Nearly 748 million people worldwide lack access to improved drinking water sources, putting them at risk for waterborne illnesses. Fecal contamination of drinking water is one of the largest contributors to the 1.8 million deaths per year from diarrheal disease. Because many countries lack active monitoring of drinking water quality, it is often unknown if consumed waters are safe. Current microbial monitoring methods typically require the use of specialized equipment, electricity, and trained personnel. However, in low-resource settings, these capacities are often unavailable. Therefore, there is a need for a low-cost, portable, and simple method for determining the microbial quality of drinking water in low-resource settings.

The drawbacks of current water tests based on fecal indicator bacteria may be overcome using the Compartment Bag Test (CBT), a novel microbial water quality test innovated at the University of North Carolina at Chapel Hill. The CBT uses a simple design of a clear, chambered plastic bag with various compartment volumes totaling 100 mL to determine a Most Probable Number (MPN) estimate of Escherichia coli bacteria concentration using a chromogenic liquid medium. This method could provide actionable results to identify microbially unsafe water and decrease microbial water quality health risks, if its performance is further documented against standard tests under a variety of use conditions.

The goal of this research is to evaluate and document the performance of the CBT. A laboratory evaluation was conducted to explore the use of CBT to detect E. coli compared to a standard test using the Colilert medium in Quanti-Trays at various incubation temperatures. The CBT was also evaluated in field settings by incorporating the CBT in Demographic Health Surveys in Peru and Liberia. Household surveys were conducted in Tanzania to evaluate the CBT as a health behavior and education tool. Overall these studies demonstrate that 1) the CBT detects and quantifies E. coli comparable to standard methods, 2) incubation temperature between 27°C to 44°C provide comparable E. coli MPN results, 3) the CBT can be utilized in low resource settings and incorporated within national health surveys, and 4) the use of the CBT as a health behavior and education tool can influence perception and knowledge of microbial water quality of household users.

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