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Accidents to young pedestrians: distributions, circumstances, consequences and scope for countermeasures

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Abstract
An outline is provided of the general pattern of accidents involving the 27,315 pedestrians aged 19 years and under injured in Great Britain in 1988. Recent research about the nature of accidents to young pedestrians and available countermeasures is reviewed.

The West Midlands metropolitan districts and accidents in these areas are described. Police (Stats 19) records of accidents involving 2470 young pedestrians in Birmingham between December 1985 and November 1988 are analysed.

An in-depth study of 51 fatalities occurring during a 5 year period is made from a study of the records of HM Coroner in Birmingham. These records provide evidence from statements given before and during inquests and this is used to build up a picture of the circumstances surrounding these accidents.

The data set is enhanced by detailed police information on 417 young pedestrian serious injury accidents occurring in Birmingham, Coventry, Sandwell, Wolverhampton and Walsall between September 1988 and August 1989. A postal and interview survey, giving details of events before, during and after the accidents, is made of 251 pedestrian casualties and drivers of 192 striking vehicles involved.

The results from the various data sets are then discussed and compared and supplementary analyses made of issues highlighted by earlier parts of the research.

The implications of the research are discussed within the context of what change may be possible. Ranking of different types of location at which accidents to young pedestrians are common indicates that great benefits may be obtained from treating minor roads in small urban areas.

Recommendations for action are proposed.

Contents

Preface

This is the second report from a series of research projects based in the working environment of the Accident Research and Remedial Measures Team at Birmingham City Council. It is a study of road accidents to young pedestrians aged 19 years and under.

These projects are funded by, and carried out in partnership with, the AA Foundation for Road Safety Research. In addition to this support, parts of the surveys described in this report have been co-funded by the metropolitan districts of Coventry, Sandwell, Walsall and Wolverhampton, and conducted with technical assistance from Midland Environment Limited.

A study with a view to taking action to reduce road accidents to young people is not a new venture. There is unlikely to be a highway authority anywhere in the developed world that has not at some time moved to take action when concern was expressed about accidents involving young pedestrians. Almost every year the UK Department of Transport runs a campaign of one sort or another and many dozens of local authorities up and down the country organise events to draw attention to aspects of these accidents. These range from measures designed to tackle children's propensity to 'dash out' into the street, to the conspicuity of their clothing, from the dangers of 'rat running' vehicles in residential streets, to choosing safe routes to and from school. Accident remedial measures are devised, pedestrian crossings installed, and parents, youth groups, schools and many other agencies involved in the drive to cut casualties.

Birmingham City Council has a history of protection and road safety education of young people and the AA Foundation is pledged to pay particular attention to the needs of children. The City Council runs regular road safety campaigns, is active in education with all of the agencies described above and, in addition, has a Community Liaison Team whose duties involve road safety work with the members of the ethnic minority communities. The team responsible for accident remedial measures has implemented several schemes designed specifically for young pedestrians, some of which are described later in this report.

In preparing to take action, information is required about how these accidents happen and who is involved. The approach taken in deciding what to do varies enormously from authority to authority and person to person – from the individual who immediately 'knows' and has a 'gut feeling' for what the accident problem is at a given site or for a particular road-user, through to someone who scours all available data sources and contacts before deciding what to do. This report should contribute particularly in demonstrating a series of steps, describing what is generally-available knowledge in this subject and what can be obtained with skilled-access to a good local authority accident records system. Additionally, the report shows how time and money can be spent in

breaking new ground to gather additional information about these accidents, and then how this information can be used. The report can therefore be viewed and used at two different levels, either as a source of information (much of it new) about these accidents, or as a set of procedures which others may go through in collecting data appropriate to their own local needs.

This study presents new information – about the pattern of these accidents in urban areas and to a greater level of detail than before about the circumstances surrounding the way the accident occurred. It examines the consequences of these accidents for young people and the practical steps which may be taken to reduce the problem. In addition, this is one of the few studies which has given specific attention to the needs of the teenage pedestrian above the age of 14 years, the research having used the term 'young pedestrian' to extend the definition of child pedestrians to include and consider those aged 15-19 years.

This is a narrative account of the research project, narrative in the sense that it describes how one part of the research led to another and how events occurring during the work influenced and modified both the approach that was taken and the results obtained. The research is action-based and opportunities are taken where possible to indicate where research findings may be used to change policy or action. In an effort to guide readers through the work and provide something that is relatively easy-on-the-eye to those unaccustomed to long, technical reports, a brief commentary is provided at the start of each major section.

This report will primarily be of benefit to traffic engineers and road safety officers, but should also be read by those whose work is in public policy and health and the enforcement of traffic law. Researchers in all these fields and students of traffic and transportation will also be interested. The report has been written for practitioners and for the layman and esoteric technical detail has therefore been kept to a minimum.

Tables and figures

Executive summary

Introduction

Birmingham, with a population of about one million, is the largest of the 7 metropolitan districts which comprise the county known as the West Midlands. Together these districts form one of the largest conurbations in Great Britain outside London. Birmingham is the largest metropolitan highway authority in the UK.

In summer 1988 the Automobile Association Foundation for Road Safety Research and Birmingham City Council, with some assistance from the University of Birmingham, established a programme of traffic safety research based in the City Engineer's Department. This was the first time a local highway authority in the UK had been awarded private sector funds to pay for a research worker to be situated in the workplace. The research is designed to concentrate on road accidents in urban areas and to be conducted so as to be of potential benefit not only to Birmingham but also to other local authorities in the UK.

Where possible the emphasis has been on doing action-based research with direct applications for practitioners. In 1989 the first results from this research (a demographic and hierarchic analysis of accidents in the West Midlands districts) were published and this work was used in providing pointers for the direction of the present study.

Context and methodology

Each year there are between 8000 and 10,000 injury producing road accidents in the metropolitan districts of the West Midlands. Typically, these accidents result in more than 11,000 casualties per year, about 15% of them being young pedestrians aged 19 years and under.

The purpose of the present study has been to analyse the characteristics of accidents to young pedestrians in an urban area and to suggest appropriate countermeasures for their treatment.

The research started by using accident data from 27,315 young pedestrian casualties injured in Great Britain in 1988 to set a national context to these accidents. It continued with a review of policy and recent research concerned with young pedestrian accidents.

Birmingham police-recorded accident data from accidents were then used to analyse general accident patterns and trends for young pedestrian casualties. The accident records of 2470 casualties injured in a 3 year period between December 1985 and November 1988 were analysed.

In the next stage the very detailed records of HM Coroner in Birmingham were used to study the circumstances of 50 accidents involving 51 young pedestrians killed during a 5 year period ending in June 1988. Particular interest lay in who was involved in these accidents, where they happened, contributory factors, and what countermeasures could be used.

The study of the Coroner's records provided a level of information much more detailed than the police records, but for only a small sample. That data set was then enhanced by means of postal questionnaires and interviews with 251 seriously injured pedestrian casualties and 192 drivers, these accidents having occurred in Birmingham, Coventry, Sandwell, Walsall and Wolverhampton between September 1988 and August 1989. This survey achieved a response rate of 71.5% from all pedestrians and 55.5% of drivers who were contacted. The information was supported with data from police files of 417 accidents involving 423 seriously injured pedestrians.

The results from the various data sets were then compared, this generally showing similar findings from each information source, with comparatively few contradictions.

The final part of the study involved some supplementary analyses prompted by other parts of the work, and various locational studies designed to show where the greatest benefits for treatment of these accidents may lie.

The situation in Great Britain

In 1988 young pedestrians represented 8.4% (27,315) of all those injured, and 7.0% (356) of those killed, on roads in Great Britain, 96.6% of all young pedestrian casualties in Great Britain in 1988 being injured on roads in urban areas.

Accidents to those aged 0-4 years were most common in the summer months from May to August, to those aged 5-9, at these times but also in September and October and, to those aged 10-14, in the spring and autumn. The pattern for those aged 15-19 years was more evenly distributed throughout the year, with slight increases in the winter months.

There were more casualties in each of the four age groups considered who sustained injury on Friday compared with any other single day of the week.

Accidents to those aged 0-4 years were distributed relatively evenly throughout the day but showed a peak in the early afternoon. Pedestrians aged 5-9 years showed a small peak in the morning (08.00-08.59 hours) but were most common between 15.00 and 17.59 hours; those aged 10-14 again show two peaks, between 08.00 an 08.59 and 15.00 and 16.59 hours. The distribution for those aged 15-19 years was relatively even throughout the day but there were noticeable peaks coinciding with time of the journey to and from school or work and late evening.

The casualty rate per head of population of the individual age groups for those pedestrians killed or seriously injured in Great Britain is now lowest for those aged 0-4 years, about half of that of those aged 15-19 years and one-third that of both those aged 5-9 and 10-14 years. The casualty rates for those aged 0-4 and 5-9 have been decreasing over the last 17 years; the casualty rates of those aged 10-14 and 15-19 have fluctuated over recent years.

More information required

A survey of relevant literature showed that a lot is known generally of the types of young people at risk in these accidents but that there are areas where more information was required. It was found that more information is required about how these accidents occur, the characteristics of those involved and what can be done to reduce such accidents in the future.

Research findings: accident characteristics

Analysis of Birmingham police (Stats 19) data showed similar patterns to those of Great Britain for all aspects of accidents examined.

The study of the records of HM Coroner in Birmingham showed 14 of the 35 aged 0-14 years who died were injured in accidents in inner city areas, that 14 of the 50 accidents occurred on 'residential' streets – those for which the only use would be access – and that 11 of the 30 casualties aged 0-9 years were killed immediately outside their home. Distance of the accident site to the casualty's home increased with age and more than half of the pedestrians crossed the road at the site 3 or more times per week prior to the accident. Only 5 were at the location for the first time.

Supporting the results of the study of records of HM Coroner, the questionnaire survey showed pedestrians tended to know the site where the accident happened, two-thirds crossing the road between 3 and 5 time a week prior to the accident, only one-tenth never having crossed the road there before. A quarter of the total (and proportionally more of the younger ones – 43.4% of those aged 0-4 years) were knocked down in the street where they lived.

Two-thirds of all pedestrian casualties were going to or from home. A third were on a trip to or from school (slightly more than half of these on the return journey) and over a quarter going to or from shops.

Pedestrians sustained severe but non life-threatening injuries to the legs (half of all seriously injured casualties contacted), with comparatively few such injuries reported to other body areas. Life-threatening injuries were generally those to the head (3.6% of all casualties). A fifth were hospitalised for more than one month. There was severe disability for 1.6%, with some residual dysfunction for 16.4% of others.

Like the pedestrians, the drivers responding to the questionnaire survey knew the site, two-thirds having travelled through the site between 3 and 5 times a week prior to the accident, only 3.6% never having been through the site before.

Cars accounted for 91.9% of striking vehicles and three-quarters of drivers were going to or from home, with twice as many returning from, as going to, work. A tenth were driving as part of their work.

The research provided information about the moments before and during the accident with a fifth of pedestrians admitting they looked neither right nor left before the accident. Almost half of pedestrians said they did not see the vehicle before the accident and two-thirds of drivers said they did see the pedestrian before the collision, but half of these when the pedestrian was 5 metres or less away. According to a third of drivers, they had no time to take avoiding action.

Almost a third of pedestrians said that something made it difficult for them to see the striking vehicle, a parked vehicle being the most common source of obstruction. Similarly, 41.7% of drivers said something made it difficult to see the pedestrian, more than half of these citing a parked vehicle as the obstruction. The magnitude of the role of parked vehicles in these accidents can be judged by the fact that, according to local Stats 19 records, of those casualties struck whilst crossing from the nearside, more than half of those aged 0-4 and 5-9 years were reported as masked by a stationary vehicle.

Linked to seeing and being seen, pedestrians wearing predominantly dark clothing accounted for 41.9% of those injured in the dark and 31.1% of those injured in daylight.

Research findings: pedestrian and driver characteristics

Of the 27,315 pedestrians aged 0-19 years injured on the roads of Great Britain in 1988, 3179 (11.6%) were aged 0-4, 8473 (31.0%) aged 5-9, 8661 (31.7%) aged 10-14 and 7002 (25.6%) aged 15-19 years.

Male casualties were more common than female in each age group, forming 60.5% of all casualties.

The study of the records of HM Coroner showed that disproportionately high numbers of those aged 0-9 who had been killed were of Asian ethnic origin and indeed that 8 of the 9 aged 0-4 who had been killed were of Asian origin.

The high numbers of children of Asian origin identified in the study of the records of HM Coroner prompted further analysis of these road-users. Overall, per head of their respective populations, people of Asian and non-Asian ethnic origin were found to be equally-represented in road accidents, but Asian child pedestrians aged 0-4 and 5-9 years were twice as likely to be knocked down and injured as their non-Asian counterparts. Work is continuing in order to investigate the extent to which features of accident environment, activity pattern and culture contribute to these accidents.

Analyses also showed Asian children more likely than non-Asians to be involved in accidents where a parked vehicle is a contributory factor, this likely to result from the amount of on-street car parking in areas where Asian ethnic minorities live. Additionally, relatively more Asian young pedestrians were injured in accidents involving non-Asian drivers, than non-Asian pedestrians injured in accidents involving Asian drivers – this due almost certainly to combinations of: the numbers in the populations of the respective drivers, the numbers involved in these accidents, and the likelihood of the respective driver groups being in the areas where Asian and non-Asian young pedestrians are active.

The questionnaire survey showed pedestrians to be predominantly from low Socio-Economic Groups (SEGs) – for example, 26.3% of the heads of household were unemployed and 43.4% lived in council accommodation. Almost all (95.0%) were injured in the metropolitan district where they lived and half were at Junior or Infant school.

Analysing the Stats 19 data of drivers involved in these accidents, there was little difference in either age or gender between drivers involved in young pedestrian accidents and drivers involved in all accidents.

Only 3.6% of drivers who participated in the survey were unemployed and the proportions from other SEGs were 12.5% (A/B), 29.5% (C1), 33.3% (C2), and 12.5% (D). Less than 10% of drivers who were involved lived outside the West Midlands metropolitan districts.

Research findings: police, pedestrian and driver perceptions of blame

Data on the 2470 Birmingham casualties of all severities showed that the accident cause was most often attributed by the police officer attending the accident to the pedestrian (89.0% of instances). In only 9.4% of accidents was the driver seen to be at fault, the vehicle (0.3%), the weather (0.1%), the environment (<0.1%), and some other contribution (1.1%). Only 1.0% of drivers was found to be over the prescribed limit for alcohol.

In the study of the 423 seriously injured pedestrian casualties, Police blamed the pedestrian for the accident on 93.1% of occasions and the driver on 5.4% of occasions. In about two-fifths of cases the pedestrian was described by the Police as running into the road without looking and running (implicitly without looking) into the road from behind parked vehicles on over a quarter of occasions. The results showed that 3.5% of drivers were to be prosecuted as a result of their driving conduct, 4.3% for documentation offences (for example, not being insured to drive) and 1.2% for a defective vehicle.

The study of the records of HM Coroner also gave some insights into contributory roles. Pedestrians taking great risks was a factor in some accidents. At the time of their accident, 4 of the 51 were trying to cross roads capable of carrying between 6 and 10 lanes of traffic and 9 of the 51 were trying to cross a dual-carriageway. Five of the 16 pedestrians aged 15-19 years had consumed alcohol in excess of the prescribed limit for drivers in this country. In 26 of the 50 accidents the pedestrian was seen as the sole contributor to blame for the accident and in a further 16 as mostly to blame.

The role of the drivers involved in these fatal accidents was analysed. Seven of the 50 drivers were 'rat-running'; 9 were travelling at more than 10 mph above the speed limit. Two had consumed alcohol in excess of the prescribed limit and 21 drivers were prosecuted for one (or more than one) aspect of their driving conduct, a document offence or for a vehicle defect.

Asked what caused the accident, half of all seriously injured pedestrians who offered a reason for why the accident occurred accepted some blame for their own behaviour and two-fifths blamed the driver in whole or in part. Similarly, 20.8% described the environment as a contributory factor. Three-quarters of drivers offering a reason attributed the cause of the accident entirely to the pedestrian and only 1.8% described a feature of their own driving as a contributory factor.

Drivers generally (87.5%) felt that there was nothing they could have done to avoid the accident. About half of pedestrians said that there was

nothing that they could have done to avoid the accident and a third that there was nothing the driver could have done.

Countermeasures

A major strand of this research was to find new ways to reduce accidents. Drivers and pedestrians were asked what the local authority could do to reduce accidents at the site in the future – 14.6% of drivers wanted a pedestrian crossing installed at the site, 13.5% wanted double yellow lines and 7.8%, fences or guard-railing. Just over a quarter of pedestrians wanted a pedestrian crossing, 6.4% for the speed limit to be reduced and 6.4% for there to be parking prohibition. Less than 5% of pedestrians and 1% of drivers mentioned any physical form of speed restriction as a potential countermeasure.

Looking at the potential for engineering remedial action, analysis showed that there were 72 (0.9%) Birmingham Non-network (unclassified) roads where, on average, there was at least one child pedestrian accident per year in a 5 year period. It is considered likely that it is these Non-network roads, or areas which include some of these roads, where the greatest benefits from treating accidents to young pedestrians will arise, since there are many difficulties in treating such accidents on major routes.

Not only are there 'high risk' locations, certain times are worse than others. For example, just under 10% of young pedestrians aged 15-19 years were injured between 22.00 and 01.59 hours on Friday and Saturday night, this representing under 5% of the week. These accidents have many characteristics similar to late-night single-vehicle non-pedestrian collisions; it may be there are opportunities to target combined educational campaigns to those who drive and those who walk towards injury at these times. Similarly, this study has shown high risks to some minority groups within the community and efforts are being made to use the data from the research in providing education, training and publicity.

Recommendations for action

The major recommendations for action from this research are that:

- there should be greater uniformity in the collection of accident data,
- local authority Stats 19 data sets include a coding of the type of road on which accidents occur according to the function of the road (ie various grades of distributor road, access road or 'pedestrian street'),
- routine national analyses be made of the records of HM Coroners,
- authorities make analyses of accidents occurring on minor roads with a view to finding areas or roads suitable for treatment by 'traffic calming' and other area-based means of urban safety management,
- many highway authority accident analysis systems be improved to permit such analyses,
- more analyses be made of accidents to young pedestrians on the basis of where these accidents happen, rather than simply the

characteristics of those involved, matching the characteristics of location with knowledge of available countermeasures,

- methods of education, training and publicity should take specific note of the characteristics of those at risk and the fact that they are often the least receptive to, and least able to assimilate, the road safety message,
- efforts be made to evaluate the effects of education, training and publicity,
- consideration be given to discouraging very young children from crossing opposite their own house on returning home,
- road accidents, disaggregated by type, should be put on to traffic management and long-term transportation models in order that the effect of changes on traffic flows on accidents may become part of the transportation debate,
- research be conducted to evaluate the road-user behaviour of pedestrians of different ethnic origins,
- data from the 1991 Census, as soon as they become available, be combined with road accident data and further analyses made of the exposure to risk of different groups,
- statements about the effect of traffic and transportation policies on accidents to young pedestrians, casualty reduction targets and options for countermeasures, be included in local authority Road Safety Plans,
- authorities examine the possibilities of radical reinforcement of the road hierarchy since it appears that the greatest benefits in casualty savings from engineering means are likely to come from discouraging speed, through traffic, and inappropriate parking, in a few percent of streets in an urban area.

Previous studies

Additional copies of this report and of others in the Birmingham City Council–AA Foundation series may be obtained on written request to the contacts listed with the documentation retrieval information of this report.

