

Using GIS To Determine if there is an Association between Water Quality and Enteric Disease in Canterbury

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EXTENDED ABSTRACT

Aim

To compare the rates of notified enteric diseases from the different water distribution zones in Canterbury to determine if there is a correlation between the water quality grading and the rate of disease.

Background

Canterbury, especially the rural districts, have some of the highest rates of notified enteric diseases in New Zealand. The diseases of most concern are campylobacter, cryptosporidiosis and yersiniosis which can all be acquired from contaminated water. There are many water distribution zones throughout Canterbury and a wide range of water quality gradings from Ba to Ee with some of the larger zones being U (ungraded). One of the first tasks after acquisition of a GIS (ArcView) was to investigate whether there was a correlation between the water quality grading and the rate of notified cases of enteric disease.

Methods

The shape files of the water distribution zones for Canterbury were obtained from the Ministry of Health and overlaid with the geocoded enteric disease notifications for Canterbury for 1997 1998 and 1999. The WINZ database was searched for the population data but where this was either not recorded or not current, the local authorities were contacted directly for the data. The counts of disease in each zone were made in ArcView and displayed. The rates were calculated in Excel, displayed as histograms and a linear trendline plotted.

Results

Although a correlation was identified ($R^2 = 0.8869$) between enteric disease rate and water quality, there was concern about the accuracy of the data. These concerns were based on the following; the WINZ database was often incomplete, some the local authorities did not have accurate population data for the water distribution zones in their district, the shape files of the zones were not always accurate and the gradings of some supplies had not been reviewed for up to 10 years.

Implications

Despite the limitations of the data the results are consistent with previous studies in the North Island and suggest that one of the reasons for the high rate of enteric disease in Canterbury outside of Christchurch is contaminated water supplies. Public Health Units should ensure that rural local authorities with low grade water supplies are encouraged to upgrade and maintain them. All local authorities should maintain accurate and current population and geographic data relating to their water distribution zones and the WINZ database should be utilised and kept up to date.