EXTENDED ABSTRACT: Environmental policies can improve human health only if complimented by individual household and community behaviors. In theory, economists are well-situated to help public health and bio-medical professionals because we have an established architecture for both conceptualizing the problem (e.g., health production functions) and empirically characterizing the contributions of the different inputs (cutting edge econometrics applied to household surveys). In practice, we fall well short of our promise. Consider the case of diarrheal diseases that kills over 1.5 million children annually. Although we have reduced deaths because we can (but don’t always) treat diarrhea through oral rehydration salts, we have made little progress in reducing morbidity and the subsequent impacts on human capital (growth & development, education, other diseases). Many find this perplexing because diarrhea is supposedly entirely preventable. Unfortunately, our textbook models and early crude empirical projects have done a poor job of fully characterizing the complex web of fecal-oral exposure pathways, including the specific roles of policy amenable infrastructure projects and unsafe behaviors. Part of the challenge lies in the lack of objectively measured micro data from regions most affected by these problems. In this paper, we attempt to address these concerns by conducting rigorous analysis on a newly assembled panel data set from rural India, a proverbial hot spot for diarrheal diseases.

To our knowledge, this is the first study to construct a large sample that combines an extensive set of objectively measured data on water microbiology (lab tested), averting behaviors (water safety, sanitation and hygiene) and community and household characteristics in one study. Our panel comprises approximately 20,000 household observations from 250 villages in one of India’s largest states - Maharashtra. The dataset is unique because it includes source and in house microbial water quality (tested in a laboratory using USEPA approved membrane filtration method), and prevalence of diarrhea, vaccination and nutritional supplement information, community and household level water sanitation and hygiene behaviors, and of course socio-economic and demographic information.

The household production framework (HPF) provides a useful way to conceptualize our environmental health problem. Specifically, we model the exposure through drinking water as a function of source water quality, household averting behaviors related to water safety and other exogenous factor. The key variables in our analysis are e.coli contamination of in-home and source water (in log form) and household characteristics such as wealth, education, social strata, family size, water treatment, knowledge of diarrhea; and use of improved water sources and toilet facilities; and presence of community water and sanitation programs. Our empirical strategy relies on a combination of household fixed effects and an extensive set of covariates. Fixed effect regression analyses of household water quality production confirm findings from similar exercises with data from other parts of India. First, we find that source water quality (public inputs) directly impacts home drinking water quality. Second, we show no impact of the many of the high profile household behaviors such as
improved water supply, sanitation (private latrines), and hygiene (handwashing). Instead, behaviors such as boiling impact in-house water quality.

Although it is far too early to draw any grand inferences from this specific empirical project, the richness of this particular combination of objective data drawn from a field setting lead us to the following initial conclusions. First, household behaviors impact health outcomes directly and through impacts on in-house microbial contamination, but on a case-by-case basis. These behaviors continue to be ignored, poorly measured and often misunderstood (as in, exploring the underlying determinants). Second, our early findings make the case for more careful panel-data analysis of this system of outputs and inputs including health outcomes, in-house water contamination, and household behaviors. Specifying such a model will require theoretical guidance from economics and epidemiology because of the complexity of the health production function. Ultimately, this paper underscores the importance of interdisciplinary research – from concept to data collection to analysis and inference to fully characterize the nature of these persistent water contamination problems that claim many lives and cause many more illnesses every year worldwide.