Copies of reports prepared by other contractors to the AA Foundation for Road Safety Research may be obtained on application to the Foundation.

Notes and definitions

The research described in this report was undertaken between summer 1988 and spring 1990, much of it at the same time as other projects being run in the series. Accident data analysed during the study were the most recent available at the time of the analyses. For purposes of comparison with national statistics, data from the year 1988 have generally been used, but, in some analyses of local accident statistics, 1989 data have been included, these being the most recently available at the time of the study.

As far as can be judged, the time periods when these studies were conducted were not atypical in any way that would have major influences on the results of this project.

The results quoted for accident patterns in large areas and for large numbers of accidents are, with exceptions, generally very stable over time and many of the findings described here will be relevant for many years to come.

Unless otherwise specified, the term 'West Midlands' is used in this report to refer to the county area of that name and also to the 7 metropolitan district authorities lying within that area.

Throughout this document the term 'accident' is used to refer to those injury-producing road accidents reported to the Police. 'Urban' road accidents are those occurring on roads with a speed limit of 40 m.p.h. or less. A 'serious' road accident is one involving a casualty who is detained in hospital either immediately after a road accident or later and/or who sustains one of the following injuries:

i fracture,
ii internal injury,
iii severe cuts and lacerations,
iv crushing,
v concussion,
vi severe general shock requiring hospital treatment, or who
vii dies 30 or more days after the accident as a result of injuries sustained in the collision.

'Network' roads are all the 'M', 'A', 'B' and 'C' class roads. Non-network roads are those minor roads such as in residential and industrial areas, lying between the major routes. There are approximately 430 kilometres of classified road and 1680 kilometres of unclassified road in Birmingham for which the City Council has responsibility. The Department of Transport is highway authority for motorways lying within Birmingham.

'Children' are defined as those aged 0-14 years and 'Young Pedestrians' as those aged 0-19 years.

Population figures or rates refer to the particular age groups and/or geographic areas and are mid-year estimates.

In apportioning accident blame in this study, children were judged against the same standards of reasonable road-user behaviour society sets for adults. Within this context the idea of contributory roles in the accident is introduced, but, in discussing accident occurrence, this term is used interchangeably with 'blame for', 'fault in', 'responsibility for', or 'cause of' the accident.

The Socio-Economic Groupings (SEGs) used in Section 4 of this study are those of the Market Research Society and are loosely defined as follows:

i Group A – forming about 3% of the population, and including such people as professionals, those very senior in business, and top level civil servants,

ii B – about 14% of the population, and including middle management in large organisations, top management or owners of small businesses, and principal officers in government or service establishments,

iii C1 – about 22% of the population, and including junior management, owners of small establishments and all others in non-manual positions,

iv C2 – about 31% of the population, and including skilled manual workers and those manual workers with responsibility for other people,

v D – about 19% of the population, and including semi-skilled and unskilled manual workers and trainees to skilled workers,

vi E – about 11% of the population, and including all those entirely dependent on the state long-term. (In the present study those in this category were either unemployed or were otherwise a household head without regular income.)

During the study, the level of alcohol permitted for drivers in the UK was, and is at the time of writing:

i in the blood – 80 milligrams of alcohol per 100 millilitres of blood,

ii in urine – 107 milligrams per 100 millilitres of urine,

iii in the breath – 35 micrograms per 100 millilitres of breath.

This study is part of the work of the City Engineer's Accident Research and Remedial Measures Team. The Accident Research and Remedial Measures Team works within the Traffic Management Division, primarily on the identification and 'treatment' of hazardous locations, (changing about 30 sites each year), but also conducting research and providing data on local aspects of traffic accidents.

1 Introduction

Accidents to young pedestrians

In this introduction the major parts of the work are outlined. These parts include a summary of national and local Stats 19 data, a study of the records of HM Coroner of young pedestrians killed in Birmingham, and a questionnaire and interview survey of drivers and pedestrians involved in 'serious' category accidents. The study compares data from these sources and examines where the greatest opportunities for countermeasures may lie. In addition to introducing the reader to the study, the opportunity is taken to examine what sources of accident data are available. Recent research and current policy in the field is reviewed – the 'causes' and characteristics of these accidents and the opportunities for countermeasures are examined.

1.1 Background and context

1.1.1 Why was the study done and what does it include?

Accidents to young people are a source of major concern, not least for Birmingham City Council and the AA Foundation for Road Safety Research. This research began both as a result of a need to understand more about the characteristics of accidents to young pedestrians, and concern over the number of these accidents happening each year.

It was anticipated that, if more could be known about these accidents at a local level, then more could be done to ameliorate the problem. The information would be used in both road safety campaigns and in engineering remedial measures. Concern about the incidence of these accidents stemmed from the fact that the long-term trends for the number of pedestrians injured per head of population for some of the age groups concerned (Figure 1.1) was not decreasing as rapidly as some other types of accidents. In order to bring out new information about these young pedestrian accidents and the casualties involved, new methods and sources of data were used, these complementing many of the standard techniques generally used in local authority studies of this subject.

This part of the report provides an outline of the general pattern of accidents involving young pedestrians in Great Britain and seeks to set a context for the study.

A brief summary of recent literature and national statistics relevant to the study provides, also in Section 1, a starting point for the search for information that is either new or specific to the local area of the research.

In Section 2, Stats 19 data for Birmingham are analysed in detail.

Section 3 is an in-depth study of fatalities from a coroner's records in which evidence from statements given before and during inquests is used to build up a picture of the circumstances surrounding these accidents.

In Section 4 the data set is enhanced by a questionnaire and interview survey of 251 seriously injured young pedestrians and 192 drivers of striking vehicles in these accidents, (together with supporting information from 417 police accident files).

Section 5 is a discussion and comparison of the various data sets obtained and an examination of the scope for countermeasures to these accidents.

In Section 6, the conclusions are drawn from the study, aims and objectives linked to the City Council's Traffic and Road Safety Plan listed, and recommendations for action proposed.

In summary, the data sets used in this study are as follows:

i All young pedestrian casualties in Great Britain in 1988 – 27,315 casualties.

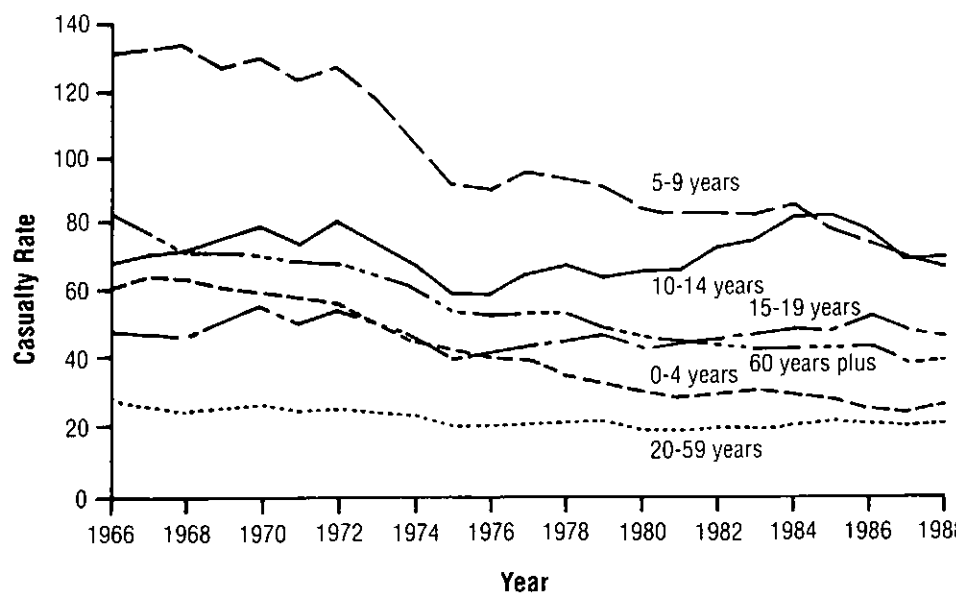
ii All young pedestrian casualties in Birmingham, 1 December 1985 – 30 November 1988 – 2470 casualties.

iii The most recently completed files of those young pedestrians dealt with by Her Majesty's Coroner in Birmingham and occurring during the period 1 November 1983 – 30 June 1988 – 51 fatalities.

iv Police booklet (HO/RT7 – see below) information on accidents and seriously injured young pedestrians in Birmingham, Coventry, Sandwell, Walsall and Wolverhampton between 1 September 1988 and 31 August 1989 – 423 casualties.

v Questionnaire data obtained from pedestrians and drivers involved in the accidents described in (iv) above – 251 pedestrians and 192 drivers.

Figure 1.1 – Pedestrians killed or seriously injured per 100,000 of population in Great Britain, 1966-1988



Source: Department of Transport (1989a)

1.1.2 What sources of accident data are there?

In seeking to provide new information about accidents to young pedestrians it is important to be aware of common data sources and of the quality of these data. Some of the most commonly used sources of data are:

i Stats 19 – the form completed by the police officer with information relating to the accident scene, vehicles and casualties involved; this is the basis for national Department of Transport road accident records such as those described in 1.1.3.

ii Police records – from the 'booklet' (Form HO/RT 7) completed by the police officer and containing statements and personal details of those involved and of witnesses.

iii Hospital data – either from the log of those attending at casualty departments or from in-patient records.

iv Records of HM Coroners – information from statements made before and during the inquests of HM Coroners. (Limited to fatal accidents – see Section 3).

v At-the-scene studies – conducted by researchers going to the scene as soon as they have news of an accident. (Such studies have the potential for providing high quality information but are expensive to run).

vi Retrospective studies – generally by structured interview or by questionnaire, and designed to elicit information about circumstances around the time of the accident.

vii Multi-disciplinary in-depth studies drawing upon various parts of the techniques described above, usually with staff from academic backgounds in engineering, physics, geography, psychology and other relevant fields.

Although the Stats 19 is the 'baseline' in terms of generally available data, it is worth noting that this data set is by no means a complete record of those people injured as pedestrians. An early local study (Bull and Roberts, 1973) showed, by comparison with hospital records, that 15% of pedestrians who present at casualty departments have not reported their accident to the police. Various studies of accidents of different kinds have indicated that accidents are less likely to be reported if they are relatively minor, occur at remote locations, involve males rather than females and if they happen late at night or early in the morning.

There is a tendency for better quality data to be collected on accidents of higher severity (for example, fatalities) but for the quality of the data to decline as the severity of the accident. For example, Bull and Roberts showed in Birmingham that for accidents to cyclists where no other vehicle was involved (many of which are minor but nevertheless require medical treatment) more than 97% of accidents do not get reported. Pedder *et al* (1981), repeating the analysis at a later date as part of another study (also in Birmingham), found that over 99% of casualties in such accidents were not reported to the police!

Other studies by the Transport and Road Research Laboratory (TRRL) have shown nearly 30% of casualties not reported in Berkshire (Hobbs *et al,* 1979), 40% of injury accidents in Oxford not reported (Tunbridge *et al,* 1988) and, even for accidents involving more than one vehicle, 25% are not reported (Mills, 1989).

National road accident data have been with us since 1949 (albeit in a more simplified format than the current Stats 19 form). The Stats 19 data set is the best place to start for many research studies and is a continuous reference point through time. However, in the first report in this series (Lawson, 1989), the importance of looking for road accident information beyond that contained in the Stats 19 form was stressed. Although it is always possible to gain new information about a local area from Stats 19 data, there is a danger that, because the data and variables involved have been analysed many times, they may become 'overworked'.

1.1.3 What is the picture of accidents to young pedestrians in Great Britain?

Mortality statistics show that road accidents are the leading cause of death for people in Great Britain until they reach their mid-thirties. Having survived birth and the early years, for almost half of people's expected lives, there is more chance they will die as a result of a road accident than from any other single threat to life. This remains true until the age is reached when circulatory and respiratory diseases and neoplasms (cancers) take their toll. Road accidents are therefore a disproportionately high source of total life years lost.

According to *Road Accidents Great Britain* (Department of Transport, 1989a), in 1988 there were 5052 people killed, 63,491 who sustained serious injury and 253,305 who sustained an injury described as 'slight'. Pedestrians formed 58,843 of the number of people injured, of these 1753 were killed, 17,880 sustained serious injury and 39,210 an injury described as 'slight'.

In 1988 pedestrians accounted for 24.5% (55,091) of all those injured and 57.1% (1397) of those killed on roads in urban areas of Great Britain. Viewed slightly differently, 95.3% (56,071) of all pedestrian casualties in Great Britain were injured on roads in urban areas.

Road Accidents Great Britain also shows that in 1987 in Great Britain the number of pedestrian deaths per hundred thousand population was 3.1, relatively high compared with some of our other European Community partners – Federal Republic of Germany (2.8), France (2.9), Italy (2.2), Netherlands (1.2).

Child pedestrians (0-14 years) represented 8.8% (19,826) of all those injured, and 9.1% (223) of those killed, on roads in urban areas of Great Britain in 1988, with 97.6% of all child pedestrian casualties in Great Britain being injured on roads in urban areas. The situation is summarised clearly in the booklet *Children and Roads: a Safer Way* (Department of Transport, 1990).

The term 'Young Pedestrian' incorporates and extends from the child pedestrian casualty definition described above to include those aged 15-19 years. In 1988 young pedestrians represented 8.4% (27,315) of all those injured and 7.0% (356) of those killed on roads in Great Britain, 96.6% (26,389) of all young pedestrian casualties in Great Britain in 1988 being injured on roads in urban areas. In 1988, pedestrian casualties accounted for 32.5% (356) of road accident fatalities in the age group 0-19 years.

Figure 1.1 shows that the casualty rate per head of population of the individual age groups for those killed or seriously injured in Great Britain is now lowest for those aged 0-4 years, and about half of that of those aged 15-19 year and one-third that of both those aged 5-9 and 10-14 years. The casualty rate for those aged 0-4 and 5-9 has been decreasing over the last 17 years, but there is concern for the 'older' young pedestrians since the casualty rates of those aged 10-14 and 15-19 have fluctuated over recent years.

As Tables 1.1 to 1.3 and Figures 1.2 to 1.9 show, there are distinctive patterns to these accidents.

Of the 27,315 pedestrians aged 0-19 years injured on the roads of Great Britain in 1988, 3179 (11.6%) were aged 0-4, 8473 (31.0%) aged 5-9, 8661 (31.7%) aged 10-14 and 7002 (25.6%) aged 15-19 years (Table 1.1).

For each of the age groups considered, male casualties were more common than female, forming 63.0% (0-4 years), 66.5% (5-9), 56.7% (10-14) and 56.8% (15-19 years) (and 60.5% overall) of all casualties (Table 1.1).

Table 1.1 – Young pedestrian casualties by gender & age group, Great Britain, 1988

Note: Because of rounding errors column percentages in tables do not always sum to 100%.

Gender of casualty	Age of casualty				
	0-4 %	**5-9 %**	**10-14 %**	**15-19 %**	**Total %**
Male	2002 (63.0)	5633 (66.5)	4908 (56.7)	3980 (56.8)	16523 (60.5)
Female	1176 (37.0)	2835 (33.5)	3752 (44.3)	3020 (43.1)	10783 (39.5)
Not known	1 (<0.1)	5 (<0.1)	1 (<0.1)	2 (<0.1)	9 (<0.1)
TOTAL	**3179 (100.0)**	**8473 (100.0)**	**8661 (100.0)**	**7002 (100.0)**	**27315 (100.0)**

The percentage of casualties killed or seriously injured was similar for the four age groups – 28.0% (0-4 years), 27.3% (5-9), 26.2% (10-14), and 26.6% (15-19) (Table 1.2). It is possible that the greater injury one may expect a vehicle to cause to the very young pedestrian is offset in this metric by the fact that 'slight' injury accidents to the very young may be more likely to be reported than those to older pedestrians.

Table 1.2 – Young pedestrian casualties by severity & age group, Great Britain, 1988

Injury severity	Age of casualty									
	0-4	%	5-9	%	10-14	%	15-19	%	Total	%
Killed	71	(2.2)	113	(1.3)	83	(1.0)	89	(1.3)	356	(1.3)
Serious	819	(25.8)	2199	(26.0)	1286	(25.2)	1775	(25.3)	6979	(25.6)
Slight	2289	(72.0)	6161	(72.7)	6392	(73.8)	5138	(73.4)	19980	(73.1)
TOTAL	**3179**	**(100.0)**	**8473**	**(100.0)**	**8661**	**(100.0)**	**7002**	**(100.0)**	**27315**	**(100.0)**

Figures 1.2 to 1.5 show that accidents to those young pedestrians aged 0-4 years were most common in the summer months from May to August, those aged 5-9 also common at these times but also in September and October and those aged 10-14 common in the spring and autumn. The pattern for those aged 15-19 years was more evenly distributed throughout the year, with slight increases in the winter months.

There were more casualties in each of the 4 age groups considered who sustained injury on Friday compared with any other single day of the week (Tables 1.3). Similarly, fewer pedestrians sustained injury on Sunday than on any other day. This pattern is least pronounced for those aged 0-4 years, accidents to these casualties being distributed more evenly throughout the week. Relatively high numbers of those aged 15-19 years were injured on Thursday, Friday and Saturday.

The time of day at which pedestrians were injured (Figures 1.6 to 1.9) reflects in part the times at which activity is highest. Those aged 0-4 years have a relatively 'flat' distribution with a peak in the early afternoon. Pedestrians aged 5-9 years show a small peak in the morning (08.00-08.59 hours) but are most common between 15.00 and 17.59 hours; those aged 10-14 again show two peaks, between 08.00 and 08.59, and 15.00 and 16.59 hours. The distribution for those aged 15-19 years is relatively even throughout the day, but there are noticeable peaks coinciding with time of the journey to and from school or work and late evening. It is also well known (see, for example, King *et al*, 1987) that the incidence of accidents to pedestrians by hour of day varies by season with, for example, child pedestrian casualties being relatively common on light evenings in summer.

