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

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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 probability 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. Arsenic negativity 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

1. Arsenicosis = β₀ + β₁Arseonicosis + u₁
2. Arsenicosis = β₀ + β₁Arseonicosis + β₂Wealth + β₃HSGrad + u₁
3. Arsenicosis = β₀ + β₁Arseonicosis + β₂Wealth + β₃HSGrad + β₄Caste + β₅Filter + u₁

Methods

- Logistic regression with robust classification

Data and Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
<th>Mean/Standard Deviation</th>
<th>Min/Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenicosis</td>
<td>Dummy variable where 1 = presence of arsenicosis, 0 = no presence of arsenicosis</td>
<td>Mean: 1.15 Std. deviation: 3.198235</td>
<td>Min: 0 Max: 1</td>
</tr>
<tr>
<td>Wealhth</td>
<td>Index level of wealth from 0 to 11</td>
<td>Mean: 4.945 Std. deviation: 1.669153</td>
<td>Min: 0 Max: 11</td>
</tr>
<tr>
<td>HSGrad</td>
<td>Dummy variable where 1 = graduated high school or higher education, 0 = did not graduate from high school</td>
<td>Mean: 1.45 Std. deviation: 35.29644</td>
<td>Min: 0 Max: 1</td>
</tr>
<tr>
<td>Caste</td>
<td>Dummy variable where 1 = Brahmin and Chetri, 0 = all other castes</td>
<td>Mean: .04 Std. deviation: .196459</td>
<td>Min: 0 Max: 1</td>
</tr>
<tr>
<td>Filter</td>
<td>Dummy variable where 1 = use of filter, 0 = no use of filter</td>
<td>Mean: 1.25 Std. deviation: .335468</td>
<td>Min: 0 Max: 1</td>
</tr>
</tbody>
</table>

Empirical Results

- Hypothesis testing: t-test, LR test
- Diagnostics: marginal probability, odds ratio
- Goodness of fit: Pseudo R², AIC

<table>
<thead>
<tr>
<th>Model</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenicosis</td>
<td>1.735***</td>
<td>1.720***</td>
<td>1.560***</td>
</tr>
<tr>
<td>Wealth</td>
<td>-0.218 (0.473)</td>
<td>-0.218 (0.473)</td>
<td>-0.218 (0.473)</td>
</tr>
<tr>
<td>HSGrad</td>
<td>-0.280 (0.802)</td>
<td>-0.280 (0.802)</td>
<td>-0.280 (0.802)</td>
</tr>
<tr>
<td>Caste</td>
<td>2.870** (1.250)</td>
<td>2.870** (1.250)</td>
<td>2.870** (1.250)</td>
</tr>
<tr>
<td>Filter</td>
<td>-2.811*** (0.365)</td>
<td>-2.811*** (0.365)</td>
<td>-2.811*** (0.365)</td>
</tr>
</tbody>
</table>

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

References

- Yali University, Nepal Study Center (2016). Women’s health and groundwater arsenic contamination.