



Assessment of Microbial Contamination in Hand-Drilled Wells and Public Health Implications in Rural Western Ethiopian Communities

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Abstract

Hand-drilled wells are a primary source of drinking water in rural Western Ethiopian communities, but their microbial contamination levels can pose significant public health risks. A cross-sectional study design was employed to investigate microbial contamination in hand-drilled wells using quantitative microbiological analysis, including standardised sampling protocols and statistical testing. Microbial counts were significantly above recommended levels for safe drinking water, with an average *E. coli* count of over 100 CFU/100 mL across sampled wells, indicating potential contamination risks. The findings underscore the urgent need for improved water sanitation and hygiene practices in these communities to mitigate public health threats from contaminated wells. Communities should be educated on proper hand-washing techniques and the importance of using clean drinking vessels. Regular well maintenance and periodic testing are also recommended to ensure safety. Hand-drilled Wells, Microbial Contamination, Public Health, Statistical Analysis Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta_1 X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *African Geography, Cross-Sectional Study, Epidemiology, Microbial Contamination, Public Health, Risk Assessment, Water Quality Analysis*

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