Table 1.3 – Young pedestrian casualties by day of week and age group, Great Britain, 1988

Day of week	Age of casualty 0-4	%	5-9	%	10-14	%	15-19	%	Total	%
Sun	413	13.0)	932	11.0)	595	6.9)	664	9.5)	2604	9.5)
Mon	475	14.9)	1227	14.5)	1321	15.3)	895	12.8)	3918	14.3)
Tue	416	13.1)	1168	13.8)	1273	14.7)	904	12.9)	3761	13.8)
Wed	439	13.8)	1116	13.2)	1409	16.3)	899	12.8)	3863	14.1)
Thur	415	13.1)	1246	14.7)	1394	16.1)	1047	15.0)	4102	15.0)
Fri	525	16.5)	1452	17.1)	1585	18.3)	1409	20.1)	4971	18.2)
Sat	496	15.6)	1332	15.7)	1084	12.5)	1184	16.9)	4096	15.0)
TOTAL	**3179**	**(100.0)**	**8473**	**(100.0)**	**8661**	**(100.0)**	**7002**	**(100.0)**	**27315**	**(100.0)**

Figure 1.2 – Young pedestrian casualties aged 0-4 years by month of year, Great Britain, 1988

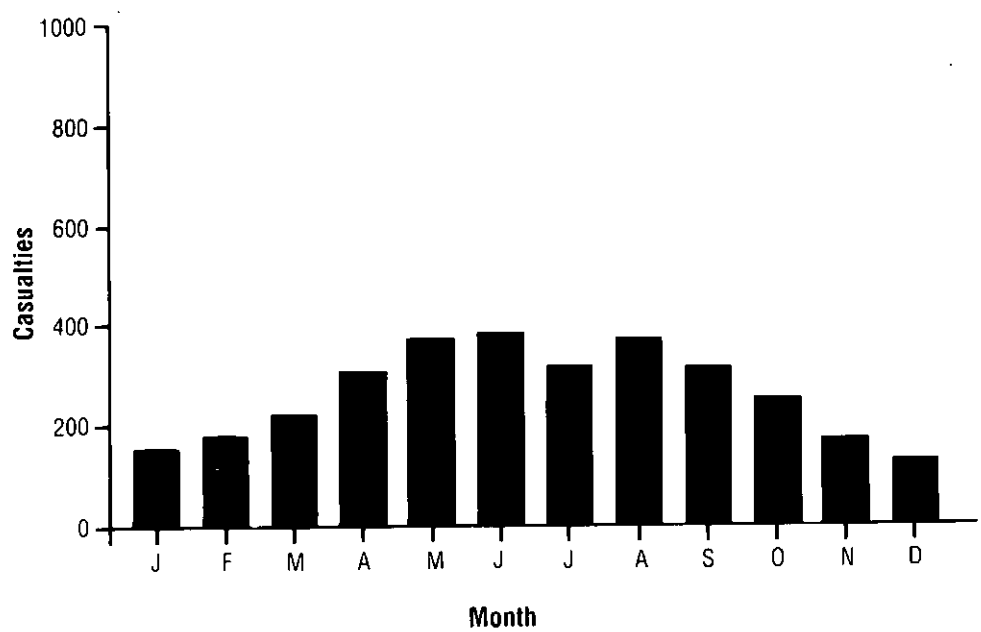


Figure 1.3 – Young pedestrian casualties aged 5-9 years by month of year, Great Britain, 1988

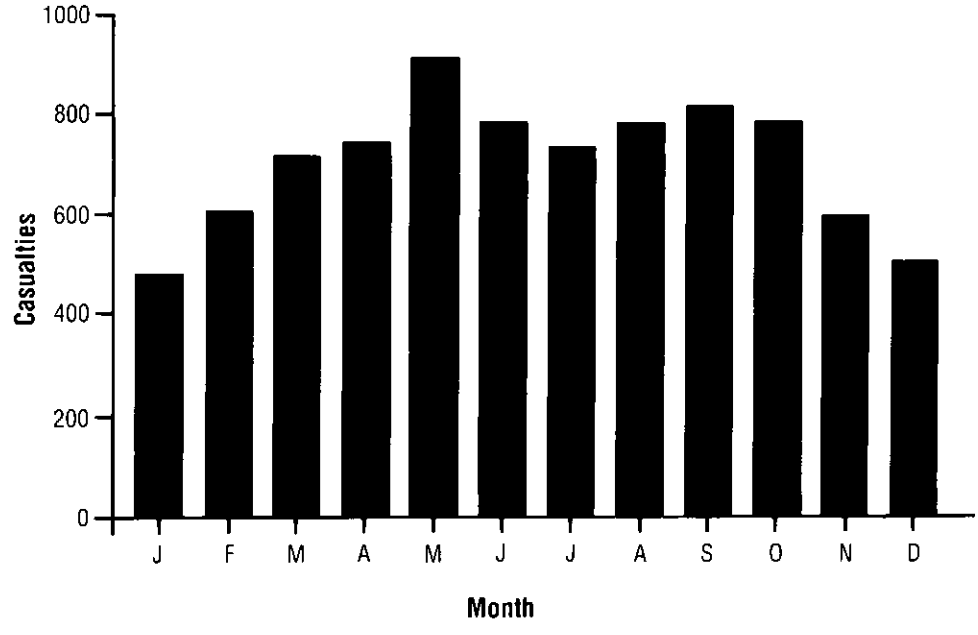


Figure 1.4 – Young pedestrian casualties aged 10-14 years by month of year, Great Britain, 1988

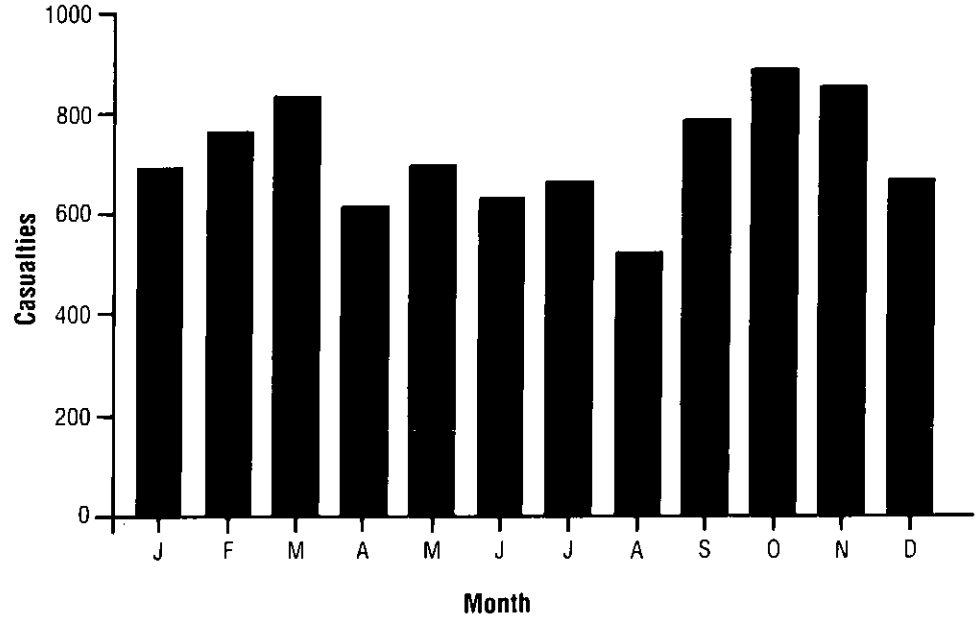


Figure 1.5 – Young pedestrian casualties aged 15-19 years by month of year, Great Britain, 1988

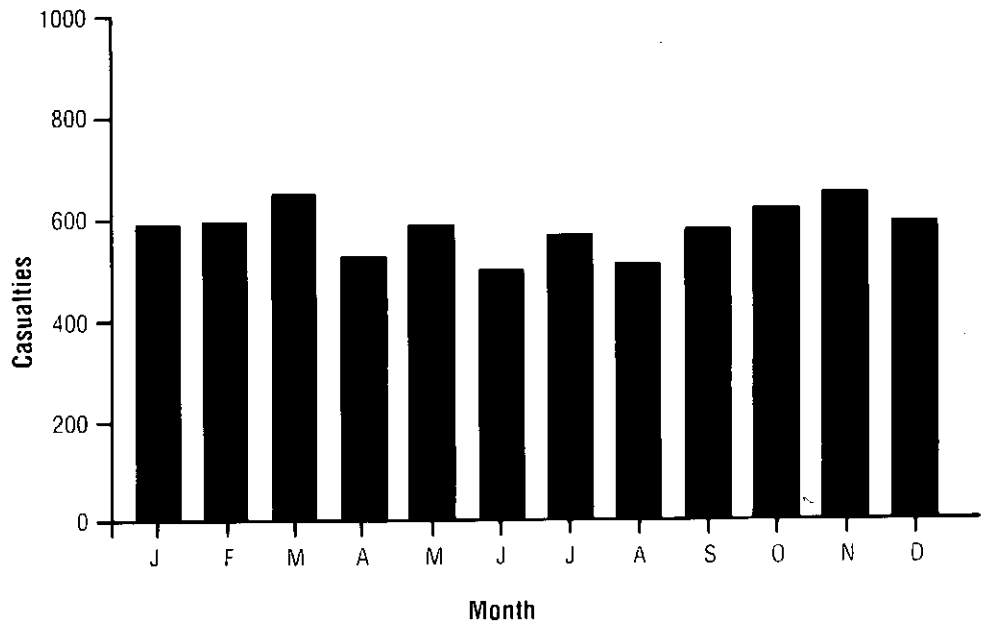


Figure 1.6 – Young pedestrian casualties aged 0-4 years by hour of day, Great Britain, 1988

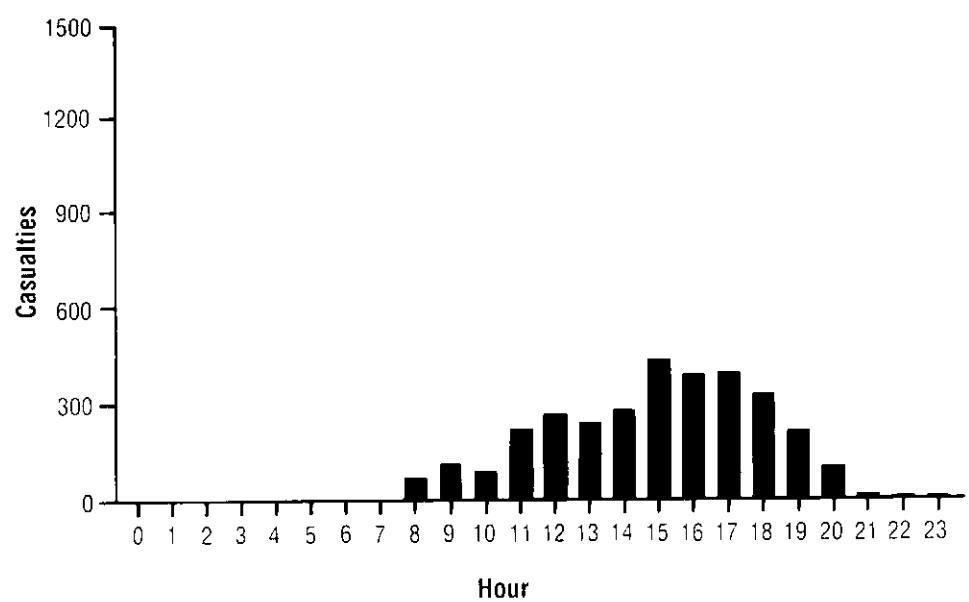


Figure 1.7 – Young pedestrian casualties aged 5-9 years by hour of day, Great Britain, 1988

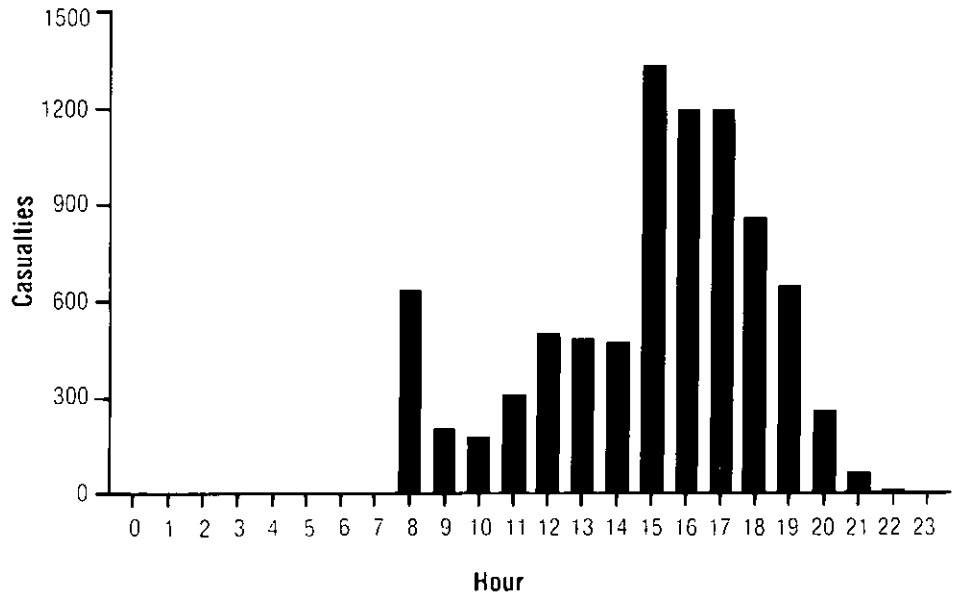


Figure 1.8 – Young pedestrian casualties aged 10-14 years by hour of day, Great Britain, 1988

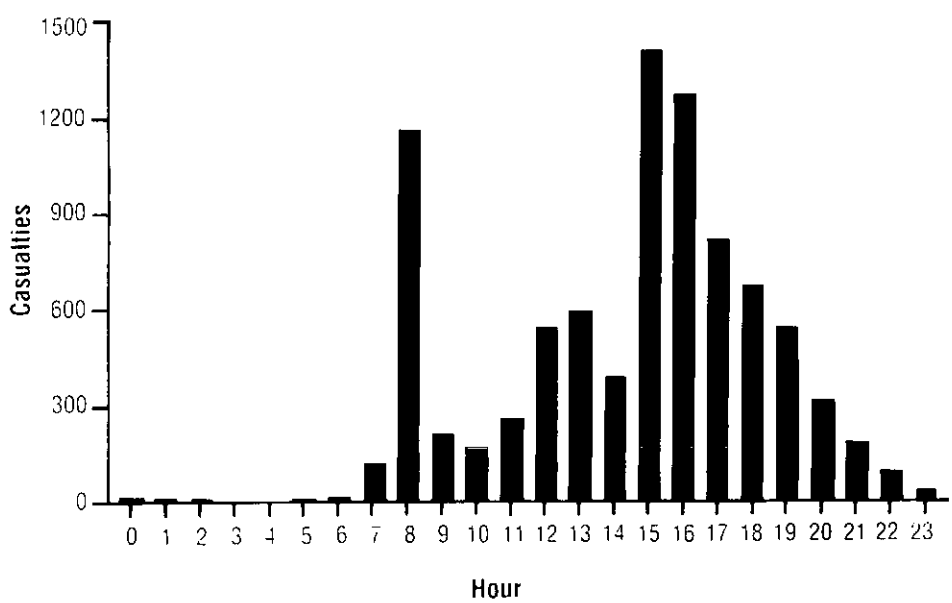
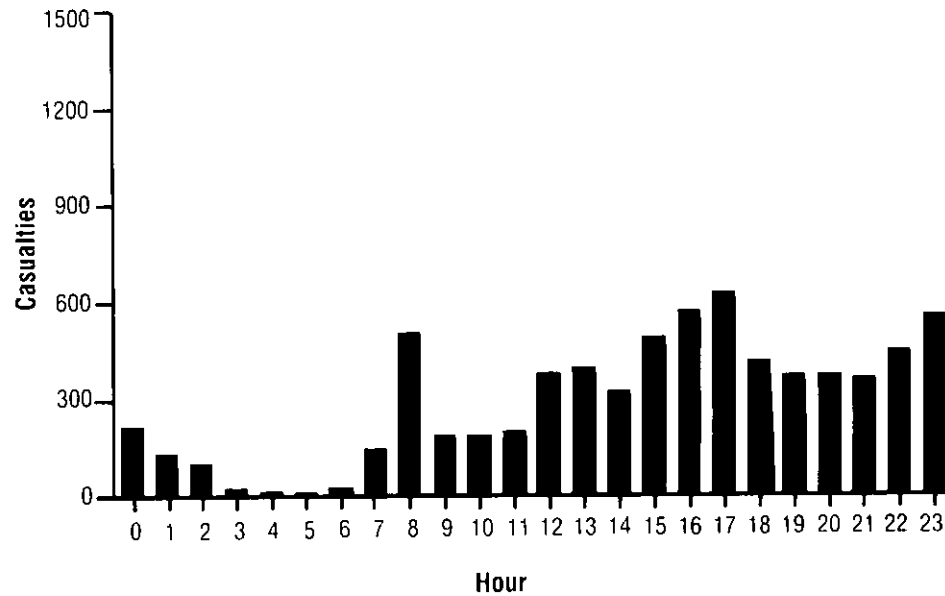


Figure 1.9 – Young pedestrian casualties aged 15-19 years by hour of day, Great Britain, 1988



1.2 Previous research and current policy

1.2.1 What is the current state of pedestrian accident research?

It is worth commenting on the state of knowledge and policy attitudes to young pedestrian accidents since this helps to provide a rationale for the direction of the research. Such a review is best dealt with in four main areas:

i an introduction about the parts of pedestrian safety research relevant to this study and where more work is needed,

ii background on the patterns and causes of these accidents and the characteristics of those at risk,

iii recent work on the research or statements of policy in traffic safety to indicate what directions the practitioner should take in accident reduction,

iv those studies closest in approach and design to the current research, from which this study can gain, and add to, by developing the body of knowledge.

The subject of the safety of young people is one which has generated an enormous amount of research over the years and so only those contributions closest in nature to the current project are considered.

In 1986, Heraty, commissioned by TRRL, provided a review of pedestrian accident research in which she drew on predominantly UK experience, but also that from overseas, in a number of key areas of pedestrian research in order to, 'suggest where deficiencies exist which could be met by further sharply focused research'. Heraty made

recommendations for further research in several areas relevant to the present study, specifically about:

i the need for further in-depth research including interviewing of witnesses and victims about specific aspects of the accident,

ii the risk to children aged 10-14 years and the need for finer disaggregation of accident data on a year-by-year of age to look more closely at their accident patterns,

iii the role of alcohol in pedestrian accidents,

iv further and more detailed analyses of Stats 19 data,

v traffic management and environmental design issues such as the effect of vehicle speeds, car parking, and modification of road layout and alignment,

vi aspects of the behaviour of the pedestrian and driver to ascertain whether or not it was 'odd' at the time of an accident, or whether a driver's hazardous behaviour was typical but led only on that occasion to an accident.

1.2.2 What are the emphases of national government?

Leading on from Heraty's work, the Department of Transport (1989b) in their guidelines, *Pedestrian Safety – new proposals for making walking safer*, outlined their focus for action. This is seen as concentrating in five main areas:

i education and training – including a 'Traffic Club' and new material for 10-14 year olds and work on 'safe routes to school',

ii traffic calming – including speed reducing measures, parking control and other measures designed to help pedestrians and re-inforce the road hierarchy,

iii conspicuity – by mounting campaigns, encouraging the use of reflective material and the use of 'dim dip' lights in vehicles which improve vehicle conspicuity without the risk of dazzle,

iv pedestrian and driver responsibilty – to discourage the consumption of excess alcohol by both parties and to improve driver behaviour towards pedestrians with respect to key aspects of the Highway Code,

v research – to do more on accident causation, the siting of pedestrian crossings, improving methods of assessment of danger to children, further work on behaviour of teenage pedestrians and on the design of road layout, vehicle front-end design and other pro-pedestrian engineering measures.

In *Children and Roads: a Safer Way* (Department of Transport, 1990) new proposals are outlined for reducing child casualties on our roads. That document gives details of methods of:

i making roads safer using methods of urban safety management including 'traffic calming' measures and 20 mph speed limits, and the Government's intention of:

ii encouraging better driving both by methods such as those described above and by making drivers more aware of their responsibilities,

iii promoting pre-school training and education in schools,

iv involving Government, local authorities, police, private sector, voluntary organisations, schools, teachers and parents in this work.

1.2.3 What 'causes' these accidents?

Sabey and Taylor (1980) were responsible for one of the most frequently cited pieces of work in accident causation in the UK. They showed that in over a quarter (28%) of all accidents a component of the road environment was a contributory factor, that very few vehicle factors played a part in accidents (less than 9% of accidents) and that road-user behaviour was a contributory factor in over 94% of accidents. These percentage contributions are not mutually exclusive.

The first contract awarded by The AA Foundation for Road Safety Research, which started in 1987 in Leeds, was a study of contributory factors in urban road traffic accidents. The report of this study (Carsten *et al*, 1989) considered 1254 injury accidents occurring in 1988 using information from police files, questionnaires to accident 'participants', site visits and case conferences convened to discuss individual accidents. They used a multi-level scheme of analysis to code accident cause and found at the first level of causation that 16% of accidents resulted from drivers/riders 'failing to yield', a further 10% failing to perceive another road user in their path in time to prevent an accident and 44% of drivers and riders deemed to be innocent victims of others' mistakes.

