arsenicosis</i>	Dummy variable where 1 = presence of arsenicosis, 0 = no presence of arsenicosis	Mean: .115 Std. deviation: .3198225	Min: 0 Max: 1
<i>ArsenicFound</i>	Dummy variable where 1 = arsenic found in well, 0 = not found	Mean: .295 Std. deviation: .4571872	Min: 0 Max: 1
<i>Wealth</i>	Index of level of wealth from 0 to 11	Mean: 4.945 Std. deviation: 1.669103	Min: 0 Max: 11
<i>HSGrad</i>	Dummy variable where 1 = graduated high school or higher education, 0 = did not graduate from high school	Mean: .145 Std. deviation: .3529844	Min: 0 Max: 1
<i>Caste</i>	Dummy variable where 1 = Brahmin and Chherti, 0 = all other castes	Mean: .04 Std. deviation: .1964509	Min: 0 Max: 1
<i>Filter</i>	Dummy variable where 1 = use of filter, 0 = no use of filter	Mean: .125 Std. deviation: .3315488	Min: 0 Max: 1

Empirical Results

- Hypothesis testing: t-test, LR test
- Diagnostics: marginal probability, odds ratio
- Goodness of fit: Pseudo-R², AIC
- Model 1: ArsenicFound is statistically significant.
- Model 2: ArsenicFound is statistically significant.
- Model 3: ArsenicFound and Caste are statistically significant.
- The constant was significant in all three models.
- In Models 1 and 3 in the LR test between the full and null models, the independent variables all added significantly to the model.
- If ArsenicFound increases by one unit, the marginal probability of exhibiting arsenicosis increases by 0.173 units (Model 1).
- Women were 7.2 times more likely to exhibit arsenicosis if there was arsenic found in the water.

Empirical Results

Table 2: Effect of Arsenic Found on proclivity to exhibit Arsenicosis

	Model 1	Model 2	Model 3
<i>ArsenicosisYes</i>			
<i>ArsenicFound</i>	1.735*** (0.472)	1.720*** (0.473)	1.969*** (0.497)
<i>Wealth</i>		-0.218 (0.152)	-0.270 (0.168)
<i>HSGrad</i>		-0.280 (0.802)	-0.451 (0.603)
<i>Caste</i>			2.870** (1.210)
<i>Filter</i>			-1.523 (1.035)
<i>constant</i>	-2.811*** (0.365)	-1.751** (0.788)	-1.606** (0.816)
<i>BIC</i>	138.942	147.211	151.149
<i>AIC</i>	132.346	134.018	131.359
<i>n</i>	200.000	200.000	200.000
<i>Log-Likelihood</i>	-64.173	-63.009	-59.680
<i>Pseudo R²</i>	0.101	0.117	0.164
<i>Chi-Sq</i>	13.493	15.713	22.491

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

Conclusion

- The presence of arsenic in the well water greatly increased the sample's chance of an arsenicosis diagnosis.

Policy recommendations

- Target women for increased healthcare, specifically for the treatment of arsenicosis.
- Enact effective filtration systems on all the wells.

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