Antibiotic-resistant Escherichia coli in drinking water samples from rural Andean households in Cajamarca, Peru

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Antibiotic resistance in pathogenic bacteria is a serious public health issue. The growing threat is a cause for concern and action to prevent the emergence of new resistant strains and the spread of existing ones to humans via the environment. This study aimed at identifying fecal pathogens in drinking water obtained from rural Andean households from Cajamarca, Peru, and measuring the antibiotic resistance profile of; Escherichia coli; . The study was embedded within a community-randomized controlled trial among 102 communities in the northern highlands of the Cajamarca region, Peru. Of 314 samples, 55.4% (95% CI [49.7, 61.0],; n; = 174) were identified as thermotolerant coliforms. Among the samples positive for thermotolerant coliform,; E. coli; was isolated in 37.3% (; n; = 117),; Klebsiella; spp; .; in 8.0% (; n; = 25),; Enterobacter; spp; .; in 5.1% (; n; = 16), and; Citrobacter; spp; .; in 2.5% (; n; = 8). Of the 117; E. coli; samples, 48.7% (95% CI [39.4, 58.1],; n; = 57) showed resistance to any antibiotic. The; E. coli; antibiotic resistance profile showed highest resistance against tetracycline (37.6%), ampicillin (34.2%), sulfamethoxazole-trimethoprim (21.4%), and nalidixic acid (13%). Some 19.7% (95% CI [12.9, 28.0],; n; = 23) of the; E. coli; isolates displayed multidrug resistance, defined as resistance to at least three classes of antibiotics. The CTX-M-3 gene, which encodes extended-spectrum resistance to beta-lactamase antibiotics, was found in one isolate. The high prevalence of fecal contamination in drinking water highlights the importance of household water treatment methods. Likewise, the high levels of antibiotic resistance found indicate a need for further research to identify the origins of potential environmental contamination, misuse, or inadequate disposal of antibiotics.
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