Carsten *et al* found that failure of a pedestrian to yield accounted for 66% of the factors coded for adult pedestrians and 78% of those coded for child pedestrians. Only 23% of adult pedestrians and 11% of child pedestrians were found to be innocent victims of others' mistakes.

In addition to the data supplied from the above studies, many local authorities are able to provide data on accident 'cause' from entries on the Stats 19 form. For example, in the West Midlands the Stats 19 form contains three fields for a choice to be made from 98 options of 'accident causation'. The main fields relating to pedestrians are, 'Walk, step or run from footway', 'Crossing heedless' and 'Masked by stationary vehicle'.

Such codes are often inadequate to describe the complexities of a road accident and are 'suggestive' rather than 'definitive' and some examples of the way in which they are used are examined in Section 2.

1.2.4 What are the characteristics of those at risk?

Tight (1987) provided an extensive review of the characteristics of those involved in pedestrian accidents, some of which are summarised in Table 1.4.

King *et al* (1987) added to this picture in their study of the ten areas in the West Midlands where accidents to young pedestrians are most common, showing that these tended to be inner city areas. Not surprisingly, they found also that there were associations which are expected of accidents occurring in the inner city – these were also areas

of high unemployment, of terraced housing, and areas where there are relatively high numbers of ethnic minorities. Additionally, over 40% of the accidents they studied involved a parked car, almost 60% of those involving a child under 5 years old.

In West Yorkshire HETS (Highways Engineering and Technical Services) Joint Committee has produced an unpublished report (HETS, 1988) of accidents to child pedestrians in Bradford. That report showed very high accident rates for children in that area, that only one-third of these accidents occurred on 'A'and 'B' class roads and that, 'Out of every ten children injured, eight of them were knocked down virtually on their own doorstep.' About two-thirds of drivers lived within 5 kilometres of the accident scene. Their study showed that 57% of casualties were of European and 43% of Asian origin.

Table 1.4 – Selected accident studies reviewed by Tight (1987)

Author(s)	Year	Location	Summary of main findings
Grayson	1975	Hampshire	Older children knocked down further from home than younger ones. Cause – usually lack of concentration rather than misjudgment.
Wallin	1979	Denmark	Little supervision given to pedestrians who become casualties.
Manheimer & Mellinger	1967	USA	Accident liability linked to extraversion, daring, 'rough-housing', poor discipline, aggressiveness.
Backett & Johnson	1959	Belfast	Accident liability linked to household illness, maternal pre-occupation, domestic crowding, lack of protection, lack of play facilities.
Bocher	1978	Essen	Linked to low SEGs, high numbers of children, high density of traffic in neighbourhood, several other indicators of urban deprivation
Preston	1972	Manchester	Linked to indices of social class, overcrowding. Boys more at risk than girls.
Lintell	1979	London	Less affluent more at risk. Casualties more likely to be aggressive, show instability under stress, be expected to shoulder unreasonable responsibility.

There has been comparatively little research on the incidence of road accident casualties to members of ethnic minority communities. The concern and need for information on such road users is focused on two main topics. Firstly, until the last 5 or 10 years there was little or no road safety educational material available in any language other than English and this was of limited value to some ethnic minority families. Secondly, recent arrivals in the UK from more rural environments in the

Indian subcontinent and elsewhere may not be well-equipped to deal with the level and complexity of traffic in the UK. These are major issues in discussion of road safety provision in many conurbations in the UK.

Apart from the HETS work, mention should be made of the study by Lee (1986) who has linked ethnic origin of casualty to population statistics and considered children in Rochdale metropolitan borough who had been detained in hospital as a result of a road accident. He showed that in an 8 month period in 1986 (January to August) the number of accidents per head of population for those under 16 years was approximately twice as high for those of Asian origin compared with the remainder. Similarly, he showed that, per head of population, pre-school children of Asian origin were approximately three times as likely to be involved in a road accident as their non-Asian counterparts and school-age children under 16 years in Rochdale about twice as likely. In his (unpublished) note he did not distinguish by road-user type and this would be an area of research worth pursuing. Lee's work is a valuable contribution to the description of road accidents in the north of England but it is worth noting that by only analysing data for the first 8 months of the year there will be some seasonal bias in this work, possibly including an over-representation of young pedestrians.

1.2.5 Where do accidents to young pedestrians happen?

In 1.1.3 pedestrian accidents were described as an overwhelmingly urban problem and many authors (including some of those listed in Table 1.4), when considering large conurbations, have pointed to the concentration of these accidents in the inner city. This was demonstrated clearly in the earlier report in this series (Lawson (1989) – almost half of all accidents occurring in selected inner areas involved child pedestrians), but is also expanded upon in Section 2 of this document.

Although accidents to the younger age groups are common in inner areas (and on other minor roads), with increasing age the distribution of accidents to young pedestrians becomes more evenly spread over the road network. This is discussed at length elsewhere in the report. Patterns may also differ if smaller urban areas are being considered. For example Faulkner (1975) considered accidents in a variety of sizes of towns and cities and drew attention to young pedestrian casualties in residential areas.

One unit of analysis for the study of accidents to young pedestrians has been the type of residential area in which they occur. For example, a TRRL leaflet (TRRL, 1977) showed that the accident rate to the 5-9 year-old age group was the biggest found in residential area accidents and 15-20 times larger than that of the 17-59 age group. Later work (Bennett and Marland, 1978) showed that there was little difference in the exposure of children on different types of street and that child pedestrian accident rates in culs-de-sac were very low. Crompton (1982) made studies of pedestrian exposure to risk in housing estates showing that, per head of population, those aged 5-9 had greatest risk, followed by those aged 10-15.

Tight (1987) made several locational and exposure studies of accidents to child pedestrians in the areas of the TRRL Urban Safety Project (see 1.2.8). Other than this, and other small pieces of work (such as that by Driscoll and Ashton (1981) of school journey accidents and their proximity to the school), and some studies of accidents at pedestrian crossings, there has been surprisingly little descriptive analysis of accidents to young or child pedestrians according to the type of location at which they occur. It would be helpful if there were additional research on young pedestrian accidents and their relationship with land-use, road standard, and other physical features.

1.2.6 How do drivers and pedestrians behave and interact?

Throughout the 1970s and 1980s there has been a series of research papers on the subject of accidents to young pedestrians from Nottingham University. These are mainly concerned with exposure to risk but also include work on driver and pedestrian behaviour and legal issues about priority of pedestrians over vehicles.

Howarth *et al* (1974) and Routledge *et al* (1974) showed that the greater number of accidents to boys aged 5, 6, and 7 is not simply due to their greater exposure but linked to the nature of their activities.

Howarth and Repetto-Wright (1978) have argued that children are actually seldom 'heedless' and 'careless' in crossing the road and that, on the contrary, they are indeed exercising every care they can. They suggest that greater responsibility in law should be placed upon drivers who 'knock children down'. This issue is discussed at greater length later in this report.

Thompson *et al* (1985) showed that the presence of children on the kerbside had no effect on either the road positioning or the speed of drivers as they passed, indicating strongly that drivers were inadequately prepared for the unpredictable behaviour of child pedestrians. Howarth (1985) stated that these findings are, 'in flat contradiction to the retrospective evidence given when accidents have occurred' (drivers often reporting that they have taken all possible care or not seen the pedestrian before the accident).

Howarth and Gunn (1982) recommended that one means of reducing accidents to the younger child pedestrians would be to give those children under, say, between 9 and 11 years special protection in law. For these children, all roads in residential areas would have the same status as Zebra crossings and, effectively, all accidents occurring thereon would be deemed to be overwhelmingly the fault of the vehicle driver, no matter the 'cause' of the accident.

This idea has its attractions, but also its opponents. Morris (1987) has pointed out some drawbacks to presuming driver negligence in residential areas. He argues that the reasoning is flawed because on-street parking is often a contributory factor in accidents in these areas. Parents may assume the area is 'automatically' safe for play (as may children) and take no care at all, and drivers, although taking care in residential areas, may somehow compensate and drive dangerously once they leave them. In the UK the system of law is based upon proof of negligence which in turn is built upon fault.

Morris gives the example of a child running heedlessly into the road and says there is no just reason to assume that the driver must have been negligent. It is also difficult to see how this modification to the law could cope with children playing 'chicken' or deliberately lying down in front of vehicles.

Nevertheless, the idea of areas other than pedestrian crossings as places of pedestrian precedence has its attractions and it would be worthy of further thought by those working in this field, rather than outright dismissal. In the United States the school bus is a 'special case' in law when stopped for children to board or alight – vehicles overtaking a school bus at this time and striking a child have greatly increased liability in law. It could be that there is potential for parallels to be drawn from this legislation.

1.2.7 What are the injury consequences of these accidents?

In 1986 Galasko *et al* reported for TRRL on the consequences of road accidents in terms of injury and long-term disability. Their report is of relevance to the present research, providing as it does a basis for comparison. Briefly, they considered every patient attending the Accident and Emergency Department at Hope Hospital in Salford between January 1982 and December 1983 as a result of a road accident. Of the 1593 attending, 222 (13.9%) classified themselves as disabled as a result of the accident. Sixty-one of these were pedestrians. Unfortunately, the age distributions of these casualties is not specified but pedestrians suffered the highest incidence of long-term disability as a result of their accident, followed by vehicle occupants, motor cyclists and pedal cyclists.

Galasko *et al* found that there was some correlation between age and long-term disability, pedestrians having the highest mean age and highest incidence of disability. The Abbreviated Injury Scale (American Association of Automotive Medicine, 1985) was of little use in predicting the development of long-term disability. There was a correlation between in-patient stay and development of disability. Injuries associated with the highest incidence of long-term disability were soft tissue injuries to the cervical spine and closed fractures to the lower limbs (the latter being particularly common in casualties involved in pedestrian accidents).

1.2.8 Are there opportunities for engineering remedial action?

For most of the 1980s the TRRL has been funding research in their Urban Safety Project in 5 urban areas of England. This research has been designed to demonstrate the benefits of area-wide measures in controlling and directing traffic on both main routes and in residential areas. The treatment areas involved vary in size, but were about 7 square kilometres on average, each having approximately 100 injury accidents annually. A particular feature of this work has been that it has been largely concerned with 'mopping up' widely scattered distributions of accidents. This has been in contrast to the more traditional approach of tackling sites where accidents concentrate in clusters, and as such is particularly appropriate for accidents involving young pedestrians since these accidents tend not to cluster at sites as some other types of accidents do.

The final report of the project (Mackie *et al* (1990)) indicated a reduction of 13% in accidents overall and likely first year rates of return on typical schemes of 30-40% and benefit cost ratios of around 3 over their first five years. Benefits accrued to all road-users and it is considered that, if adopted generally in urban areas, the approach has the potential to save about 5% of the national accident total. The authors commented that greater benefits could probably be gained by more extensive implementation of the measures used but that the (small) restrictions in mobility would probably not be socially acceptable. This is an area where there is much need for public consultation since, almost inevitably, reduction in traffic in one area leads to increases elsewhere, and even if these increases do not lead to accidents they are likely to be perceived as a disbenefit to those living adjacent to the route.

Guidelines on Urban Safety Management (Institution of Highways and Transportation, 1990) for practitioners have been produced, largely as a result of the work from the Urban Safety Project, and consideration of practice elsewhere. Reference is made to this document in Section 5.

Much of the current thinking in this field focuses on reductions in vehicle speeds. The need for reduction of vehicle speeds is generally recognised, not only because it reduces the *opportunity* for accidents but because it can reduce their consequences in terms of injury to the pedestrian. Ashton *et al* (1977) showed that, for children, all the injuries sustained in the impact speed range 0-20 kmph (0-12 mph) were minor (scoring only one on the Abbreviated Injury Scale, full details of which are provided in Section 4). In the 20-40 kmph speed range 45% sustained minor injuries and in the 40-60 kmph speed range only 19% sustained minor injuries.

As a part of the drive to make UK local authorities more aware of the methods and benefits of speed reduction, the County Surveyors' Society Special Activity Group on Accident Reduction established a working party to collate information about practice in this area. This group reported in 1990 (County Surveyors' Society, 1990) but it is apparent that relatively few authorities have come forward with information about the benefits of this type of work in terms of accident reduction. This may be due in part to the fact that speed reduction is a relatively new activity and the 'after' periods in any analysis are likely to be very short for some time to come. It would also appear that many are still at the stage of experimenting with methods and that at the time they started there were no generally available guidelines giving details of available strategies and the best way to proceed. In time it is hoped that good information will come forward on the effect of treatment on accidents, vehicle speeds, and on the volumes diverting to find quicker route alternatives.

Part of urban safety management is the topic of 'traffic calming'. Mathew (1990) has summarised a recent conference on this topic, and suggests that many such schemes arose out of urban renewal and that, according to two of the contributors, its main objectives are to:

i reduce accidents,

ii reclaim carriageway space for non-traffic activity,

iii create greater feelings of security,

iv create environmental improvements.

Mathew listed several examples of traffic calming in this country and abroad and discussed some of the issues involved with putting in schemes and how important it is that measures are tailor-made to solve problems so that pedestrians (and occasionally cyclists) benefit.

Several bodies have been raising consciousness in this and related topics recently. Apart from the Guidelines on Urban Safety Management, the Institution of Highways and Transportation has been active in producing a set of guidelines for pedestrianisation (Institution of Highway Engineers, 1989).

Similarly, there have been contributions from organisations such as the Parliamentary Advisory Council on Traffic Safety who organised a symposium *(Speed, Accidents and Injuries: Reducing the Risks)* in July 1990. The Institution of Civil Engineers has organised symposia on walking in May 1988 (*Pedestrian Safety*) and again in June 1990 *(Walking into the '90s)*.

At a more general level, the Child Accident Prevention Trust has been producing news letters and fact sheets, conducting small research studies and organising seminars on accidents to children.

1.2.9 What of action in education, training and publicity (ETP)?

Local authorities in England and Wales frequently run education, training and publicity campaigns of various kinds to tackle accidents to young pedestrians. A full review of this topic is outwith the scope of the present study but it is relevant to mention some recent initiatives in this field.

In recent years there have been efforts to develop road safety ETP in the school curriculum and to foster good practice in schools. To this end, demonstration trials have been organised in Hertfordshire and Sheffield, with the Department of Transport and the Department of Education and Science working together. RoSPA has been involved in this work with a programme called *Streets Ahead,* produced in 1989 and sponsored by SPAR (a nationwide chain of grocery stores), which is designed to be used within the National Curriculum in Personal and Social Education.

At a local level, one new and popular method (Belcher *et al,* 1987) of education and publicity used in Birmingham has involved running a 'Public Awareness Campaign', usually in conjunction with the implementation of an engineering accident remedial measures scheme. These are usually focused in a particular area or at a specific site and designed to draw attention to the scheme and elicit good behaviour from the road users it affects. In addition, there are activities linked to the results of the present project, already underway in Birmingham, which use a cartoon character 'Bobby Bottle' sponsored by the CO-OP (another nationwide retailing organisation) to draw attention to the high risk behaviours identified in this study. Both are good examples of 'data-led' ETP.

Tight (1987) has conducted a thorough review of work in education, training and publicity aimed at the younger pedestrian. He highlights two main criticisms of work to date in that there has been very little substantiation of the behavioural effects on children of most of the teaching methods used and that there has been little evaluation of the teaching methods used.

This lack of information about the effectiveness of ETP is disappointing because it makes it difficult to know which techniques are more worthwhile than others. However it certainly does not negate the necessity of doing this kind of work because education in its many forms underlies and is a necessary part of all human experience.

1.2.10 Is there recent evidence of developments in analysis techniques?

Two pieces of work relevant to the present research are those conducted by Gloyns and Rattenbury (1989) and Gloyns *et al* (1989) of reports of HM Coroners in England and by Engel (1988) in Scandanavia. Rattenbury and Gloyns have been making a series of vehicle occupant injury studies with a view to suggesting injury-reducing countermeasures for vehicle design. Their studies have shown the benefits of working from the records of HM Coroners and using pooled data to look for countermeasures.

Engel's work is a detailed analysis of 22 fatal road traffic accidents involving children between 2 and 15 years of age who were killed as pedestrians or cyclists. Working from detailed police records, she developed case studies of those involved and pictures of accident causation. Although her sample is very small, and it is not clear how representative it is, the study is interesting as an example of a method of seeking out and portraying accident data.

Within the last few years the Scottish Development Department (SDD) have commissioned a study (Scottish Development Department, 1989) by the MVA consultancy to consider the higher-than-expected level of accidents to child pedestrians in Scotland. Their study took the form of both interviews with casualties and their families and observations of the road crossing behaviour of those at risk. They found (perhaps not unsurprisingly) that most children in Scotland did not cross the road the way they are taught, that the general standard of children's roadsense is very poor and that running across the road and not looking for traffic were the most common causes of accident.

The SDD also noted how little the basic models of road crossing behaviour put forward in *The Highway Code* are used, the noticeably poorer behaviour of boys compared with girls, and the fact that although older children cope better with traffic they are frequently in situations which place heavier demands upon their behaviour. Gender differences were apparent. Boys were found to be less likely to look before crossing, more likely to cross between parked cars, and were less likely to be accompanied by adults. Boys aged 7 years old were thought to have many of the typical characteristics and problem behaviours of the young pedestrian. Additionally, children with hearing disabilities were estimated to be 30 times more likely to be knocked down than children with good hearing. The MVA report suggests a

series of educational and engineering measures and the promotion of accompaniment.

Working independently of the SDD, the TRRL employed Halcrow Fox and Associates (Halcrow Fox and Associates (1989) and Coombe and Strankalis (1989)) to develop and test a methodology for an in-depth and retrospective study of accidents to (all ages of) pedestrians. Their methodology has been relatively successful and parts are included in the present work.

Part of the work of Halcrow Fox and Associates involved sending self-completion questionnaires to pedestrians and relevant drivers in London a short time after the accident occurred. They also sent to any witnesses involved. Overall, of 115 questionnaires despatched, 81 people (70.4%) responded to the postal questionnaire and the cumulative response was boosted to 91 (79.1%) by the use of a face-to-face interview. They commented that the information gathered was far more comprehensive than that available from the Stats 19 or from a scene visit and that only in about a quarter of accidents was it felt that the true cause(s) could be obtained from police records.

The report of the results of this study (as opposed to the methodology) was not available at the time this document was being produced.

1.3 Summary – national statistics, previous studies and future research needs

National Stats 19 data have been analysed, showing that in 1988 young pedestrians represented 8.4% (27,315) of all those injured on roads in Great Britain, 96.6% (26,389) of all young pedestrian casualties in Great Britain in 1988 being injured on roads in urban areas. In 1988, pedestrian casualties accounted for 32.5% (356) of road accident fatalities in the age group 0-19 years.

The casualty rate per head of population of the individual age groups for those killed or seriously injured in Great Britain is now lowest for those aged 0-4 years, and about half of that of those aged 15-19 year and one-third that of both those aged 5-9 and 10-14 years. The casualty rate for those aged 0-4 and 5-9 has been decreasing over the last 17 years, the casualty rates of those aged 10-14 and 15-19 have fluctuated over recent years.

Of the 27,315 pedestrians aged 0-19 years injured on the roads of Great Britain in 1988, 3179 (11.6%) were aged 0-4, 8473 (31.0%) aged 5-9, 8661 (31.7%) aged 10-14 and 7002 (25.6%) aged 15-19 years.

Male casualties were more common than female, forming 63.0% (0-4 years), 66.5% (5-9), 56.7% (10-14), 56.9% (15-19 years), and 60.5% of all casualties.

