12 ROAD TRAFFIC ACCIDENTS INVOLVING CHILDREN IN NORTH-EAST ENGLAND

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Abstract
Road traffic accidents are a very serious cause of morbidity (and mortality) among children. The data are therefore worthy of examination, and in addition the nature of the data lends itself to geographical information system (GIS) analysis. The data for north-east England are analysed in this chapter, using very simple GIS techniques. Some interesting results are presented, which are used to illustrate the utility of GIS analysis of data in the field of health and environment, even when using the most basic of techniques. The caveats of the work and the data are also discussed.

12.1 Introduction
Accidents involving road vehicles are one of the most important causes of morbidity among children in the developed world. In Great Britain, for example, approximately 9000 serious or fatal accidents occur every year. Clearly, any method that is likely to result in a reduction of these numbers is worthy of consideration.

In this chapter, some very basic geographical information system (GIS) techniques are used to undertake a relatively simple analysis of childhood road traffic accident (RTA) data. At this stage the work is of a fairly simple and exploratory nature, but nevertheless, it has already exposed previously unsuspected facets of the data that are pertinent to RTA prevention. Furthermore, the uncomplicated nature (in principle at least) of this example of the use of GIS in the field of health and environment provides an excellent entrée into the potential of such works.

RTAs for children are recorded in two locations, each site holding different data. These datasets are briefly described, and the way in which they are matched is also outlined. This results in a single and comprehensive dataset of childhood RTAs both in terms of the data for each RTA held and the coverage of RTAs in the dataset. Locational data for each RTA are then processed to provide information about the ward of both the accident itself and the home address of the child. Descriptive data about the child and the accident are used to create subsets of data. Once obtained, the ward allocation data are very briefly analysed and the importance of the GIS processing clearly shown.

end of the chapter. The majority of the chapter however, is a description of the initial work undertaken into studying RTA patterns.

12.2 The data

RTA data are provided from two sources. Primarily, information came from the police, with additional information being provided by local authorities. Northumbria Police Authority covers the counties of Northumberland and Tyne & Wear in the north-eastern part of England. In general terms, Tyne & Wear is an urban metropolitan county that is relatively densely populated. Northumberland, conversely, is predominantly rural, with a few built-up towns. The total population of the two counties is approximately 1,431,000, a significant proportion of the national total. The area covered by Northumbria Police Authority was therefore taken as the study area.

Obviously, as a combination of only two counties, this area is not completely representative, so its use as a study area implies that there will be errors and uncertainties in subsequent analysis due to boundary effects. The most obvious source of such problems is the scenario where an RTA is lost from the analysis because either the home address of the child (or children) involved or the actual accident location lies outside of the study area boundaries. The importance of such cases will become more apparent in later sections. Given the absolute size of the area and the scale relative to the country as a whole, the likelihood of such problem cases was deemed to be acceptably small.

A consistent finding of previous research is that the police under-ascertain cases known to hospitals as road traffic casualties. The overall underreporting rate is as high as 33% but decreases for serious injuries to 19% and appears to be complete for deaths. The police believe that the category of accident that is most problematic is that in which children on pedal cycles are injured in an accident that does not involve any other vehicle. In any event, there is reason to suppose that the distribution of any omitted cases is random and any error introduced is self-cancelling. The data may be therefore regarded as representative and reliable in terms of coverage.

Information on accidents that involve injury to any party is coded at police headquarters from a paper format onto a computer format such as the STATS 19 system. These data are stored on the police computer in the traffic engineers department of the relevant local authority, each case indexed by a unique accident and casualty reference number. Normally, the only geographically referenced variable on the STATS 19 system is the grid reference of the accident site in the form of a ten-digit grid reference. This has a spatial resolution of 10 m.