

## ABSTRACT

### Risk Analysis and Modelling of the Epidemiology of Human Gastro-intestinal Parasites Using GIS – A Study of Selected Communities in Trinidad

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Traditional methods of spatial epidemiology relied on the use of cartography and the empirical mapping approach in order to investigate postulated correlations between environmental factors and the occurrence of direct life-cycle helminth parasites in humans. However, the combined use of Geographic Information Systems (GIS) and spatial statistics in the Health Sciences, has allowed for higher levels of accuracy in the analysis and display of geographically referenced data. The advantages include enhancement of the decision-making process of health care professionals.

The objectives in this study were to quantify the prevalence of parasite-related infections; determine the **social, economic and environmental factors** responsible for transmission of the parasites and to develop and validate a predictive GIS model for human gastro-intestinal parasites in Trinidad.

A cross-sectional survey was conducted from September 2002 to September 2004 among 300 persons, living in 3 watershed areas. Stool samples collected from each individual and tested for gastro-intestinal parasites gave a total of 11 parasite infections comprising 5 parasite species. Overall parasite prevalence was 3.14% with individual parasite prevalence as follows: *Entamoeba coli* (0.86%), *Enterobius vermicularis* (1.14%), *Ascaris lumbricoides* (0.29%), *Trichuris trichuria* (0.86%) and hookworm (0.29%). A questionnaire was developed and used to identify risk factors for infection (socioeconomic, sanitation and hygiene variables). All variables were tested using Statistix 7.0 and Geographically Weighted Regression and then modelled using ArcView GIS 3.2. Digital overlays of environmental data (soil type, soil texture, vegetation and rainfall) were used with the prevalence data to develop risk models for gastro-intestinal helminth parasites. It was found that the spatial relationships between GI parasite epidemiology and socio-economic, sanitation and hygiene variables depends the use of pit latrines, exposure at schools, not washing hands before meals and after using the bathroom, dirt around the house, not boiling drinking water, lack of electricity and small crowded households.

**Keywords:** cartography, helminth, parasites, gastro-intestinal, Geographic Information Systems (GIS), Trinidad, *Entamoeba coli*, *Enterobius vermicularis*, *Ascaris lumbricoides*, *Trichuris trichuria*, hookworm, socioeconomic, sanitation, hygiene.