

Campylobacteriosis in Aotearoa New Zealand: the usefulness of GIS to a current public health problem

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Extended Abstract

Introduction

The incidence of campylobacteriosis in New Zealand has been steadily increasing since the disease became notifiable in 1980 and has rapidly increased in incidence over the last two years. The economic cost of campylobacteriosis in New Zealand was estimated to be up to \$40 million in 1995 [1], and would have been almost double that figure in 1998. Traditional public health interventions, which focus on food preparation and personal hygiene, have been unsuccessful in reducing the incidence of this disease. A focus on the environmental factors influencing the reservoirs and transmission routes of *Campylobacter jejuni* may point to more effective methods of reducing the burden of disease in human populations [2].

GIS is increasingly being used in health research and health services planning, as reviewed by Clarke *et al* [3]. GIS can be used to analyse spatially referenced health data, in order to generate hypotheses and also to identify cause and effect relationships that are not otherwise obvious. GIS is considered to be of particular value in assessing links between environment and health [4]. GIS will be used to examine the spatiotemporal distribution of campylobacteriosis in relation to ecological factors.

Methods

Notification data for campylobacteriosis were obtained from the National Notifiable Disease Database, EpiSurv, for the period January 1993 to December 1998. For each Territorial Local Authority (TLA), disease rates per 100 000 population were calculated for each summer (December, January and February) and winter (June, July and August) period. A rate difference for each TLA was then calculated by subtracting the TLA rate from the national rate for each summer and winter period. Data was divided into seven categories, from >30 per 100 000 below the national average to >30 per 100 000 above the national average using size classes of 10 per 100 000. These results were visualised using a choropleth map to illustrate the seasonality and regionality in campylobacteriosis disease rates in New Zealand.

Results

Three distinct seasonal patterns were observed. Firstly, Northland and Central North Island TLAs showed low incidence rates during both the summer and winter periods. Secondly, Christchurch City exhibited high incidence rates in the summer months only. Thirdly, Wellington City had high incidence rates of campylobacteriosis in both the summer and winter periods.

Discussion

The observed spatiotemporal variation in campylobacteriosis disease rates illustrates the complex ecology of campylobacteriosis in New Zealand. The major transmission routes for campylobacteriosis include food, water, animal contact, and person-to-person transmission. If one or more risk factors (such as the consumption of undercooked chicken and/or faecal-oral contact in daycare) could account for the majority of cases, we would expect consistent temporal patterns in urban centres with similar demography (Auckland, Wellington, and Christchurch). The observed spatiotemporal variation in rates suggests that each region is influenced by varying contributions from the different transmission mechanisms at different times of the year.

Conclusion

GIS has enabled the visualisation of spatiotemporal variation in campylobacteriosis disease incidence in New Zealand. It has been used primarily as a hypothesis-generating tool, to present disease patterns that would not otherwise be discernible. Future work will attempt to explain the observed spatiotemporal variation, by adding climate and land use surfaces to the existing GIS model.

References

1. Withington, S and Chambers, S. The cost of campylobacteriosis in New Zealand in 1995. *NZ Med J.* 1997. 110: 222-4.
2. Weinstein, P, Russell, N and Woodward, A. Drinking water, ecology and gastroenteritis in New Zealand. In: 2nd International Symposium on Assessing and managing health risk from drinking water contamination. 1998. Santiago.
3. Clarke, K, McLafferty, S and Tempalski, B. On epidemiology and Geographic Information Systems: a review and discussion of future directions. *Emerg. Infect. Dis.* 1996. 2(2): 85-92.
4. Briggs, D, and Elliott, P. The use of geographical information systems in studies on environment and health. *Wld hlth statist quart.* 1995. 48: 85-94.