The percentage of casualties killed or seriously injured was similar for the four age groups – 28.0% (0-4 years), 27.3% (5-9), 26.2% (10-14), and 26.6% (15-19).

Young pedestrian casualties aged 0-4 years were most common in the summer months from May to August, those aged 5-9 also common at

these times but also in September and October and those aged 10-14 common in the spring and autumn. The pattern for those aged 15-19 years was more evenly distributed throughout the year, with slight increases in the winter months.

There were more casualties in each of the four age groups considered who sustained injury on Friday compared with any other single day of the week. Similarly, fewer pedestrians sustained injury on Sunday than on any other day. This pattern is least pronounced for those aged 0-4 years, accidents to these casualties being distributed more evenly throughout the week. Relatively high numbers of those aged 15-19 years are injured on Thursday, Friday and Saturday.

Those aged 0-4 years have a relatively 'flat' distribution with a peak in the early afternoon. Pedestrians aged 5-9 years show a small peak in the morning (08.00-08.59 hours) but are most common between 15.00 and 17.59 hours; those aged 10-14 again show two peaks, between 08.00 and 08.59 and 15.00 and 16.59 hours. The distribution for those aged 15-19 years is relatively even throughout the day but there are noticeable peaks coinciding with time of the journey to and from school or work and late evening.

An extensive review of recent literature has been combined with a discussion of current policies and practice. This has shown that, generally, a lot is known of the types of young people at risk in these accidents – typically they involve members of low SEGS, more boys than girls, with those aged 5-9 and 10-14 more at risk than those aged 0-4 and 15-19 years.

At a relatively superficial level it is understood that these accidents involve careless or impetuous behaviour, pedestrians failing to take account of traffic, and vice versa, and are linked to many indices of social stress.

However, additional analyses are required and other sources of data are needed to complement Stats 19 information. For example, until recently there has been comparatively little in-depth work to ascertain children's activities at the time of an accident and more work on causation is required.

Similarly, there is very little information available on teenagers over the age of 14 years, the role of alcohol in young pedestrian accidents and the characteristics of the drivers of vehicles involved in these accidents.

More information is also required on the long-term consequences of pedestrian accidents, but one study has shown that pedestrian casualties sustain a higher incidence of long-term disability than other road-users.

Very few of the studies identified provide information about the issues and problems concerned with reducing these accidents in the inner cities. Additionally, there is a scarcity of information on the involvement of ethnic minorities in road accidents but indications that they are over-represented in certain types of accident. The lack of information on this subject is surprising in the light of the fact that many

strategic planning authorities hold data by ethnic origin to enable decisions to be made about provision of services in health care, housing and employment opportunities.

Much of the research on accidents to children and to young pedestrians is of a demographic nature but has not been 'locationally-based' – comparatively little thought has therefore been given to specific types of site where these accidents happen, and therefore what countermeasures are available.

Some targets for remedial measures have been identified. The Guidelines on Urban Safety Management (Institution of Highway Engineers, 1990) does much to explain how to show how to determine priorities, devise policies and gain public acceptance for these measures.

However, other than the initiatives by TRRL on the Urban Safety Project and the County Surveyors' Society through SAGAR (which has made efforts to collate the activities of local authorities), there has been little formal reporting of research activity in the area of seeking appropriate remedial measures.

There is a need for evaluation of the benefits of road safety education and training.

1.4 Conclusions

Several areas of this topic require further research. In the light of the above comments, and the interests of the bodies participating in this research, there would be particular benefit in gaining information from new data sources and making analyses of accidents on a locational basis.

Additionally, information on the characteristics of drivers and (especially) 'older' young pedestrians appears to be sparse and therefore worth collecting. Similarly, accidents common in some of the larger cities in the UK, such as those accidents involving ethnic minorities, have not been studied in detail and it would be useful to have more information on some of these issues.

2 Analysis of police (Stats 19) records

In this Section the nature of the West Midlands metropolitan districts is briefly described and, using previously published research, accidents in this area compared with those elsewhere. The Stats 19 data base for accidents to young pedestrians in Birmingham is analysed. Information is provided about who was injured, and when and where accidents happened. Police officers' descriptions of causation factors in these accidents are examined and information provided about the vehicles and drivers involved in these accidents.

2.1 Study area: its geography and accidents

The West Midlands metropolitan districts are predominantly urban in nature and this is reflected in the type of accidents occurring in the area. There are a relatively high number of accidents involving pedestrians compared with Great Britain as a whole. Birmingham, the largest district, has about four times the number of casualties of each of Coventry, Dudley, Sandwell, Walsall and Wolverhampton, these five districts having broadly similar areas, population and road lengths. Solihull is more rural than the other districts, has fewest accidents, but relatively more involving drivers and passengers of cars and fewer involving pedestrians.

It would seem likely that research conducted in the West Midlands is relevant to many areas of the UK. The first report in this series, a review of *Traffic Collisions in an Urban Area of Great Britain* (Lawson, 1989), compared the characteristics of accidents occurring in 1986 in various urban areas of Great Britain and described those in Birmingham and the West Midlands within this context. That study showed (Table 3c of **that** document) that, in the West Midlands, for all types of road-users studied, the number of casualties injured per head of population was of the same order of magnitude and (certainly not at the extremes of the range) as the mean values for all English metropolitan areas. That study also showed that (Table 3b of the earlier report), in terms of the percentage that various casualty types formed of any casualties in a given metropolitan area, child (0-14 years) pedestrians were relatively common in the West Midlands (11.7% of all casualties), with only Tyne and Wear exhibiting a higher percentage (14.6%). Compared with 'all urban road accidents in Great Britain' the West Midlands districts had relatively fewer road-user casualties who were cyclists (10.2% in Great Britain compared with 7.7% in the West Midlands) and TWMV (two-wheeled motor vehicles) users (18.0% compared with 12.8%) and more car occupants (39.8% compared with 44.2%).

It is probably justifiable to describe the roads in the West Midlands metropolitan districts as 'typical' of their type on the grounds that design standards are such that they vary comparatively little by area of the country and that such differences as do exist do not necessarily have a dominant influence on accidents. In all but 2 of the West Midlands metropolitan districts 95% or more of the roads are urban in

nature (having a speed limit less than or equal to 40 mph), the exceptions being Walsall and Solihull (90% and 72%, respectively).

What does differ by area of country is the mix of any road type in an area and, although the West Midlands districts almost certainly has a good representation of all of these, it probably has more than most of urban dual-carriageway and inner-city streets.

Again, to draw on evidence from the earlier report, accident **rates,** although differing from other areas of the country (probably because the samples examined, and the traffic volumes in the samples were different, rather than because of any inherent differences in road-user behaviour or other causative factors), showed similar patterns when ranked and compared with similar features in other areas of the country (Tables 9b, 9d, and 9e, again, of the earlier report).

2.2 Accidents to young pedestrians in Birmingham and the West Midlands

2.2.1 Trends and aggregated statistics

The introductory paragraphs of Section 1.1.1 described the national trend in accidents to young pedestrians. In the West Midlands metropolitan districts the picture (Lawson and Proctor, 1989) is similar.

The numbers of young pedestrians injured in Birmingham, the West Midlands metropolitan districts and in Great Britain in 1988 are presented in Table 2.1. It can be seen that those aged 0-4 years formed about 10% of the total, those aged 5-9 and 10-14 years about one-third each of the total and those aged 15-19 about one-quarter. Interestingly, these proportions vary very little by each of the areas considered, indicating that in this respect accidents local to this study are representative of those in Great Britain as a whole.

Table 2.1 – Young pedestrian casualties in Birmingham, West Midlands and Great Britain, by age group, 1988

Age	Birmingham		West Midlands Met. Districts		Great Britain	
0-4	91	(11.7%)	198	(11.1%)	3179	(11.6%)
5-9	264	(33.8%)	571	(32.1%)	8473	(31.0%)
10-14	253	(32.4%)	587	(33.0%)	8661	(31.7%)
15-19	173	(22.2%)	423	(23.8%)	7002	(25.6%)
TOTAL	**781**	**(100.0%)**	**1779**	**(100.0%)**	**27315**	**(100.0%)**

Table 2.2 illustrates the number of casualties in the individual metropolitan districts of the West Midlands. The age distributions are similar although the absolute numbers involved varies in line with the size and nature of the district. Throughout this document emphasis will be on the analysis of accidents in Birmingham, but in Section 4 the analysis is extended to include Coventry, Sandwell, Wolverhampton and Walsall.

Table 2.2 – Young pedestrian casualties in individual West Midlands districts by age group, 1988

District	Age of casualty				
	0-4	5-9	10-14	15-19	Total
Birmingham	91	264	253	173	781
Coventry	23	64	64	37	188
Dudley	17	39	63	54	173
Sandwell	24	74	75	49	222
Solihull	4	12	22	25	63
Walsall	18	54	50	41	163
Wolverhampton	21	64	60	44	189
TOTAL	**198**	**571**	**587**	**423**	**1779**

Figures 2.1 to 2.4 illustrate the distribution of the four age groups of pedestrian accidents in Birmingham against a background of the 'A' class network (Motorways and other roads, classified and unclassified, have been omitted for fear of causing 'clutter'). Accidents to those aged 0-9 years are particularly common in the inner areas (but not the City Centre itself) in a 'distorted horseshoe' shape stretching from the north-west, through the north and east, to the south of the City. As the age of casualty increases the pattern of accidents becomes less concentrated on the inner areas and more distributed throughout the City. It is noticeable that a relatively high proportion of those accidents to pedestrians aged 15-19 years, compared with those aged 0-14 years, occurs on the 'A' roads and in the City Centre.

