

TITLE: BIOTECHNOLOGY AND GEO-INFORMATICS APPLIED TO IMPROVE MUNICIPAL DRINKING WATER QUALITY IN THREE MUNICIPALITIES IN MINAS GERAIS, BRAZIL.

Authors: Moreira, M¹; Salles, L.F²; Dias, A. F²; Soares, A.F.M²; Ferreira, J.F.G¹; Carneiro, T. G.S²; Farias, L.M¹; Magalhães, P.P¹; Lanna, M.C.S².

Institutions: ¹ UFMG - Universidade Federal de Minas Gerais (Avenida Antônio Carlos 6627, Pampulha, CEP 31270-901, Belo Horizonte, MG), ² UFOP - Universidade Federal de Ouro Preto (Campos Morro do Cruzeiro, S/n - Morro do Cruzeiro, Ouro Preto, MG.)

Abstract:

In developing countries *Escherichia coli* is commonly associated to diarrheal disease and plays an important role in child mortality. In Brazil the quality of water for human consumption has gained relevance in current public policies, specially with the development of laws for natural resources conservation and also of standardized procedures for promoting drinking water quality. In Minas Gerais State the law "Portaria 2.914/2011" determines that Municipal Health Departments must collect and send water samples to the Ezequiel Dias Foundation (FUNED), which performs potability analysis. In Ouro Preto, Mariana and Itabirito, three municipalities of Minas Gerais, the Microorganism Biology and Technology Laboratory of the Federal University of Ouro Preto (UFOP) acts as a FUNED partner. In this context, this study aims to detect diarrheagenic pathotypes of *E. coli* present in water samples from this region and build risk maps that will guide immediate interventions of Municipal Health Departments. For this, the water samples are georeferenced and spatial interpolation methods are used to provide innovative analysis. During this study, 800 water samples were collected and analyzed between September 2014 and May 2015. The Colilert® enzymatic method was used to determine the total and fecal coliforms concentrations. Each 10 µL of all positive water samples were inoculated onto MacConkey Agar (MCK) and Salmonella Shigella Agar (SS) and incubated at 37 °C for 24 h. After that, all the morphotypes (up to five colonies/morphotype) were isolated in Tryptic Soy Agar (TSA.) Then, biochemical tests (Rugai) were performed to confirm the presence of *E. coli*, *Salmonella* and *Shigella*, resulting in 44 samples positive for fecal coliforms and 22 positives for total coliforms. In total, 591 colonies were obtained from MCK and SS agar. The biochemical identification resulted in 208 colonies identified as *E. coli* and 7 as *Shigella*. The isolates have been criopreserved in Brucella Broth added with 10% glycerol in ultra-low temperature freezer for later DNA extraction and molecular identification of virulence markers. All the results were reported in useful maps for preventing the emergence of new outbreaks of diarrhea.

Keywords: acute diarrhea, diarrheagenic bacteria, water potability

Funding agencies: CNPq, FAPEMIG, CAPES, Novelis and PRPq/UFMG.