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# An Examination of Household Drinking Water Storage and Management Practices in Bonao, Dominican Republic from September 2005-January 2006.

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association between economic/political factors and access to water and sanitation varied. GE and GNI had the strongest positive associations with access to improved water source and household water treatment. GNI was positively associated with access to improved sanitation; political stability was inversely associated with travel time to water source. The results of this study indicate that GNI, PS, and GE are associated with water and sanitation access in sub-Saharan Africa. With this information, context-specific interventions to improve and expand water and sanitation services in the region can be developed, focusing on building stable, effective governments, and alleviating the burden of poverty.

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#### **SCHISTOSOMA MANSONI CERCARIAE DETECTION IN WATER SAMPLES USING DEAD-END ULTRAFILTRATION AND PCR**

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An estimated 207 million people worldwide are infected with *Schistosoma spp.*, a water-borne parasitic helminth, with an estimated 779 million people at risk in 76 endemic countries. Transmission of schistosomiasis is spatially and temporally restricted to water bodies inhabited by competent intermediate host snails. Because humans become infected through contact with cercariae-infested water, identification of active transmission sites can help maximize the effectiveness of control interventions. The standard cercariometric filtration method relies upon suction and requires technically skilled staff to perform the collection. Moreover, water turbidity can drastically limit the volume sampled. We applied a previously described dead-end ultrafiltration (DEUF) method (Smith, 2009) using commercially available hollow-fiber dialysis ultrafilters for concentrating *Schistosoma* cercariae from 100-liter surface water samples followed by detection using real-time PCR (Gomes, 2006). Seeded water samples were pumped through the ultrafilter; the filter was then backflushed with a surfactant solution. The backflush solution was further concentrated through two 150 µm screens using a 60cc syringe. Lysis buffer (1.5 mL) was then slowly pushed through the filter screens and cercarial DNA was extracted and analyzed by PCR. The DEUF method consistently detected 5 cercariae in 100 liters of surface water with turbidities of up to 90 NTU. The limit of detection with other cercariometric methods is 1 cercariae in 5-10 liters of 120 NTU water. DEUF is a simple and cost effective method that can be utilized by untrained field personnel for rapid sample collection (~1 hr to collect 100 L). PCR detection of cercariae in DEUF samples offers a reliable technique for detection of cercariae in natural waters, which could be of great value in mapping areas of schistosomiasis infection risk, estimating the force of transmission and assessing whether transmission has been reduced after an intervention.

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#### **USE OF THE BRISTOL STOOL CHART TO COMPLEMENT SELF-REPORTED DIARRHEA AS AN OUTCOME MEASURE FOR WASH RESEARCH**

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We discuss the use of the Bristol Stool Chart as a potential outcome measure for public health research on water, sanitation, and hygiene interventions. The literature on WASH interventions has relied on mothers' reports of whether or not their children suffered from diarrhea, since more objective measures such as stool samples are difficult to obtain and expensive to analyze. As an alternative health indicator, mothers could be asked to rank their child's most recent stool according to the Bristol Stool

Chart, a 7-point pictorial scale that ranges from (1) "separate hard lumps" to (4) "like a sausage or snake, smooth and soft" to (7) "watery, no solid pieces". The Bristol Stool Chart has been used for clinical purposes among adults in upper-income countries, but no previous studies have used the scale as an indicator of gastroenteritis among children in developing countries. We asked over 300 mothers in rural western Kenya to rank their child's most recent stool on repeat survey visits, with an average of 7 observations per child under age 5 for over 1100 unique children. We would not expect a perfect correlation between this measure and the clinical definition of diarrhea used in the same survey ("3 or more looser than normal stools in a 24 hour period over the past 7 days"), since the stool chart measure is only the previous stool compared to an absolute scale whereas the clinical definition is compared to the child's normal stool and references a 7 day period. Nonetheless, the prevalence rate of loose stools (ranking of "7") according to the chart (21%) is almost twice as high as for the clinical definition of diarrhea (11%), p-value<0.001. Use of the chart is limited in that mothers were unable to rank stools of children over age 3, as they did not know what older, more mobile children's stools looked like, and the chart did not adequately represent the stools of infants under 6 months, as evidenced by the fact that in over a third of such cases mothers selected the option "other" rather than one of the 7 categories on the scale.

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#### **AN EXAMINATION OF HOUSEHOLD DRINKING WATER STORAGE AND MANAGEMENT PRACTICES IN BONAO, DOMINICAN REPUBLIC FROM SEPTEMBER 2005-JANUARY 2006**

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More than 2.2 million people die each year from diarrheal disease. Most cases of diarrheal disease can be linked to a lack of access to clean water and sanitation. The proper usage of sanitation, hygiene and safe drinking water are all mechanisms by which to prevent or limit fecal contamination, and in turn, will reduce the risk of diarrheal disease. In an attempt to better understand the roles of drinking water storage, we analyzed data collected during a prospective cohort study performed in the Dominican Republic from September 2005 to January 2006. The purpose of this study was to determine if characteristics of household drinking water storage containers influenced the concentration of *E. coli* in the stored household drinking water in communities of Bonaó, Dominican Republic. Drinking water samples were taken at approximately two week intervals and tested for turbidity, total coliforms and *E. coli*. In addition, information was collected about the storage container, drinking water source and use of dippers or other utensils for serving the water. After testing independent risk factors for *E. coli* contamination using t-tests and chi-squared tests, it was established that household storage practices have a significant impact on drinking water quality. Specifically, water samples collected from narrow-mouthed containers had significantly less *E. coli* (geometric mean of 10.5 MPN/100 ml) than those collected from wide-mouthed containers (geometric mean of 25.1 MPN/100mL water). In addition, household drinking water samples that were reported to be treated via boiling or chlorination had significantly lower concentrations of *E. coli* compared to samples that were reported to be untreated. The geometric average *E. coli* for all untreated samples was 19.5 *E. coli* MPN/100mL and for all treated samples was 7 *E. coli* MPN/100mL. The results of this study suggest an association between household storage practices and concentrations of *E. coli* in household drinking water. This highlights the importance of understanding the role of household water storage practices and the need to encourage hygienic practices that might prevent or reduce contamination of drinking water during storage in the home.