Figure 2.1 – Pedestrian casualties aged 0-4 years in Birmingham, 1989

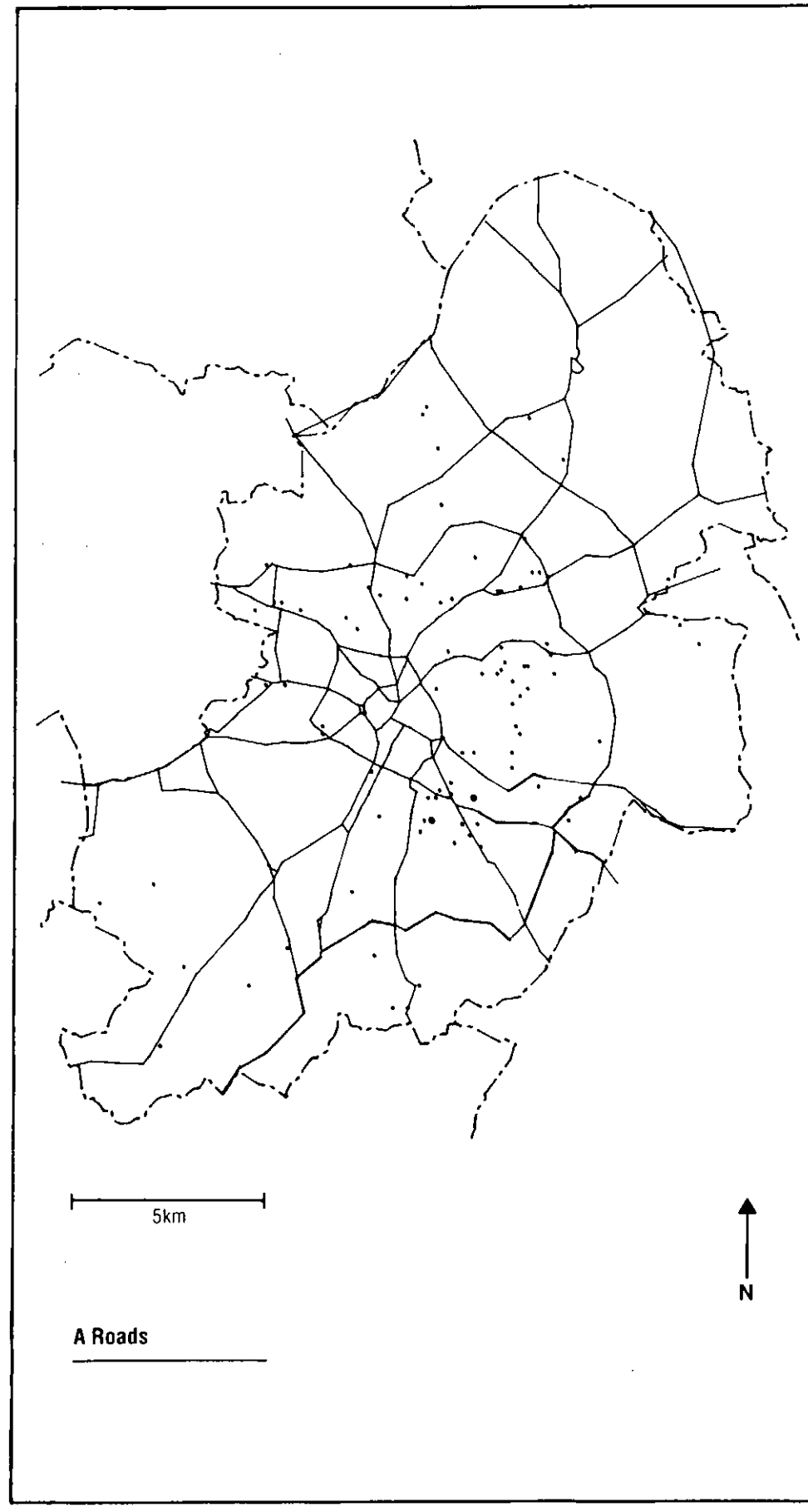


Figure 2.2 – Pedestrian casualties aged 5-9 years in Birmingham, 1989

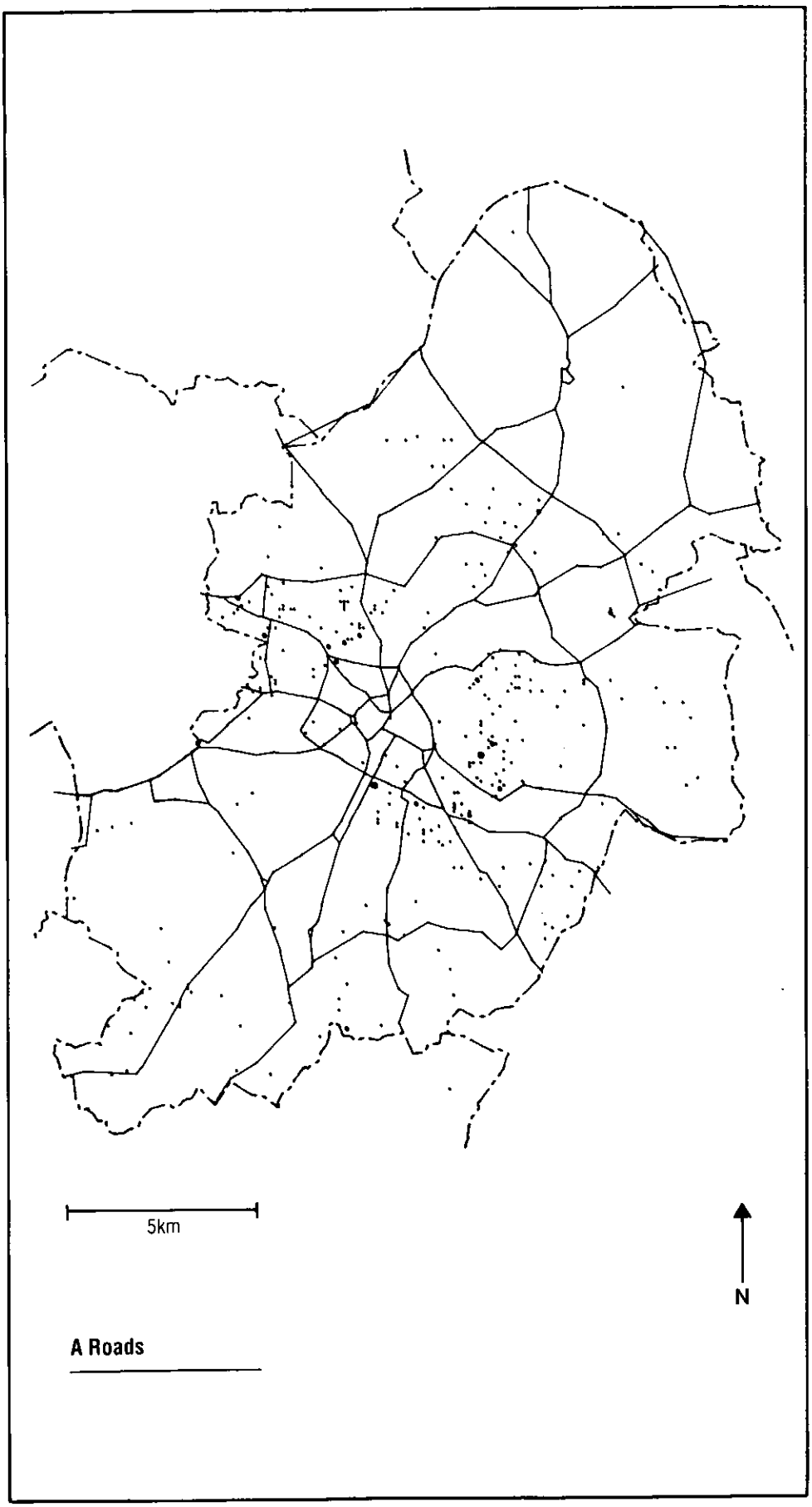


Figure 2.3 – Pedestrian casualties aged 10-14 years in Birmingham, 1989

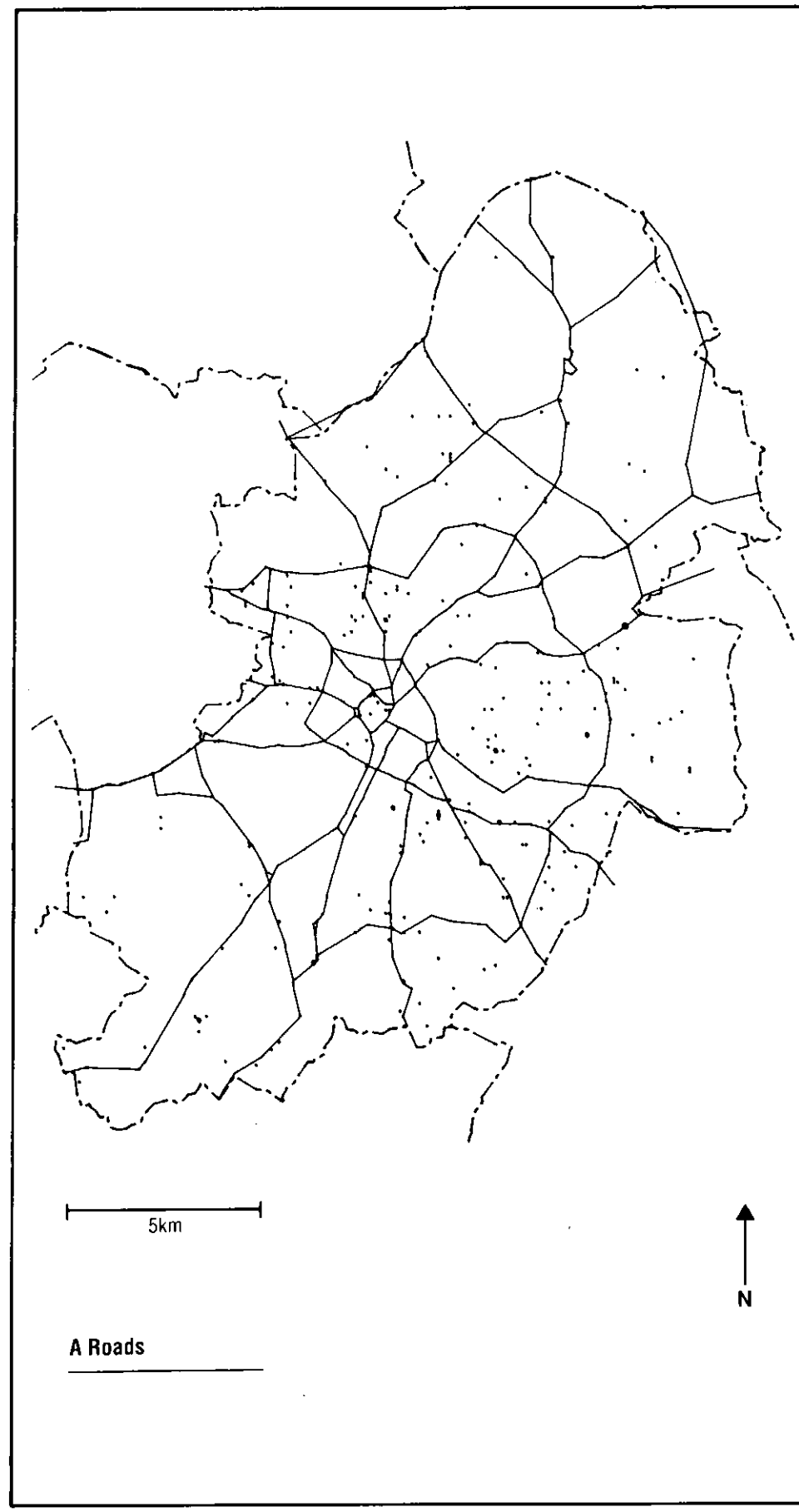
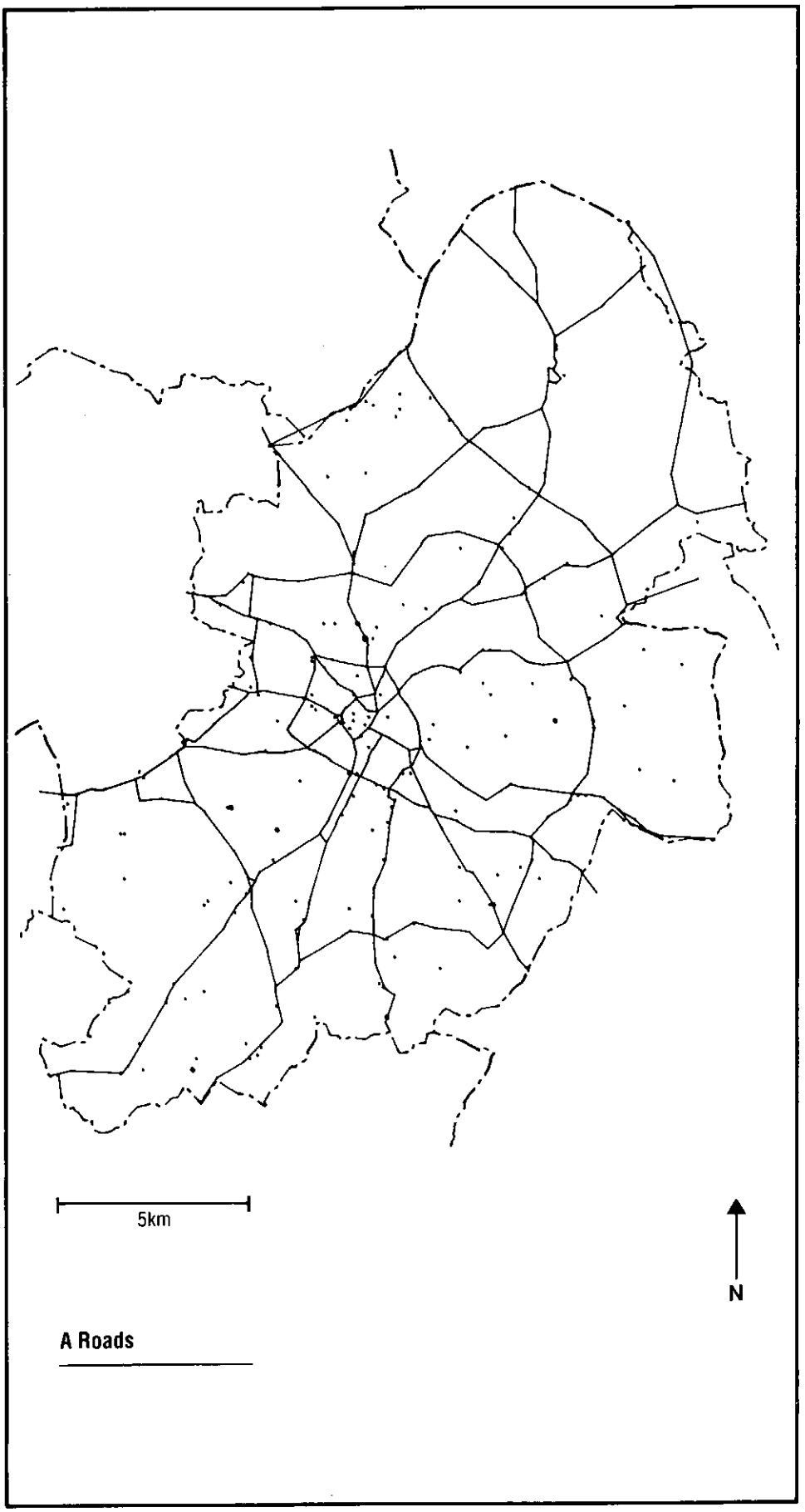


Figure 2.4 – Pedestrian casualties aged 15-19 years in Birmingham, 1989



The data described in this Section are simple frequency counts of casualties. They are not related in any way to 'exposure' and the opportunities people have for accidents, such as casualties per journey or head of population. Such metrics are often useful derivatives of these frequency counts, but, initially it is important to know the **number** of times events happen and there are contexts in which this is as important as knowing a rate of occurrence – for example, the number of people killed or bed spaces required, the number of aeroplane crashes or ferry disasters.

It should also be noted that many of the variables studied in these tables are strongly associated with others. For example, if more accidents of a certain type happen on 'A' class roads, then it is also likely that relatively large numbers will occur at pedestrian crossings and on dual carriageways (because there are more of these features on 'A' class roads than others). Similarly, if more accidents to a certain road-user occur between 22.00 hours and midnight, then it is likely that more accidents to this road-user will also occur in the dark. Such associations are common in the results of this study.

2.2.2 Who was injured?

Data for the time period 1 December 1985 to 30 November 1988 for Birmingham have been analysed (some of which have been presented in Tables 2.3 to 2.7 and Figure 2.5) and are discussed below.

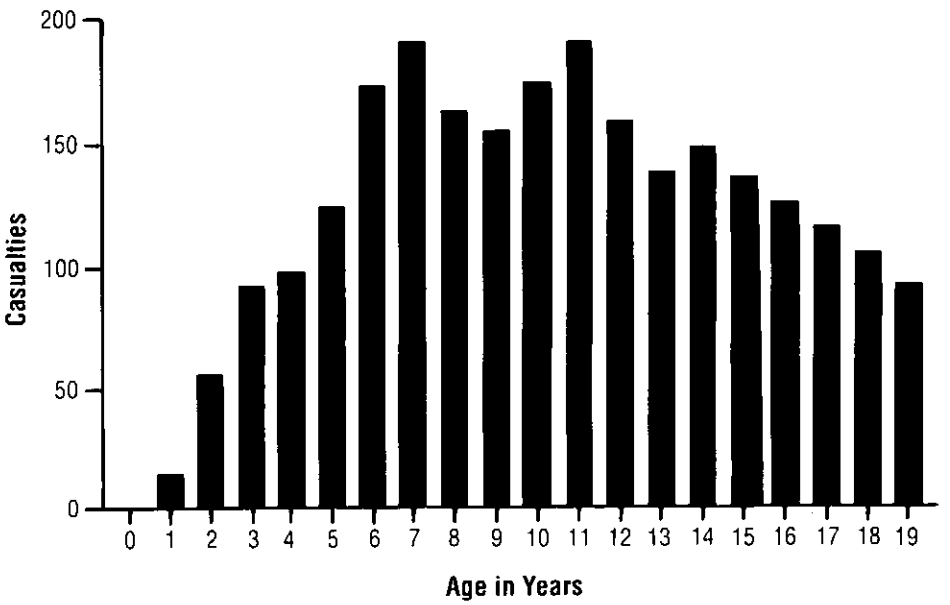
All tables are analysed by the standard age groups introduced in Section 1 and give totals for casualties within these age bands. There was a total of 2470 casualties.

Table 2.3 – Young pedestrian casualties by severity & age group, Birmingham, December 1985 – November 1988

Injury severity	Age of casualty				
	0-4	5-9	10-14	15-19	Total
Killed	6	14	4	9	33
Serious	63	199	220	167	649
Slight	192	598	590	408	1788
TOTAL	**261**	**811**	**814**	**584**	**2470**

Split by individual year of age (Figure 2.5), there were most casualties to those aged 7 and 11 years.

Figure 2.5 – Young pedestrian casualties by individual year of age, Birmingham, December 1985 – November 1988



In each of the four age groups there was a small number of fatalities – 6, 14, 4, and 9 respectively in the four age groups 0-4, 5-9, 10-14 and 15-19 years (Table 2.3).

Although overall, the number of seriously injured young pedestrians (649) formed about a quarter (26.3%) of the sample, it can be seen (Table 2.3) that the 15-19 year old age group had a very slightly higher number of serious casualties (167 – 28.6% of all casualties in that age group) but the percentage of serious casualties in the other three age groups was close to the average.

The percentage of male casualties in the four age groups by increasing age was 59.4%, 64.5%, 62.7% and 56.8%. The overall ratio was about 3:2 (61.5% male), this being similar to the national data presented in Table 1.1.

In addition to the 2470 pedestrians injured, there were 12 serious and 40 slight injuries recorded to vehicle drivers/riders, and one serious and 19 slight injuries to passengers.

2.2.3 When were they injured?

The most common day of week for pedestrians to be injured was Friday and the least common, Sunday. The data are similar to the national statistics (Table 1.2) and show a more even distribution by day of week for those aged 0-4 years.

Overall, 72.2% (1783) of the 2470 young pedestrian casualties were recorded as school pupils. This varied from 10.7% of those aged 0-4,

through 95.3% of those aged 5-9, 98.9% of those aged 10-14 and 30.3% of those aged 15-19 years. Of the 1783 school children, the percentage of casualties injured on journeys to and from school was 31.0% overall and 32.1%, 20.4%, 40.0%, and 35.6% for the four groups in increasing order of age.

Local data on casualties by month of year showed patterns similar to the national data (Figures 1.2 to 1.5), although there was some slight variation in the months in which most or fewest accidents occurred. Young pedestrians aged 0-4 and 5-9 years were most frequently injured in the spring, summer, and late summer whilst those aged 10-14 were most commonly involved in November and also in May. The distribution for those aged 15-19 years was relatively flat and peaked slightly in December.

The percentage of casualties injured in darkness increased by age group – 5.7% of those aged 0-4 years, 7.8% (5-9), 12.3% (10-14) and 38.9% (15-19 years).

The pattern of casualties injured by hour of day was substantially the same as that of the national data (Figures 1.6 to 1.9). Those aged 0-4 years showed an increase from the hour starting 08.00 to a small peak at lunchtime, with little change until a peak between 17.00 and 17.59 hours. There was a decline until 20.59 hours with very few casualties thereafter.

Casualties aged 5-9 and 10-14 years were common between 08.00 and 08.59 hours (markedly so for the latter age group), comparatively infrequent in the late morning, rising to a small peak at lunchtime, before falling again in the early afternoon. In the late afternoon and early evening casualties were particularly common (noticeably in the 5-9 age group). Casualties decreased after 19.00 hours in the age group 5-9 years and after 17.00 hours in the 10-14 year-old age group.

Again, this pattern of casualty frequency by time of day for those aged 15-19 is more evenly distributed than for the younger age groups, but has peaks in the morning (08.00-09.00 hours), at lunchtime, in the mid to late afternoon, early evening and between 23.00 and midnight, the latter peak not being a feature of the younger age groups. Compared with the national data, relatively fewer casualties were injured between 02.00 and 02.59 hours.

2.2.4 Where were they injured?

Just over half (1288 – 52.1%) of all young pedestrian casualties were injured on Network roads, the remainder (1182) on Non-network roads. Although the majority of those aged 10-14 years (60.1%) and 15-19 years (65.4%) were injured on Network roads, only 32.2% of those aged 0-4 years and 40.6% of those aged 5-9 years were injured on such roads.

Young pedestrians were most frequently injured (2062 casualties (83.5%)) on single-carriageway 2-lane roads, these being, of course, the most common type of road. Of all casualties, 13.6% were injured on dual-carriageways.

It is noticeable that the 'size' of road tended to increase with age, the older young pedestrians being injured on higher standard, or wider, roads than the very young. For example, 7.7% of casualties aged 0-4 years were injured on dual-carriageway roads, 6.2% of those aged 5-9, 15.5% of those aged 10-14 and 21.9% of those age 15-19 years. Addtionally, the severity of accident increased with road standard, fatalities forming 0.9% of casualties on 2-lane single-carriageways, 2.6% of casualties on roads of 3 or more lanes and 3.5% of casualties on dual-carriageways.

Further disaggregation showed that 58.2% of those injured on a dual-carriageway were male and that 13.6% of those school pupils injured on a journey to or from school were injured on a dual-carriageway.

Over half (1337 – 54.1%) of the young pedestrian casualties were injured at or within 20 metres of a junction of one form or another (Table 2.4), the remaining 45.9% being injured on links between junctions. The split for the various age groups was 44.8% of those aged 0-4 injured at junctions, 51.2% for those aged 5-9, 55.9% for those aged 10-14 and 59.9% for those aged 15-19 years. However, junctions are comparatively common in an urban area such as Birmingham, and it is important to note that only 12.8% of casualties injured at junctions were struck by a turning vehicle. One possible implication of this result may be that these accidents have some characteristics similar to those occurring away from junctions.

Table 2.4 – Young pedestrian casualties by proximity to a junction and age group, Birmingham, December 1985 – November 1988

Junction Detail	Age of casualty				
	0-4	**5-9**	**10-14**	**15-19**	**Total**
Not at a junction	144	396	359	234	1133
Roundabout	2	11	21	23	57
Mini roundabout	0	0	1	0	1
'T' or staggered	71	246	263	185	765
'Y' junction	1	5	10	12	28
Slip road	0	1	2	2	5
Crossroads	31	124	125	81	361
Multiple junction	1	5	8	8	22
Using private drive	7	2	8	6	23
Other	4	21	17	33	75
TOTAL	**261**	**811**	**814**	**584**	**2470**

Most pedestrians were crossing from the driver's nearside when struck by a vehicle – 1448 (58.8%) of all casualties (Table 2.5). The remainder were either crossing from the offside (34.7%) or making some other manoeuvre (6.5%).

There was little difference by age group in the percentage struck whilst crossing from the nearside – 57.1%, 58.4%, 59.5% and 58.3% (in increasing order of age band).

Large differences between age groups were apparent in the role of masking by stationary vehicles (Table 2.5). For those aged 0-4 and 5-9

years, of those casualties struck whilst crossing from the nearside, more than half (85 (57.0%) and 248 (52.3%) respectively) were reported as masked by a stationary vehicle. Only 37.8% of those aged 10-14 years struck whilst crossing from the nearside were masked by a stationary vehicle. The corresponding figure for those aged 15-19 was 31.1%

The pattern was slightly different for those crossing from the offside. The percentages for the four age groups of those struck whilst crossing, from the offside whilst masked by a stationary vehicle was 57.1% (0-4 years), 40.8% (5-9), 31.9% (10-14) and 22.2% (15-19).

Although the trend for 'percentage masked' is to decrease with increasing age, it is noticeable that the figures for the older age groups for casualties masked whilst crossing from the offside are smaller than their nearside equivalents. This is likely to be due in part to the nature of the roads on which accidents to older pedestrians occur, larger, more open roads having less on-street parking and also giving drivers more time to see pedestrians. In addition, the younger pedestrians are shorter and are more easily masked by parked cars.

Considering only those casualties on non-network roads, 47.2% were masked by a stationary vehicle, these distributed 59.0% (0-4 years), 55.3% (5-9), 45.7% (10-14) and 29.2% (15-19).

Table 2.5 – Young pedestrian casualties by crossing movement and age group, Birmingham, December 1985 – November 1988

	Age of casualty				
Movement	**0-4**	**5-9**	**10-14**	**15-19**	**Total**
From driver's nearside	64	226	301	235	826
From nearside, masked	85	248	183	106	622
From driver's offside	39	180	196	137	552
From offside, masked	52	124	92	39	307
In carriageway stationary	8	15	15	30	68
In carriageway, stationary and masked	0	4	0	0	4
In carriageway, walking and facing traffic	0	0	2	1	3
In carriageway, walking and with back to traffic	0	1	3	1	5
Unknown or not in carriageway	13	13	22	35	83
TOTAL	**261**	**811**	**814**	**584**	**2470**

Table 2.6 shows the distribution of the casualty's location prior to the accident in terms of position on the highway. Of the 2470 casualties, 9.6% (237) were on a pedestrian crossing, and a further 8.9% (219) within 50 metres of a crossing. It is important that these simple casualty frequency counts are viewed in perspective. For example, Mackie and Older (1966) and Grayson (1987) have shown that, per crossing of the road, pedestrian crossings themselves are sites of lowest accident risk, but that the area within 50 metres either side of them is the highest – this for both sexes and all age groups considered.

It is noticeable that comparing the four age groups, the distributions by location in relation to a pedestrian facility are remarkably similar but that the percentage of casualties in the given age groups injured on pedestrian crossings increases with age (4.5%, 7.3%, 11.4% and 12.5%).

Table 2.6 – Young pedestrian casualties by location and age group, Birmingham, December 1985 – November 1988

	Age of casualty				
Location	**0-4**	**5-9**	**10-14**	**15-19**	**Total**
On pedestrian crossing	12	59	93	73	237
Within zigzags on crossing approach	1	4	6	7	18
Within zigzags on crossing exit	0	3	3	7	13
Elsewhere within 50m of crossing	9	43	73	63	188
In carriageway elsewhere	217	651	585	355	1808
On footway or verge	12	17	20	32	81
On refuge or central island or reservation	0	0	1	2	3
In centre carriageway	1	7	12	13	33
In carriageway not crossing	8	23	20	30	81
Unknown	1	4	1	2	8
TOTAL	**261**	**811**	**814**	**584**	**2470**

The location of the casualty in relation to a pedestrian facility is shown in Table 2.7. Overall, 81.5% (2014) of casualties were neither at nor within 50 metres of a pedestrian crossing facility when injured.

It is interesting to note, however, (although it would be wise to be circumspect because of the small samples involved) that the relative incidence of casualties on Zebra and Pelican crossings increased with age. For the four age groups the percentage of each group injured on a Zebra and Pelican respectively was 2.7% (7 casualties) and 5.0% (13) for those aged 0-4 years, 5.7% (46) and 6.7% (54) for those aged 5-9 years, 7.1% (58) and 12.5% (102) for those aged 10-14 years, 8.4% (49) and 13.7% (80) for those aged 15-19 years.

