Cross-Cultural Perceptions of Health Implications from Wastewater Reuse

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Introduction

The Global Ethnohydrology Study is a transdisciplinary, multi-year, multi-site research project designed to survey cross-cultural understandings of water issues. This comparative approach allows us to examine how site-specific knowledge of wastewater shapes perceptions about wastewater reuse. Current overuse of water resources paired with increased urbanization and abuse of natural resources have contributed to stressed water systems. Wastewater reuse offers a sustainable developmental model for world water systems, as well as an avenue for improving health outcomes by treating unsanitary water.

Data Collection

- Semi-rural and urban communities were selected in four countries to compare differences based on development status and wastewater reuse (see below table).
- A purposive sampling strategy was used to capture local residents' cultural and institutional knowledge. A total of 282 respondents participated.
- Face-to-face interviews elicited responses to questions on wastewater reuse as well as respondent demographics.
- The survey items analyzed herein included an open-ended question asking respondents to draw or depict the path wastewater should take to become drinkable again

Four Study Sites Classified by Development Level

Economically Developed	Madrid, Spain (n=80)	Wellington, New Zealand (n=64)
Economically Developing	Acatenango, Guatemala (n=63)	Viti Levu, Fiji (n=75)

Data Analysis

- Drawings were coded using visual content analysis
- All other analysis was conducted in SPSS

How do perceptions of disgust and willingness to consume treated wastewater reuse differ cross-culturally, specifically regarding health risks, contaminant exposure, and familiarity with treatment types and levels?

Hypotheses

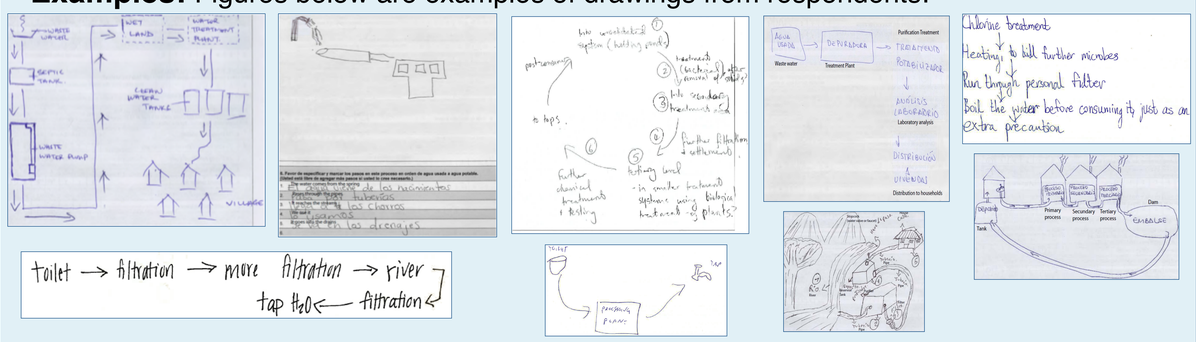
1. Willingness to accept treated wastewater will not decrease in relation to **cost** across all study sites. Instead, **sustainability for future generations** will pose as a higher motivator to switch to treated wastewater at all sites.

2. Spain and New Zealand, will display higher levels of **disgust** with all levels of treated wastewater than do Guatemala and Fiji.

3. Fiji and Guatemala will have higher mean scores of concern than New Zealand and Spain for all **health risks** and **contaminant exposures** from treated wastewater.

4. New Zealand and Spain are more likely to **draw** higher level **wastewater treatment** as well as depict **advanced treatment options**.

Examples: Figures below are examples of drawings from respondents:



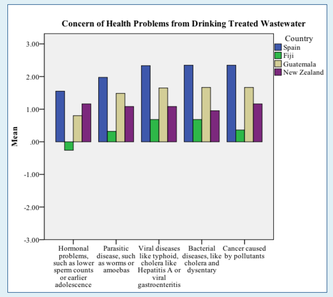


Figure 1. Bar chart of concern (-3 = not at all concerned to 3 = extremely concerned) of health problems from drinking treated wastewater.

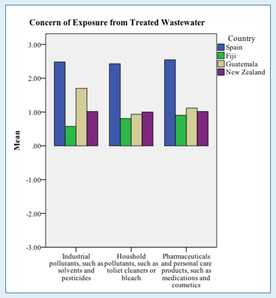


Figure 2. Bar chart of concern of exposure (-3 = not at all concerned to 3=extremely concerned) from treated wastewater.

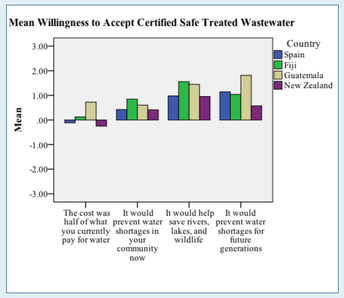


Figure 3. Bar chart of willingness (-3 = totally unwilling to 3 = totally willing) to accept certified safe treated wastewater

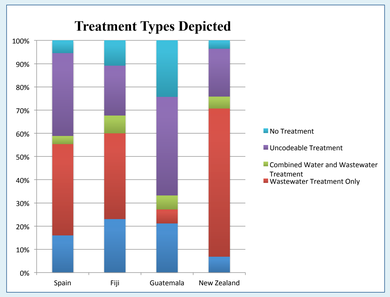


Figure 4. Bar chart of percentages of treatment types drawn.

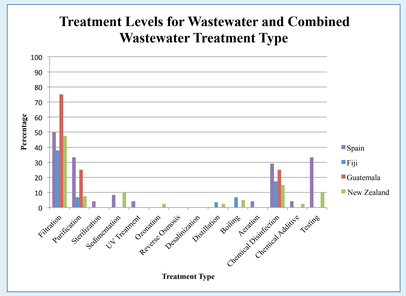


Figure 5. Bar chart of percentage of treatment levels drawn for wastewater and combined wastewater reuse drawings.

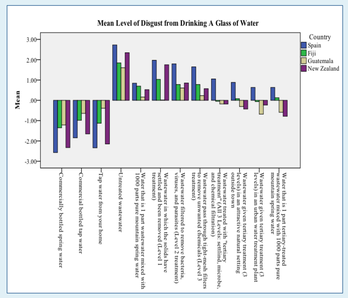


Figure 6. Bar chart of disgust (-3 = not at all disgusted to 3 = completely disgusted) from varying levels of treated wastewater

Results

- Water **cost** was a motivating factor for Global South sites to switch to wastewater reuse. Both the Global North and Global South displayed willingness to use treated wastewater to save wildlife, rivers, lakes and **preserve water for future generations**.
- Spain and New Zealand displayed **more disgust** than Fiji and Guatemala with advanced treated wastewater.
- Concerns about **health risks** from treated wastewater were highest in Spain. Concern from **exposure to contaminants** in treated wastewater were highest in Spain and Guatemala.
- New Zealand, Spain, and Fiji depicted high levels of wastewater treatment types, however **advanced treatment levels** were more often drawn in these depictions by New Zealand and Spain.

Conclusion

This study identifies the persistence of cross-cultural disgust and unwillingness for reuse of treated wastewater. The findings identify that better education methods are needed in both urban and rural sites about potential health risks and contaminants that exist in treated wastewater. Further results display that high value is placed on sustaining wildlife and natural water resources for future generations. The cross-cultural findings are potentially useful within public health as a tool to better designing and implementing wastewater reuse programs.

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