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Título: **The quality of water is strained: Fecal contamination in rural Brazil**

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Palavras-chave: **Water Sanitation. Fecal Contamination. Environmental Changes**

Resumo:

Wherever humans concentrate, fecal contamination of surface waters becomes a problem. We previously traced the concentration of human fecal contamination along a river dividing a village in rural Brazil. In this cross-sectional study we found that concentration increased in a downstream direction and diminished as the river left the populated area. This correlated with the prevalence of schistosomiasis. In order to follow longitudinal changes in water quality, we sampled water at 8 points over a km long stretch of the Jiquiriçá River and its tributary, the Brejões, as well water from the local treatment plant. The water is clear in most places, but heavily sedimented after heavy rains. Its temperature was within 1-2 degrees of the ambient temperature and averaged 26.2 oC across all sites. Oxygen saturation was on average good (mean 3.7 mg/d) at most sites. pH decreased as population density increased. For the Jiquiriçá, pH decreased from 6.99 upstream to 6.50 downstream of the last dwelling (mean=6.75). On the Brejões, the same trend was seen (pH 6.96 to 6.63, mean=6.75). The presence of E. coli is better associated with human feces than total coliforms. We found significant correlation between the total coliforms and E. coli ( $r^2=0.81$ ). Over the year, the concentration of coliforms (337 cfu/ml) and E. coli (184 cfu/ml) was consistently highest at site 8, which corresponded to a point immediately downstream of the major population concentration on the Brejões. On the Jiquiriçá, site 4 had the highest levels of coliforms (190 cfu/mL), but site 3, where the Brejões enters the Jiquiriçá, showed the highest levels of E. coli. When river flow increased we found that levels of coliforms increase statistically ( $r^2=0.99$ ), however, levels of E. coli did not ( $r^2 = 0.05$ ). Samples from the water treatment plant had abundant coliforms at times, but rarely showed E. coli. This suggests that run-off produces the greatest risk of zoonotic contamination, but does not influence the concentration of human sources. qPCR will be used to evaluate more specific markers of human fecal contamination.