Table 2.7 – Young pedestrian casualties by proximity to crossing facility and age group, Birmingham, December 1985 – November 1988

	Age of casualty				
Pedestrian crossing type	**0-4**	**5-9**	**10-14**	**15-19**	**Total**
Not at a Pedestrian crossing	231	688	610	406	1935
Zebra	7	46	58	49	160
Pelican	13	54	102	80	249
Other controlled site	10	17	34	34	95
Central refuge	0	3	5	4	12
Footbridge or subway	0	3	5	11	19
TOTAL	**261**	**811**	**814**	**584**	**2470**

2.2.5 Casualty analysis by individual year of age

Figures 2.6 to 2.9 show the percentage of those casualties, by individual year of age, injured on a dual-carriageway, at a pedestrian crossing, being masked by a stationary vehicle or on a journey to or from school. (Note that in order to avoid undue distortion, the one casualty aged less than one year has not been included in these diagrams, he being injured on a dual carriageway whilst masked by a stationary vehicle.) Figure 2.6 shows that, although demonstrating some variation, the percentage of those pedestrians injured on a dual-carriageway was relatively constant until age 9, but increased thereafter until the age of 17. That is, of those casualties aged 9 years and under, relatively few, compared with those older, were injured on a dual-carriageway. The picture for those injured on a pedestrian crossing (Figure 2.7) is similar, but there are arguably 'steps' at ages 10 and 13 years.

The percentage of pedestrian casualties, by individual year of age, masked by a stationary vehicle dropped fairly consistently after the age of 3 years (Figure 2.8).

Figure 2.9 shows that, of school pupil casualties, the percentage injured whilst on a school journey was greater between 11 and 16 years than at other ages.

Figure 2.6 – Percentage of young pedestrian casualties crossing a dual-carriageway by individual year of age, Birmingham, December 1985 – November 1988

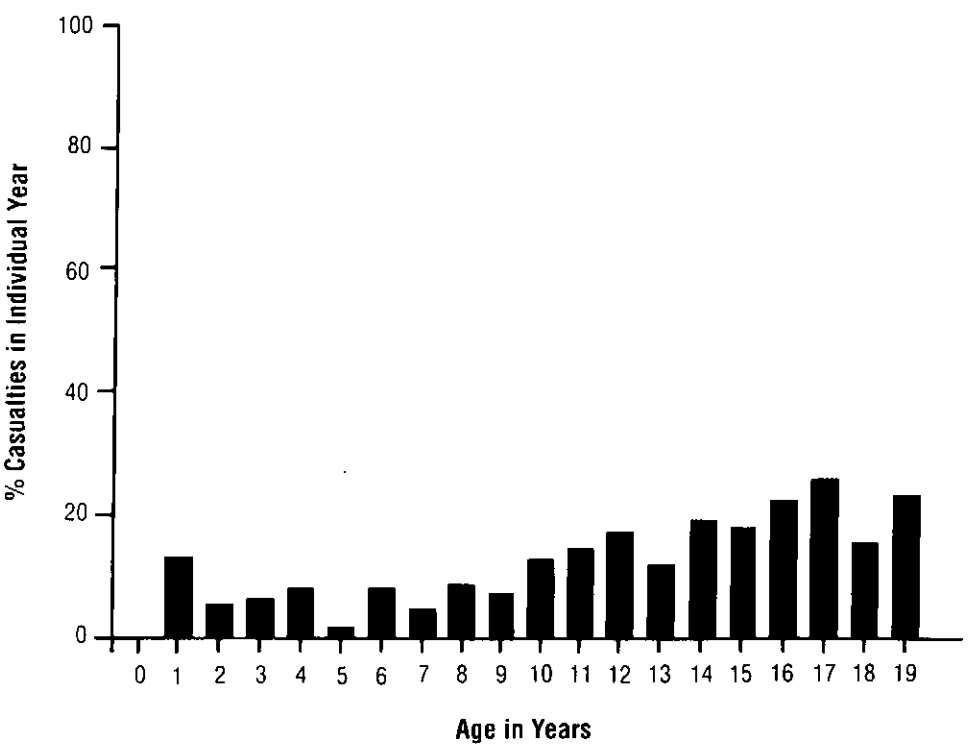


Figure 2.7 – Percentage of young pedestrian casualties crossing at a pedestrian crossing by individual year of age, Birmingham, December 1985 – November 1988

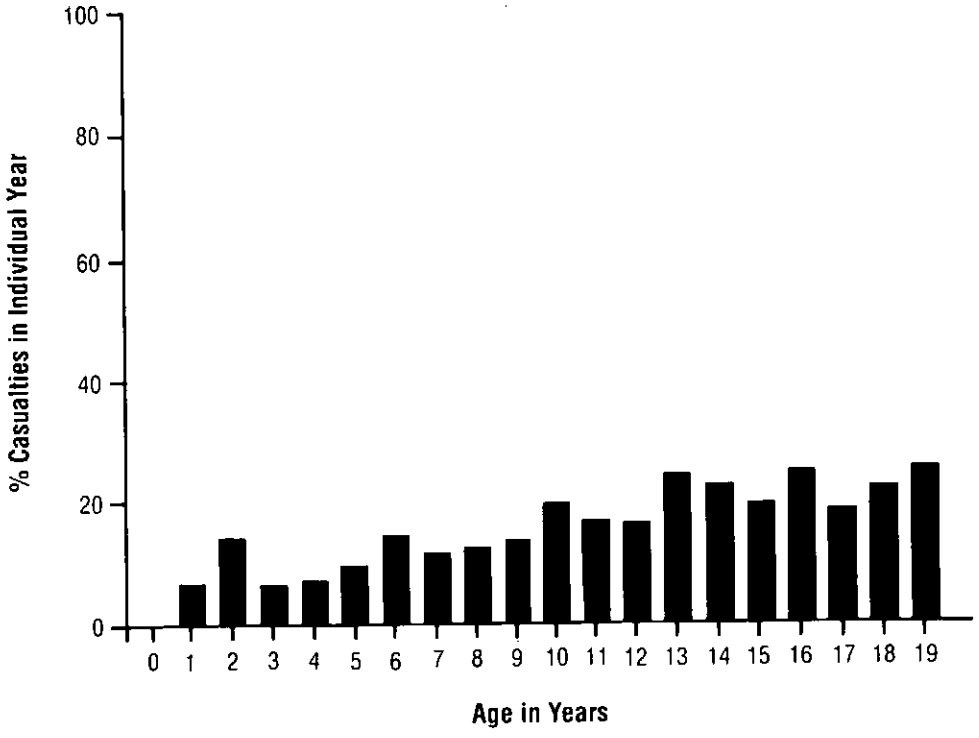


Figure 2.8 – Percentage of young pedestrian casualties crossing masked by a stationary vehicle, by individual year of age, Birmingham, December 1985 – November 1988

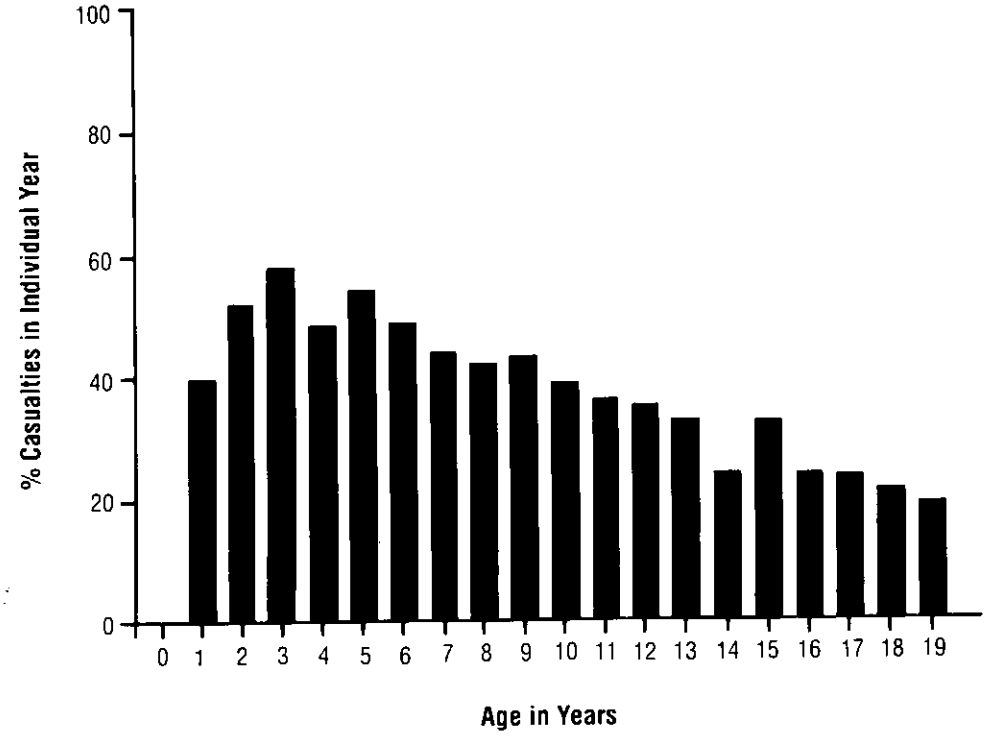
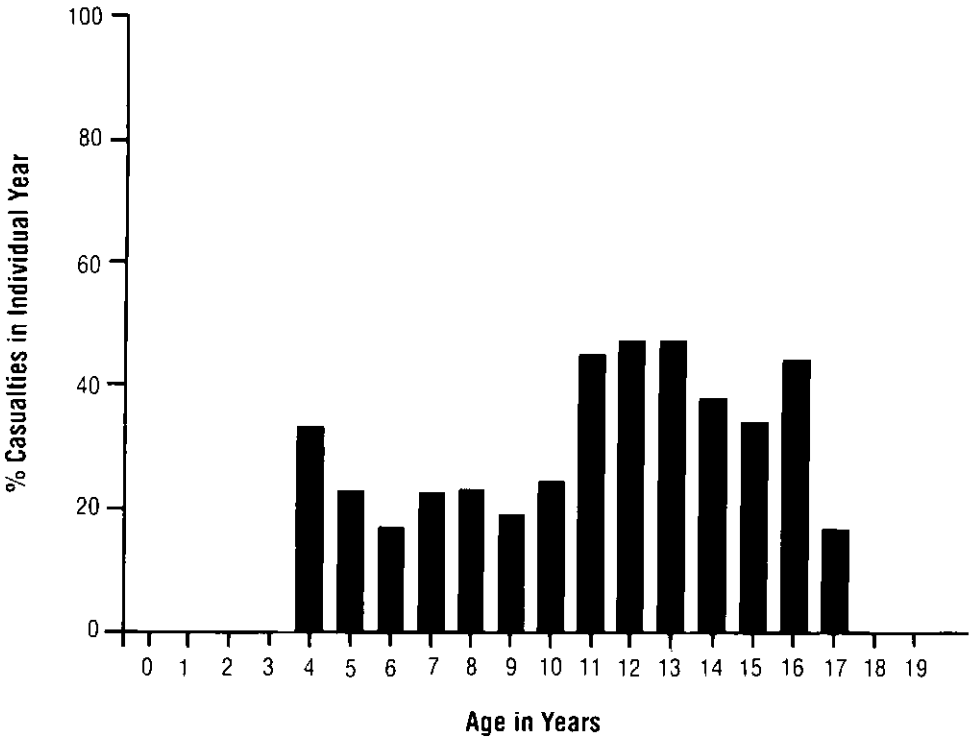


Figure 2.9 – Percentage of young pedestrian school pupil casualties injured while on a journey to or from school, by individual year of age, Birmingham, December 1985 – November 1988



2.2.6 Police officer's report of accident 'cause'

The major contributory factor coded by the police officer for these accidents was, 'crossing masked by stationary vehicles' (36.6%), 'crossing heedless' (34.2%), 'step, walk or run from footpath' (12.6%) and (driver) 'failing to accord precedence at pedestrian crossing' (3.7%).

Within these categories of causation there was considerable variation by age group. In increasing order of age bands, the percentages of all casualties within each age group crossing 'masked' was 50.0%, 44.7%, 33.5% and 23.8%, for 'crossing heedless', 8.7%, 29.3%, 43.1% and 40.2%, for 'step walk or run from footpath' 28.0%, 15.9%, 8.6% and 6.7%, and for (drivers) 'failing to accord precedence at pedestrian crossing', 1.9%, 3.0%, 4.3% and 4.6%.

Summarising the codes to apportion blame in these accidents, the cause was overwhelmingly attributed to the pedestrian (89.0% of instances). The other targets of blame were the driver (9.4%), the vehicle (0.3%), the weather (0.1%), the environment (<0.1%), and some other contribution (1.1%). This differed slightly by age in that the pedestrian aged 0-4 years was seen to be at fault in 90.9% of cases and those aged 5-9 in 93.0%, those 10-14 in 90.1% and 15-19 year-olds in 81.2%. Comparatively few 15-19 year-olds were seen to be at fault largely because a higher proportion of their accidents (compared with younger age groups) occurred on pedestrian crossings. As mentioned before, this is probably a feature of the likely greater use of this facility by the oldest age group.

The driver was seen to be at fault in 6.9% of accidents involving a 0-4 year-old, 5.8% (5-9), 8.7% (10-14) and 15.3% (15-19).

2.2.7 Vehicle and driver/rider information

As would be expected, cars formed the great majority (83.5%) of all vehicles involved in these accidents, followed by light goods vehicles (7.1%), motorcycles (2.3%) and public service vehicles (1.7%).

There was little difference in the nature of the striking vehicle by age group, although only one of those aged 0-4 years was struck by a motorcyclist compared with 12 (5-9 years), 19 (10-14) and 26 (15-19).

Of the 2478 vehicles involved in these accidents, 10.8% were 'non stop' and 0.2% defined as 'non stop, non hit' – not actually colliding with the pedestrian. The incidence of 'non stop, non hit' varied little by age group but 17.9% of vehicles striking 15-19 year-olds failed to stop, compared with 8.0% (0-4 years) 7.9% (5-9), and 9.5% (10-14).

Only 1.0% of driver/riders provided a positive breath test, being over the prescribed limit for alcohol. A further 0.1% 'failed to provide', the remainder either not being requested to take a test (78.6%), providing a negative result (7.5%), not being contactable (12.4%) or the test not being applicable (0.5%). Relatively more driver/riders who collided with those aged 15-19 years were tested for alcohol (11.3%) compared with those age 0-4 years (7.6%), 5-9 (7.2%), 10-14 (8.9%) and this probably reflects the times of day at which accidents to those aged 15-19 occur.

The age and gender of drivers involved in accidents involving young pedestrians was compared with those of drivers/riders involved in all accidents in Birmingham during the same period. Of drivers/riders striking young pedestrians, 76.2% were male (compared with 77.6% of those involved in all accidents), 17.2% were female (17.1% in all accidents) and 6.7% were unknown (5.3% in all accidents). Similarly, the age distributions for the two distributions were within a few percent of each other, with the exception of those aged 16-19. The respective percentages for drivers striking young pedestrians and all drivers were, for those aged 16-19 years (5.3% and 9.1%), 20-24 (18.1% and 20.0%), 25-29 (16.8% and 16.4%), 30-34 (13.5% and 12.3%), 35-39 (11.6% and 10.9%), 40-64 (31.6% and 28.4%) and 65-99 (3.0% and 2.9%).

2.3 Summary of analysis

The summary of accidents in the West Midlands and study of these 2470 casualties has set a context for the work and shown several distinct patterns in the characteristics of the accidents these pedestrians were involved in, both in overall terms and for each of the four age sub-groups studied.

Previous research has shown that accidents occurring in Birmingham and the West Midlands metropolitan districts have similar patterns and characteristics to those in other urban areas of Great Britain.

The local data for young pedestrian casualties show similar patterns to those of Great Britain presented in Table 1.2 to 1.4 and Figures 1.2 to 1.9.

The results show that with increasing age an increasing proportion of casualties are injured on Network roads. Similar results hold true for accidents at features, such as on pedestrian crossings and dual-carriageways, which tend to be associated more with Network than Non-network roads.

Over half (1337 – 54.1%) of the young pedestrian casualties were injured at or within a junction of one form or another, the remaining 45.9% being injured on links between junctions. The split for the four age groups was 44.8% of those aged 0-4 injured at junctions, 51.2% for those aged 5-9, 55.9% for those aged 10-14 and 59.9% for those aged 15-19 years.

For those aged 0-4 and 5-9 years, of those casualties struck whilst crossing from the nearside, more than half (85 (57.0%) and 248 (52.3%) respectively) were reported as masked by a stationary vehicle. Only 37.8% of those aged 10-14 years struck whilst crossing from the nearside were masked by a stationary vehicle. The corresponding figure for those aged 15-19 was 31.1%.

There was little difference in either age or gender between drivers involved in young pedestrian accidents and drivers involved in all accidents in Birmingham.

Only 1.0% of drivers were found to be over the prescribed limit for alcohol.

The police officer completing the Stats 19 form overwhelmingly attributed the accident cause to the pedestrian (89.0% of instances). In only 9.4% of accidents was the driver seen to be at fault, the vehicle (0.3%), the weather (0.1%), the environment (<0.1%), and some other contribution (1.1%).

3 Survey and analysis of records of Her Majesty's Coroner

In this part of the work a study of 50 fatal accidents involving 51 young pedestrians is described. The accidents occurred between November 1983 and June 1988. Fatalities are the type of accidents for which the greatest amount and highest quality of information can be gained. It was anticipated that this information would provide pointers to examine aspects of young pedestrian accidents in detail. The type of and quality of the information available from the records of HM Coroner is listed, as is the way these data were collected for the present study. Details are provided of both the young pedestrians and drivers involved. Particular consideration is given to what pedestrians and drivers were doing and how the accident happened. Assessments are made of contributory roles in these accidents and information given about any prosecutions arising from the collision. The section concludes with a summary of impressions of the nature of accidents to young pedestrians.

3.1 Records of Her Majesty's Coroner

The decision to use the records of HM Coroner in Birmingham was made in the knowledge that he had a particular interest in road accidents and that the information he stored was extensive and of a particularly high quality. It was also known that the inquests he conducted were thorough, that he had a habit of calling upon road accident specialists as expert witnesses and that their statements and those of others would be available for analysis.

In addition, the move in the direction of a coroner's records was prompted by the work of Gloyns and Rattenbury (1989) and Gloyns *et al* (1989) and their nationwide study of vehicle occupant injury using such records as a source of data.

HM Coroner in England is a guardian of the public, entrusted with the task of enquiring into sudden or suspicious death. His records, compiled from information gathered before and during inquests, contain:

i HM Coroner's certification of verdict, provided in all instances except those where the case is to be passed to another court – for example, if there is likelihood of prosecution for 'causing death by reckless driving' – where certification by HM Coroner may be thought to pre-judge the issue. The certificate gives basic details of the identity and status of the deceased and how, when, where and why he/she came to his/her death.

ii The return of HM Coroner (Coroner's Certificate After Inquest) sustained. In the West Midlands basic details from this record are stored on computer by the Regional Health Authority.

iii The post mortem examination report (usually, although in about one-fifth of the accidents studied no post mortem had been conducted either because of the (young) age of the child or the

(high) severity of the injuries sustained) giving a detailed description of appearance, injuries and cause of death.

iv Copies of the statements taken by Police at the scene of, and after, the accident. These would generally include a statement of the driver, any witnesses to the accident, the police officers who attended the scene.

v Other statements provided by:

- the Police vehicle examiner (together with a completed vehicle inspection form containing details of the vehicle defects, whether contributing to the accident or not),
- the police officer making a 'reconstruction' to assess vehicle travelling speed before braking prior to impact,
- the doctor who treated the casualty or certified death,
- other expert witnesses who provide evidence on the circumstances surrounding the accident.

vi Photographs of the vehicle involved and of the accident scene.

vii A sketch plan of the accident scene, often showing the resting position of vehicle(s) and casualty but seldom the precise point of impact.

viii Correspondence with the Crown Prosecution Service relating to any contemplated prosecution.

ix A list of charges for prosecution of the driver of the striking vehicle (where applicable).

x Evidence of the alcohol level in the blood or urine of the driver (when applicable).

xi A summary, drawing together all the available evidence (usually of about 20 pages, but occasionally up to three times this length) of the events before, during and after the accident. This summary is usually prepared by the police officer supervising the case.

xii A statement of the parents or next of kin identifying the deceased and commenting on any feature of physical or mental wellbeing such as disability which may have had a role in the accident.

xiii Occasionally (in about one-quarter of cases studied) a transcription of the evidence provided by witnesses during the inquest. (Witness accounts are held on audio tape if a transcription is not kept on file).

xiv Other material such as correspondence with solicitor of the driver or the family of the deceased, the highway authority, copies of newspaper cuttings etc.

