Department Level Changes in Pediatric Diarrhea and Mortality after a Large Scale WASH Program in Colón, Honduras

Kristen Check, MA & Jeffery L. Deal, MD, FACS, MA, DTMH
kcheck@watermissions.org www.watermissions.org
Water Missions International 1150 Kinzer St., Bldg 1605, North Charleston, SC 29405-1814

Water Missions International

PENTAIR

BACKGROUND

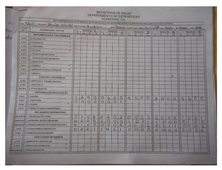
In 2006, Water Missions International (WMI) received a grant from the Pentair Foundation to provide safe water and latrines to the department of Colón, Honduras - a population of approximately 340,000 people.

In the baseline study conducted in 2009, water sources for 613 communities were identified. High counts of coliform bacteria indicative of fecal contamination were found in 100% of the water sources. Initial stool tests of household residents showed 29.3% of subjects (53 of 181) from the twelve randomly selected communities carried at least one waterborne, protozoan parasite (Deal, Nazar et al. 2010). After installation of the water and sanitation facilities, the prevalence of positive protozoan parasite levels was significantly lower in the intervention group (26.4%) as compared to the test group (35.9%) (Deal 2011).

Upon completion, the project provided access to water for approximately 257,377 people in the form of 203 community-managed water treatment systems. In addition, 15,652 poor-flush latrines were constructed serving approximately 103,303 people.

OBJECTIVES

Prompted by verbal reports from local officials of health improvements attributed to the intervention, WMI received a grant from the Pentair Foundation to review the public health records for pediatric diarrhea and infant mortality rates for the country, the department of Colón, and a department matched by appropriate indicators (Deal, Check et al. 2015).



Left: The Healthy Latrine™
Center: Department of Health data in Honduras
Right: Water Missions International research team collecting data in Colón

METHODS

- Honduras Department of Health (HDOH) and Colón Department of Health records were obtained from 2004 to present. This included pediatric diarrhea rates at both the national and department level from 2004 until 2012, as well as infant mortality rates for 2005 and 2011 (the years such data was collected).
- Gracias a Dios was selected as a control department based upon Human Development Index (HDI) indicators for 2004—the year closest to project commencement. The HDI is a geometric mean of normalized indices for three critical developmental dimensions—health, education, and per capita income (UNDP 2015). In 2004, the UNDP gave nearly identical HDIs for both Gracias a Dios (.636) and Colón (.635) (UNDP 2015).
- Infant mortality rates (deaths per thousand for infants > 1 yr.) were available for the national level and for Colón for 2005 and 2011. Infant mortality data for Gracias a Dios was not collected by public health officials prior to 2011.
- All data was scanned or photographed and transcribed into spreadsheets for analysis. Over 34,000 data points were collected and where appropriate, were subjected to linear regression analysis.

RESULTS

- From 2005 until 2012, Honduras experienced a country-wide reduction in pediatric diarrhea rates. Colón experienced a reduction in pediatric diarrhea at a rate significantly greater ($p<.005$) than found in both the national rates (Figure 1) or in the control department of Gracias a Dios.
- Figure 2 shows the trend of decreasing diarrhea rates seen in Colón, compared to the cumulative number of the population served by water treatment systems and given access to household-level sanitation.
- In 2011 the infant mortality rate in Colón was 62.7% lower than the rate found in Gracias a Dios (Table 1). Also, Colón experienced a reduction in infant mortality rates that was almost twice as great as the national trend (29.6% vs. 15.6%), as seen in Table 1.

