

## Spatial relation between arsenic in drinking water and *Mycobacterium ulcerans* infection in the Amansie West District, Ghana

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### Abstract:

This paper hypothesizes that arsenic in drinking water indirectly contributes to Buruli ulcer (BU), a disfiguring and sometimes fatal skin disease caused by *Mycobacterium ulcerans* (MU) infection. Population statistics and BU incidence data for 1999-2002 were used to calculate BU prevalence for 39 rural settlements in Ghana's Amansie West District. Fisher's least significant difference test was then applied to distinguish settlements in a high BU-endemicity class and those in a moderate-low BU-endemicity class. Samples of drinking water collected at groundwater wells near these settlements contain 5-1200  $\mu\text{g l}^{-1}$  As (EU-recommended maximum, 50  $\mu\text{g l}^{-1}$  As), but concentrations appear to have no spatial relation with BU endemicity. However, samples of drinking water collected at surface water abstraction points contain 10-2900  $\mu\text{g l}^{-1}$  As, and concentrations at the higher end of this range are from abstraction points near settlements in the high BU-endemicity class. Linear regression reveals a significant positive exposure-response relation between concentrations of arsenic in surface water and BU prevalence ( $R^2 = 0.67$ ). These results implicate arsenicosis in BU, but the role of arsenic remains unclear: it induces skin lesions that could predispose to MU penetration; it inhibits circulation; and it depresses the immune response.

**Keywords:** surface water, groundwater, arsenic, *Mycobacterium ulcerans*, Buruli ulcer