Coliform Contamination and Associated Risk Factors in Domestic Well Water Sources Within Gampaha District; A Preliminary Study

R. Janarthani [1,2], C.D. Jayasinghe[3], K.O. Bandaranayaka[3]*

[1]*School of Applied Sciences, Edinburgh Napier University, Scotland.*
[2]*Spectrum Institute of Science and Technology, Sri Lanka.*
[3]*Department of Zoology, Faculty of Natural Sciences, The Open University of Sri Lanka.*
**emban@ou.ac.lk*

Waterborne illnesses remain a serious public health concern in developing countries like Sri Lanka, where limited access to clean drinking water, inadequate sanitation infrastructure, and poor waste management practices contribute significantly to the transmission of diseases such as cholera, typhoid, dysentery, and various forms of diarrhoea. This study aimed to assess the level of coliform contamination in domestic well water sources in the Gampaha District, Sri Lanka and the potential risk indicators of coliform contamination of well water. In this cross-sectional study, water samples were randomly collected from 35 domestic wells. To assess potential risk factors, a structured checklist was simultaneously administered to one individual from each household. The water samples were analysed using the Most Probable Number (MPN) technique to detect coliforms. This was followed by two biochemical tests: culturing on MacConkey agar to assess lactose fermentation and on Eosin Methylene Blue (EMB) agar for the identification of Escherichia coli. Bacterial identification was based on colony morphology and growth characteristics. Data on potential risk factors of coliform contamination were analysed using the chi-square test. The findings revealed that a significantly high proportion of wells (94.7%, n=34; p=0.0078) were contaminated with coliform bacteria. Among these, 35.3% (n=12) of household well water sources were deemed unsafe for human consumption, exhibiting MPN values exceeding 150 per 100 ml. Based on morphological characteristics the isolated bacterial contaminants were identified as *Klebsiella* spp. (45.83%), *Enterobacter* spp. (27.08%), *Pseudomonas* spp. (14.58%), *Escherichia coli* (6.25%), and *Salmonella* spp. (6.25%). Key risk factors contributing to contamination included inadequate sanitation practices, improper waste disposal, close proximity of wells to septic tanks and toilet pits, lack of regular well maintenance, and environmental pollution from agricultural and industrial activities. This study highlights the urgent need to improve groundwater quality in Gampaha District by addressing key risk indicators such as poor well sanitation and environmental contamination, offering insights to promote safer water practices in rural Sri Lanka.

Keywords: Coliforms, contamination, groundwater, most probable number (MPN), waterborne illnesses