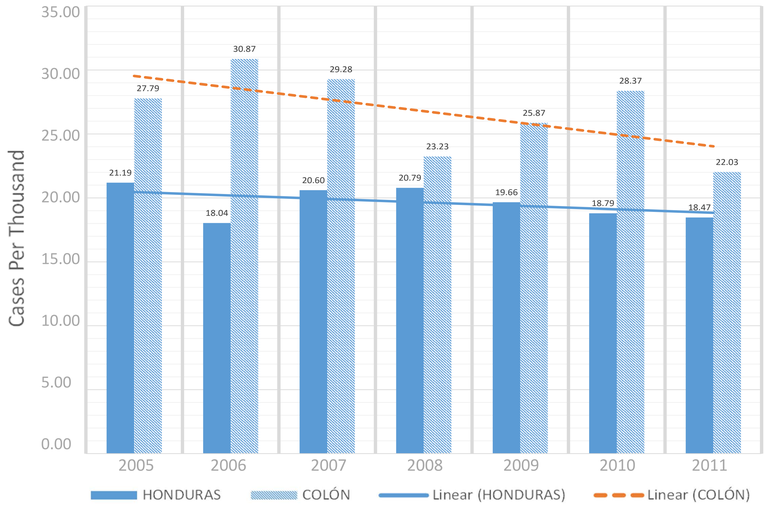


Figure 1: Colón vs National Diarrhea Rates

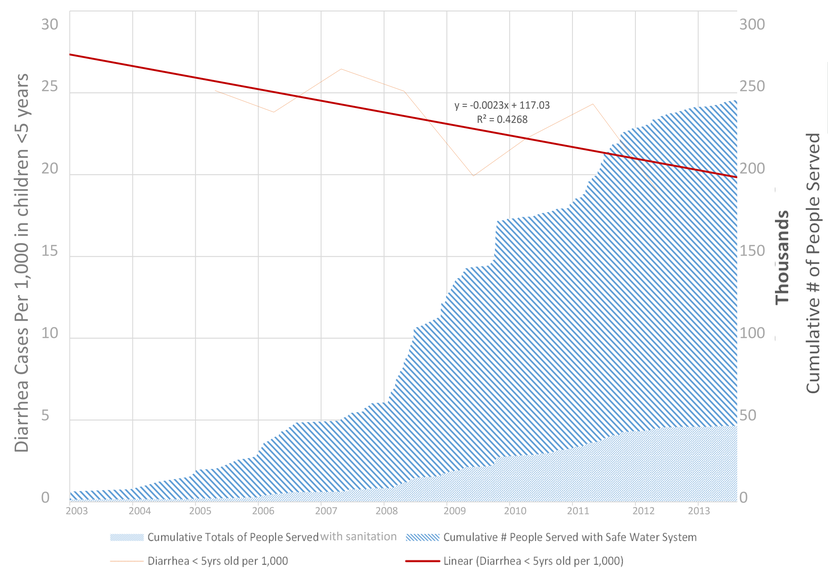


Figure 2: Under Age 5 Diarrhea Rates and Population Served by Water Treatment and Sanitation

RESULTS

	Colón	Gracias a Dios	Honduras
2005	27.0	N/A	29.25
2011	19.0	51.0	24.7
% change	29.6%		15.6%

Table 1: Infant Mortality per Thousand

CONCLUSIONS

- The broad array of causes of diarrhea and infant mortality unrelated to water and hygiene create potential confounding variables including regional fluctuations in disease rates, socioeconomic changes, vaccinations (especially for rotavirus) (Ulloa-Gutierrez and Avila-Aguero 2014), and variations in reporting accuracy.
- This study confirms verbal reports from Colón public health officials that pediatric diarrhea rates, as well as the infant mortality rate of Colón, significantly decreased over the time that widespread installation of safe water treatment facilities and pour flush latrines were installed by WMI. When compared to national disease and mortality rates, the difference is statistically significant with a $p<.005$. Compared to the control department (Gracias a Dios), the differences were even more profound with a $p<.001$.
- While a causal link for these favorable trends cannot be definitively established with this type of study, the decreasing trend in diarrhea rates in Colón appears to follow the cumulative number of population served by water treatment systems and household latrines. As one measure, had the infant mortality rate in Colón continued upon the national trend rather than that which was observed (15.6% decrease rather than 29.6% decrease), at least 40 more newborns would have died per year than was observed.

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