Environmental Hazard: When Drinking Water is Poisonous

Personal, Social, and Structural Factors Influencing the Use of Arsenic-Safe Deep Tubewells in Bangladesh

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I. Abstract

- In Bangladesh, millions of people drink arsenic-contaminated water.
- We hypothesized that different factors derived from psychological theories influence the use of arsenic-free deep tubewells.
- Social factors emerged as the most influential determinants of using deep tubewells.

II. Arsenic in groundwater

Figure 1. Arsenic-contaminated shallow tubewell.

- Arsenic contamination of groundwater is a global health threat.
- In Bangladesh, app. 20 million people drink water from **arsenic-contaminated shallow tubewells**.

Health effects of chronic arsenic exposure: arsenicosis

- Skin lesions, cardiovascular diseases, cancer.

Figure 2. Skin lesions.

Prevention: arsenic-safe deep tubewells

Deep tubewells provide safe water by tapping deeper, arsenic-free aquifers.

Figure 3. Construction of an arsenic-safe deep tubewell.

III. Determinants of protective behavior

- Novel behaviors always face barriers.
- The Protection Motivation Theory (Rogers & Prentice-Dunn, 1997), and the Theory of Planned Behavior (Ajzen, 1991) propose different factors to influence people's protective behaviors.
- These factors can be grouped into personal, social, and structural factors:

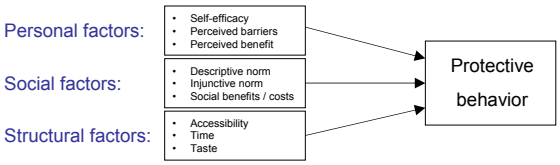

Figure 4. Personal, social, and structural factors proposed to influence deep tubewell use.

Which factors influence the use of arsenic-safe deep tubewells?

IV. Methods

Figure 5. Face-to-face interview, rural Bangladesh.

Data collection

- Sreenagar, Bangladesh
- N = 222 households
- Face-to-face interviews
- Structured questionnaire

Dependent variable
Proportion of drinking water from deep tubewells.

Independent variables
Personal, social, and situational factors.

Data analysis
Multiple linear regressions.

V. Personal, social, and structural factors influencing the use of deep tubewells

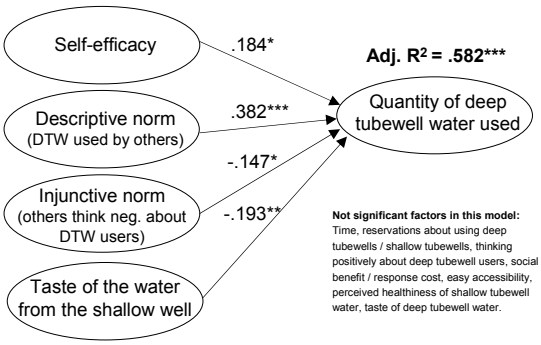

Figure 6. Multiple linear regression (n = 176): personal, social, and structural factors predicting the quantity of deep tubewell water used for drinking.
Note. DTW = deep tubewell.

- **Social influences are the most important predictors of deep tubewell use.**
- More deep tubewell water is used,
  - the more people feel **confident in their ability** to use deep tubewells,
  - the more favorable **descriptive, and injunctive norms**, and
  - the less **tasty** people perceive water from shallow tubewells.

VI. Implications for practice

- Social interventions should be at the core of campaigns: target families, and neighbors.
- Increase self-efficacy, e.g. by demonstrating that deep tubewells are easy to use.
- Emphasize the good taste of deep tubewell water.

Figure 7. Group discussion as an intervention.

VII. Mitigating geogenic contamination

- This research is part of an ongoing inter-, and transdisciplinary project – Water Resource Quality (WRQ).
- WRQ aims at building a framework to tackle geogenic contamination.
- See more at http://www.wrq.eawag.ch/index_EN

References
Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179-211.
Rogers, R. W., & Prentice-Dunn, S. (1997). Protection motivation theory. In D. S. Gochman (Ed.), *Handbook of health behavior research I: personal and social determinants* (pp. 113-123). New York: Plenum Press.