

Structural equation modeling to identify social drivers for water use in low-income communities in Southern Texas

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Abstract.

The *colonias* in Texas along the Mexican border are self-built neighborhoods of low-income families that lack basic infrastructure. While some funding from the State of Texas has built roads and provided electricity, water and sewage systems are still lacking for many of the estimated 400,000 *colonias*' residents. Of those that do have tap water, the supply is either inadequate or of questionable quality. These communities have suffered from waterborne disease, such as cholera epidemics, over the past few decades. This research is the first to collect a comprehensive dataset on water use, socio-economic parameters, and actual water quality in selected *colonias* in several counties in Texas. A quantitative statistical model has been developed using structural equation modeling, that relates social drivers for water use and management with actual water quality. Water quality parameters measured in these communities include traditional microbial indicators (total coliforms, *E. coli*, and heterotrophs), pH, hardness, free and total chlorine, and metals (arsenic and lead). The model explores relationships among latent variables relating water, health, and living situation to assess potential impacts of a water treatment technology in these low-income households. The study provides quantitatively reports for the need and desire of adopting a point-of-use treatment system, evaluates the relationship between perceived versus actual water quality, and determines the factors that influence the choice of drinking water. This model can be adopted for identifying social drivers for water use and management in other low-income communities in the United States.