The use of Water Point Mapping (WPM) as a tool to assess improved water resources in rural communities

by

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Abstract

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Background

The sporadic outbreaks of child dysentery in the Vhembe rural areas, where the incidences have been occurring at more than the national average signals that there could be a problem in the provision of safe drinking water. Questions relating to the functionality and sustainability of rural water supply services become eminent. It can be assumed that service delivery has slowed down and where infrastructure exists, not all poor households experience the benefits of this infrastructure.

Objectives: The purpose of this research was to examine the existing water supply status in the Thulamela Local Municipality using the Water Point Mapping (WPM) tool; with a view to determine the extent of deficiency and determine what would be required to meet the MDG of halving the number of people without access to safe drinking water by 2015. The objectives of the study include recording the distribution of Municipal borehole water points in Thulamela Municipality using a global positioning system (GPS) to produce a map that indicated the improved water point coverage and functionality and to determine the microbiological and physico-chemical quality of all functional boreholes. Digital maps were developed to correlate with the demographic, administrative and physical data.

Methods

A GPS was used to get coordinates of all borehole water points. A structured questionnaire was also used for each Improved Community Water Point (ICWP) to record the information relating to location, ownership, age, and functionality, history of maintenance and hardware type of all ICWPs.

Water samples were collected from all functional boreholes for water quality analysis. Total coliforms and *E. coli* were analyzed using the Colilert® Quanti-Trays/2000 (IDEXX, USA). Molecular characterization of *E. coli* strains was carried out using a published multiplex PCR protocol.

As part of analysis, Equity of Distribution (ED), Functionality Rate (FR) and Water Point Coverage (WPC) indicators were presented to quantify the degree to which resources were fairly distributed, the level of access to safe water and investment needed to improve water supply coverage.

Survey results were captured using a database form prepared in Microsoft excel spreadsheet. The GIS ArcView 10.1 software was used to reproduce the information on a map. EXCEL-formatted water point inventories were correlated with spatial information based on South Africa statistics 2011 population census. Based on the official spatial infrastructure information, densities divided into Enumeration Areas (EAs), of which the smallest was the village.

Results: A total of 125 boreholes were mapped of which only 12 were functional (9.6%). Seven of the functional boreholes tested positive for Total coliforms with 4 of these tested positive for diarrheagenic *E. coli*. The results indicated that 58.3% of the water samples were microbiologically good, 16.67% were marginal and 25% were poor according to the South African water Assessment Guidelines. Functionality rate was 12%, 10.35% and 8.57% in wards 15, 18 and 19 respectively. ICWP coverage was 0.29, 0.56 and 0.39 WPs per 1000 inhabitants in wards 15, 18 and 19 respectively.

Conclusion: The WPM tool revealed that drinking water borehole coverage in the assessed rural villages was unacceptably low and periodic monitoring of water quality should be stepped up in South Africa rural areas.

Key words: PCR, Water Point Mapping, Diarrheagenic *E. coli*, Colilert® Quanti-Trays/2000, Functionality Rate, Improved Community Water Point Coverage, Equity of Distribution