Water Safety Plans for Rural Communities: A Case Study from Drinking Water Treatment Plants in Badulla, Sri Lanka

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The Water Safety Plan (WSP), endorsed by the World Health Organization, is essential for ensuring global access to safe drinking water. However, its effectiveness in rural areas like Badulla, Sri Lanka, is largely unexplored. This study investigates WSP strategies in rural regions, focusing on factors influencing water quality risks. Data on risk elements affecting water safety were collected from five major drinking water supply systems managed by the National Water Supply and Drainage Board (NWSDB) and four smaller systems operated by Community-Based Organizations (CBOs) in Badulla. The study utilized questionnaires, on-site observations, and location-specific surveys. Additionally, the study analyzes long-term water quality trends, system effectiveness, and climate change impacts. In NWSDB-managed facilities, raw water turbidity ranged from 10 to 1000 Nephelometric Turbidity Units (NTU) due to rainfall, typically reduced during treatment, though treated water occasionally exceeded guidelines, raising concerns about contamination or operational issues. Epidemiological studies and five years of water quality data from nine treatment plants showed no correlation between water quality and waterborne illnesses. However, pathogens were found in 46% of 50 household tap samples within the NWSDB distribution area in the Badulla Medical Officer of Health zone. The risk assessment highlighted challenges for CBO-operated facilities in maintaining water quality, mainly due to inadequate treatment and poor catchment area management. Despite an overall assessment of drinking water quality in Badulla as acceptable, only four out of nine schemes implementing WSP consistently delivered higher-quality water. The study offers recommendations to improve operations, performance, and reduce costs, providing valuable guidance for professionals and stakeholders in water treatment and public health management in rural areas.

Keywords: Drinking Water Treatment, Risk Assessment, Water Quality Management, Performance Evaluation, Community Engagement