

Utility of EC 3M™ Petrifilm™ and sanitary surveys for source water assessment in Nyabushozi County, south-western Uganda

Amber L Pearson¹, Marilyn C Roberts², Olusegun O Soge², Iana Ivanova², Jonathan D Mayer³ and John S Meschke^{4*}

¹ *Departments of Geography and Global Health, University of Washington, Box 353550, Seattle, WA 98195, USA*

² *Departments of Pathobiology and Environmental and Occupational Health Sciences, University of Washington, Box 357234, Seattle, WA 98195*

³ *Departments of Geography and Epidemiology, University of Washington, Box 353550, Seattle, WA 98195, USA*

⁴ *Department of Environmental and Occupational Health Sciences, University of Washington, Box 354695, Seattle, WA 98195*

Abstract

The majority of people in developing nations rely on untreated or minimally treated surface and shallow groundwater sources which are prone to faecal contamination. This study evaluated the utility of EC 3M™ Petrifilm™ and sanitary inspection forms (SIFs) as tools to assess 47 water sources and identify hazards of contamination in two rural Ugandan villages (90% were surface sources). Water samples were cultured on EC 3M™ Petrifilm™, which are intended for the enumeration of *E. coli* and total coliforms following 24 h incubation at 37°C. Isolated bacteria were cultured on MacConkey agar and identified using standard biochemical tests, while selected isolates were verified by sequencing 16S rRNA genes. From 105 Petrifilms, 110 presumptive *E. coli* were isolated and identified to genus level. However, only 33 presumptive *E. coli* isolates from 14 water sources (representing 27 distinct strains as determined by PFGE) were confirmed *E. coli*. The other presumptive *E. coli* isolates were identified as *Citrobacter*, *Enterobacter*, *Proteus*, *Salmonella* and *Yersinia* species. SIFs used an adapted survey designed for urban water sources of Uganda. The form yielded an SIF score based on binary data and characterized potential sources of contamination. SIF scores alone offered little information to distinguish between contamination levels of surface water sources, but the information collected in the surveys could be used to identify ways to improve sources. The results of this study suggest that the use of sanitary surveys may assist in identifying potential pollution sources that may be targeted to protect water sources. Bacterial monitoring using EC 3M™ Petrifilms™ may be effective for the screening of relative levels of contamination of source waters, including surface sources.

Keywords: drinking water, developing countries, sanitary survey, EC 3M™ Petrifilm™