

Detection of Pathogenic and Non-pathogenic Bacteria in Drinking Water and Associated Biofilms on the Crow Reservation, Montana, USA

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Abstract Private residences in rural areas with water systems that are not adequately regulated, monitored, and updated could have drinking water that poses a health risk. To investigate water quality on the Crow Reservation in Montana, water and biofilm samples were collected from 57 public buildings and private residences served by either treated municipal or individual groundwater well systems. Bacteriological quality was assessed including detection of fecal coliform bacteria and heterotrophic plate count (HPC) as well as three potentially pathogenic bacterial genera, *Mycobacterium*, *Legionella*, and *Helicobacter*. All three target genera were detected in drinking water systems on the Crow Reservation. Species detected included the opportunistic and frank pathogens *Mycobacterium avium*, *Mycobacterium gordonae*, *Mycobacterium flavescens*, *Legionella pneumophila*, and *Helicobacter pylori*. Additionally, there was an association between HPC bacteria and the presence of *Mycobacterium* and *Legionella* but not the presence of *Helicobacter*. This

research has shown that groundwater and municipal drinking water systems on the Crow Reservation can harbor potential bacterial pathogens.

Keywords Drinking water · *Helicobacter pylori* · *Legionella* · *Mycobacterium*

Introduction

In the USA, over 15 million households rely on private ground water wells for their primary drinking water source [1], and in many rural areas private and community groundwater wells provide a major source of drinking water. During 1999–2002, 22 % of water-borne illnesses were attributed to individual water systems and 36 % were attributed to community systems [2]. Private water systems are not routinely monitored for bacteriological water quality, thus, little is known about the presence of bacterial pathogens in these systems. Information regarding well water quality on Indian Reservations in the USA is equally scant. However, it is known that American Indian populations have disproportionately high disease burdens compared to the overall population of the USA [3]. This is due to many factors which include economics, geographic isolation, cultural barriers, and inadequate sewage disposal [4].

The United States Centers for Disease Control report that chronic lower respiratory disease, influenza, and pneumonia are among the top ten causes of death among American Indian and Alaska Native populations [1]. In Montana, cancer is included as a major cause of death for American Indian populations [5]. Although it has been observed that the disease burden of these populations is greater than for the overall population of the

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