Introduction
GIS integrates database and digital mapping technologies to enable the management of location-based phenomena.

In the Public Health Department GIS may be used to examine the geographical relationship between the population and a number of issues, such as environmental factors. It may also be used in the event of an outbreak of infectious disease.

Methodology
Two case studies are presented.

Case 1: Major Emergency Exercise. GIS is used to determine the population at risk and identify any vulnerable sites/population within the vicinity.

Case 2: Cryptosporidiosis outbreak in a town. GIS is used to investigate whether there is a local pattern/clustering of cases.

Data Sources include:
- Ordnance Survey digital maps, GeoDirectory,

Case 1: Major Emergency Exercise

Background
- A major emergency exercise occurred on 22nd March 05 in Youghal on the inter-county boundary of Cork and Waterford.
- Involved a simulated collision between a passenger bus, a heavy goods vehicle carrying 25,000 L HCl and 4 cars.
- Public Health in the South East was contacted to determine the population within specified distances of the collision in Co. Waterford.

Result
- Site of collision was mapped.
- Multiple buffers were created around the site at specified distances of 1, 3 and 5km.
- Identification was made of:
  a) any vulnerable risk groups within the buffer zones e.g. schools, hospitals, nursing homes, crèches. One primary school was within 4 km of the chemical spill. No risk groups were identified within the vicinity of the site.
  b) population within the Waterford EDs surrounding the site.

Figure 1: Site of collision, buffers at 1, 3 and 5 km, and a vulnerable site. Also included are population figures for surrounding Waterford EDs.

Discussion
GIS assists with the identification of vulnerable risk groups, visualisation of population density, as shown in Figure 1, and visualisation of epidemiological data as shown in Figure 2.

The availability of spatially referenced data enables the visualisation of patterns and relationships in data and thus aids decision making. The visual impact of maps is beneficial, as the above cases have shown and provides an added dimension to data analysis.

Case 2: Cryptosporidiosis Outbreak

Background
- 31 laboratory confirmed cases of cryptosporidiosis
- Common risk factor of drinking water from town supply
- 17 resided in the town
- 14 had contact with the town
- 11 had no risk factors other than town water

Result
- Residence or point of association with the town for each case was mapped.
- There was no apparent clustering of cases and cases were scattered throughout the water distribution system.

Figure 2: Geographical spread of cryptosporidiosis cases.

Conclusion
- Mapping is useful for public health decision making.
- Public health databases should include geo-referenced information, whether it is associated with a specific location (x,y coordinate) or a geopolitical boundary (ED, townland).
- These databases should be updated regularly.
- Advance identification of local important sites will assist in the early implementation of public health emergency measures.

Limitations of GIS
- There are resource implications for the development and maintenance of the system.
- Significant expertise is required. A detailed protocol is now available in the HSE-SE Public Health Department on how to access and operate the system in the absence of the local expert.
- The importance of locally based knowledge is vital for locating rural addresses which are not clearly identifiable in GeoDirectory.