HM Coroner is required by law to store for 15 years the records of the inquests of the deaths into which he enquires.

3.2 Data extraction

Data from the records of HM Coroner were used to build up a picture of the accident with information not available on the Stats 19 form. This included details of what the casualty had been doing at the time of the

accident, who he/she had been with and what the purpose of the journey undertaken had been.

The coding sheet used in this study was in 11 parts:

i Case details: including name of deceased, Coroner's reference number, date and time of accident, the road, settlement and ward name, together with Police reference number (thereby enabling linkage with the Stats 19 form at a later date).

ii Details of deceased: age, sex, height, weight, occupation of deceased or of parents, ethnic origin.

iii Deceased's journey details: home address, distance of accident from home, time since at home (if appropriate), journey purpose, familiarity with the route, length of total intended journey in time and distance, whether accompanied, whether there was physical contact (for example, a parent holding a child's hand at the time of impact), the action of the pedestrian prior to impact.

iv Deceased's injuries: time taken to die, description of injuries sustained and location of any spinal injury, the cause of death, and predisposition to injury.

v Predisposition to accident involvement: physical or mental disability, carrying of large objects, obscured vision, alcohol or medication.

vi Environmental information: the land-use within 50 metres of the accident site, the road width in terms of number of lanes and width in metres, presence of damage to the road surface, details of sight obstructions, presence of pro-pedestrian countermeasure. Other measures considered but not subsequently collected because of difficulties in extracting the information, included a measure of the length of uninterrupted vehicle travel on the road before and after the impact point and an estimate of traffic volume and skid resistance of the road surface.

vii Striking vehicle: details of vehicle make, model, size, colour, age and type, together with details of the first point of pedestrian contact on the vehicle and information about location and degree of damage to the vehicle and, often, the likely sources of injury to the deceased.

viii Other vehicle details: an estimate was obtained from photographs, scene sketch and witness statements of the lateral distance of the vehicle from the kerb or an obstruction such as a parked car at the time of impact. Any vehicle defect reported by the Police was noted. Estimates of the vehicle travelling speed prior to impact were extracted from one or more of the witness statements, the report of the driver and of the Police reconstruction. The author used his judgement to assess the vehicle speed, always using the Police estimate when available or the **lowest** reasonable estimate from other sources.

ix Driver's journey details: information similar to that gathered for the deceased's journey (see (iii) above) was collected. In addition, the total number of persons in the vehicle was noted, as was whether or not the driver was making a 'rat run' in a residential area.

x Additional details of driver: the driver's occupation was noted and, where possible, his ethnic origin was recorded. Information about any testing for alcohol involvement was gathered, as was the validity of the driver's licence, MOT and excise certificate.

xi Blameworthiness: in the final part of the data extraction process an attempt was made to assess the contribution of the driver and pedestrian to the accident. Note was taken of the comment of witnesses, the Police and driver to obtain an overall assessment and an assessment of the extent to which the driver avoided or was able to avoid the impact. Details of any prosecutions to be brought against the driver were also noted.

In none of the cases studied was it possible to collect all the information described above. However, the level of detail contained in the files was such that it was possible to gather about four-fifths of the required information for most cases. It took on average, about one hour to read through and extract the data from each file.

3.3 Results of the study

Data were collected from the 51 most recently completed files of pedestrians aged 0-19 years whose deaths had been the subject of an inquest by HM Coroner for Birmingham and Solihull. All had died in the period between November 1983 and June 1988. These 51 fatalities were the result of 50 road accidents, one of which resulted in the death of 2 young pedestrians. All but 2 of these accidents occurred within the City of Birmingham, these 2 occurring in the area of Chelmsley Wood, immediately to the south east and adjacent to Birmingham but in Solihull metropolitan district. (Tables 3.1 to 3.8 refer to the 51 pedestrians and 50 drivers involved in the 50 accidents). Four other pedestrian casualties resulted from these accidents – in one, the mother of a five year-old girl accompanying her daughter sustained serious head injuries but survived; in another, an elderly pedestrian crossing at the same time as a younger pedestrian, sustained fatal injuries; the other 2 were part of a family struck by a vehicle leaving the road.

3.3.1 Who was killed, where were they, and what were they doing?

The age and sex groupings of the casualties is shown in Table 3.1. Thirty-five of those killed were male and 16 female.

Table 3.1 – Age and gender of 51 young pedestrian fatalities in Birmingham

	Age of casualty				
Gender	**0-4**	**5-9**	**10-14**	**15-19**	**Total**
Male	8	11	5	11	35
Female	1	10	0	5	16
TOTAL	**9**	**21**	**5**	**16**	**51**

The ethnic origin of the deceased was established in all but one instance and details are presented in Table 3.2. Of the 9 aged 0-4, 8 were of Asian ethnic origin, whereas none of those aged 10-19 was of Asian origin. In total there were only 2 casualties of Afro-Caribbean ethnic origin, these both being aged 15-19. Of the 51, there were 30 non-minority (White – UK).

Table 3.2 – Ethnic origin of 51 young pedestrian fatalities in Birmingham

Ethnic origin	Age of casualty 0-4	5-9	10-14	15-19	Total
Pakistani	4	4	–	–	8
Bangladeshi	–	2	–	–	2
Indian subcontinent unspecified	4	2	–	–	6
Afro-Caribbean	–	–	–	2	2
Other minority	–	–	1	1	2
Non-minority	1	13	4	12	30
Not known	–	–	–	1	1
TOTAL	**9**	**21**	**5**	**16**	**51**

About two-fifths (14) of the 0-14 year olds killed were involved in accidents in the inner city areas of Balsall Heath, North Moseley, Sparkhill, Small Heath, Alum Rock, Saltley, Handsworth and Washwood Heath. All but one of the 16 aged 15-19 years killed had been involved in accidents outside the inner city areas, the single exception being struck by a vehicle on a dual carriageway within the City Centre.

Fourteen of the 50 accidents occurred on a road designed mainly for local use and access to houses – 'residential streets'. This definition includes local spine roads in housing estates and some smaller distributor roads which may provide through travel between larger routes, but are primarily designed for access to, for example, more remote parts of a housing estate.

The 50 accidents occurred most commonly adjacent to or within 50 metres of housing – there were 25 reports of 'housing with front garden', 3 of 'terraced housing with garden' and 11 of 'terraced, no front garden', a category which included a category of terrace housing having a small boundary wall approximately one metre from the front door. There were 13 reports of local shops, 10 of 'open' or park land, 4 of industrial land and 9 of other land use types. It should be noted that up to 3 land use entries were permitted per accident and that these reports are therefore not mutually exclusive.

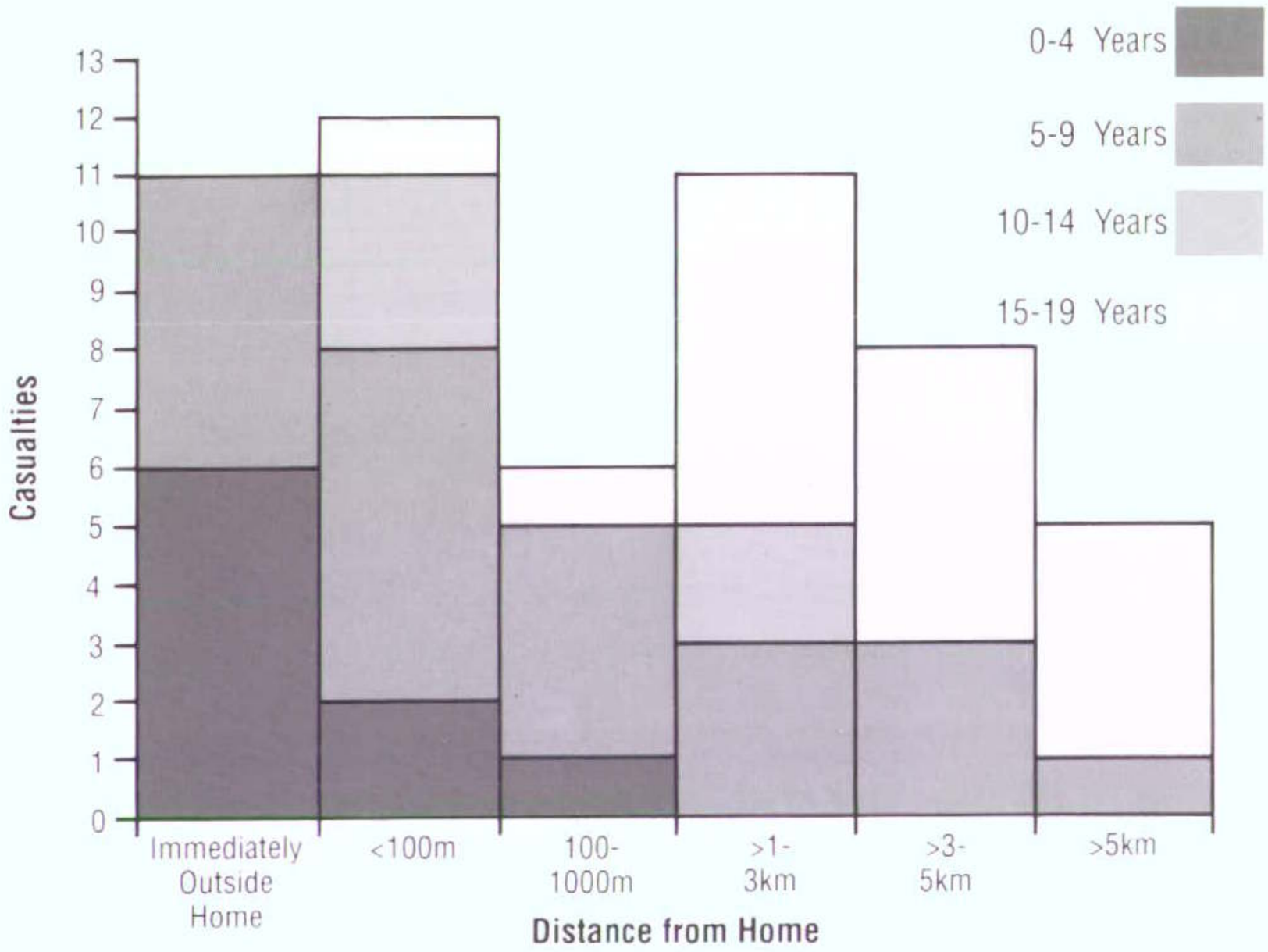
Eleven of the pedestrians were killed either on a dual- or single-carriageway radial route (5 and 2 instances respectively), dual-carriageway routes in and around the City Centre (3) or a motorway (1). These routes all carry high volumes of traffic and on 4 occasions the deceased was attempting to cross roads capable of carrying 6 or more lanes of traffic (see, for example, Figure 3.1). All but one of the 11 was male, and all but 3 aged 15 years or older.

Figure 3.1 – Ten-lane dual-carriageway – site of fatality

As would be expected, the distance of the accident from the deceased's home tended to increase with age (Figure 3.2). Of the 9 children aged 0-4 years, 4 were involved in accidents immediately outside their home, 2 within 100 metres, another at less than 1000 metres from home and the remaining 2 immediately outside the house of a friend or relation to which they had been taken by their parents.

Five of the 21 aged 5-9 years were involved in accidents immediately outside their own home and another 5 within 100 metres.

Figure 3.2 – Distance from home by casualty age group – 51 young pedestrian fatalities in Birmingham



The pedestrian's familiarity with the route was coded on a three point scale-

i 'regularly' – the route could reasonably be expected to have been used by the pedestrian 3 or more times each week,

ii 'occasionally' – the route would be used less often than 3 times each week,

iii the pedestrian would have been likely to have been using the route for the first time. A crosstabulation of the purpose of the deceased's journey with his/her familiarity with the route taken is shown in Table 3.3.

Table 3.3 – Familiarity with route and purpose of journey of 51 young pedestrian fatalities in Birmingham

	Purpose of journey					
	To or from school	To or from social/ domestic or pleasure	At social domestic or pleasure	At play	Not known or other	Total
Familiarity						
Regular	2	13	4	9	–	28
Occasional	–	9	5	1	–	15
First time	–	1	2	2	–	5
Not known	–	–	1	1	1	3
TOTAL	**2**	**23**	**12**	**13**	**1**	**51**

It can be seen that over half (28) of the pedestrians were at a location they used regularly, that only 5 were first-time users of a route and that 13 were at play. Twenty-three were 'to or from or at' 'social, domestic or pleasure', a definition used to cover such activities as visits to shops, walks with friends, trips to a public house or place of entertainment. Only 2 of the 51 were making a journey to or from school.

Table 3.4 describes the accompaniment pattern at the time of the accident. Two-thirds (33) were accompanied by either a parent, other adult or peer. Four of those aged 0-4 years were being supervised by an adult (the adult being in close attendance and, in 2 cases actually holding the hand of the infant before he/she broke free) immediately before the impact. Ten of those aged 5-9 years were accompanied, 3 by a parent and 10 also by peers. None of those aged 10 years and above was accompanied by their parents at the time of the accident. Thirteen of the 16 aged 15-19 were accompanied at the time of the accident, 11 of them by peers.

Table 3.4 – Accompaniment at time of accident of 51 young pedestrian fatalities in Birmingham

	Accompanied			Other	
	Yes	No	Parent	adult	Peer
Age					
0-4	6	3	2	2	6
5-9	11	10	3	1	10
10-14	3	2	–	–	3
15-19	13	3	–	2	11
TOTAL	**33**	**18**	**–**	**–**	**–**

All but 5 of the accidents in residential streets involved the presence of a parked vehicle as a major contributory factor (in 2 instances an ice cream van), the vehicle masking the pedestrian from the driver and the vehicle from the pedestrian. On another occasion a pedestrian ran from behind a portacabin being used by contractors at the side of the road. Four of the accidents on non-residential streets involved a parked car as a direct contributor (masking lines of sight) to the accident, 2 accidents involved a momentarily-stopped vehicle and another a vehicle travelling in the opposite direction.

3.3.2 What injuries did they receive and were they predisposed to accident involvement?

Almost half (23) of the deceased died either instantaneously, at the scene, or were certified dead on arrival at hospital. A further 9 were dead within 6 hours and all but 5 died within 2 days of the accident. It was not possible to discern any difference between age groups in 'time to die'.

Twenty-six died as a result of head injuries and 19 as a result of 'multiple injuries', all but a few of these including a head injury which in itself would have been profoundly life threatening. Two died as a result of neck injuries, one from chest (crushing) injuries, another from abdominal injuries and 2 from 'massive internal injuries'.

According to the Coroner's record, only one of those killed had any predisposition to involvement in an accident and this only very slightly, the child being a 'slow learner' in educational terms but otherwise well equipped to use and cross the road. All of the young pedestrians were physically healthy, could hear and see traffic and were 'good on their feet'.

None of those aged 0-14 years was considered to have consumed alcohol, abused drugs or other substances immediately prior to the accident. Of the 16 aged 15-19 years, 5 had consumed alcohol in excess of the legal limit for drivers of vehicles in this country and a sixth was described as intoxicated by friends she was with. These 6 were aged 16 years (2), 17 years (2) and 18 years (2).

3.3.3 Where was the driver going?

Data on the distance of the driver from his home, his familiarity with the route (coded on the same basis as for the pedestrian) and the purpose of his journey are presented on Tables 3.5 to 3.7.

The picture that emerges from these tables is one which may be expected of an urban scene. All but 5 of the drivers, whose addresses were known, were within 20 km of their home, and 29 within 10 km of home (Table 3.5).

Table 3.5 – Distance of driver's home to scene of accident, 50 accidents involving young pedestrian fatalities in Birmingham

	Distance								
Road type	Within 100m	>100m -1km	>1-3 km	>3-10 km	>10-20 km	>20-50 km	>50 km	Not known	Total
'Residential' street	2	0	3	7	–	2	–	–	14
Other street/ road	–	1	2	14	10	2	1	6	36
TOTAL	**2**	**1**	**5**	**21**	**10**	**4**	**1**	**6**	**50**

Four-fifths (40) had driven the route before and 24 could reasonably be expected to use the route 3 or more times each week (Table 3.6).

Table 3.6 – Driver familiarity with route and location of accident, 50 accidents involving young pedestrian fatalities in Birmingham

	Familiarity				
	Regular	Occasional	First time	Not known	Total
Number of drivers	24	16	3	7	50

Three were going to or from work, 11 were at work, 18 were making journeys classified as 'social, domestic or pleasure' and the journey purpose of 17 could not be discerned (Table 3.7).

Table 3.7 – Purpose of driver's journey, 50 accidents involving young pedestrian fatalities in Birmingham

	Purpose						
	To work	From work	To from social/ domestic and pleasure	At work	Other	Not known	Total
Number of drivers	2	1	9	9	11	1	17	50

In only 3 of the 14 accidents occurring in residential areas and only 4 of the accidents on other roads could the driver be identified positively as 'rat running', which for the purposes of this study is defined as, 'choosing to take a route on minor roads, away from the signed route of major roads, between two points, for reasons of expediency or comfort'. This definition was only applied to those accidents occurring in residential or very local distributor roads and effectively identifies only those drivers of vehicles who did not live in, deliver to or work in these roads.

3.3.4 How fast was the driver going and did he see the pedestrian?

Police analysis and reconstruction, and/or witness statements were used to provide the best estimate of vehicle travelling speed (the speed immediately prior to the driver becoming aware of a collision or the possibility of a collision). These are summarised below:

i of 38 drivers in 30 mph speed limits, 20 were travelling at or below the speed limit, none at up to 5 mph above the limit, 11 at up to 10 mph above the limit and 7 at speeds greater than this,

ii of 9 drivers in 40 mph speed limits, 5 were travelling at or below the speed limit, 2 at up to 5 mph above the limit, none at up to 10 mph above the limit and 2 at speeds greater than this,

iii of 3 drivers in 70 mph speed limits, 2 were travelling at or below the speed limit, one at up to 10 mph above the limit.

So, in summary, 27 drivers were travelling at or below the limit, 2 at up to 5 mph above it, 12 at up to 10 mph above it, and 9 more than 10 mph above.

For those accidents in residential areas, the nearside of 6 of the 14 vehicles was estimated to have been within one metre of either the kerb or a parked vehicle at the time of impact and all but 2 within 2 metres of a kerb or parked vehicle. For those 27 accidents which occurred on 'non-residential' roads for which the lateral distance from the kerb could be discerned, in 11 instances this displacement was found to be between 2 and 5 metres.

In the 50 accidents, from an assessment of driver, Police and witness statements, it was determined that on:

i 21 occasions the pedestrian was not seen before the impact occurred,

ii 29 occasions no pre-impact action was possible or taken,

iii 13 occasions there was some pre-impact braking,

iv 5 occasions the driver swerved to avoid the pedestrian,

v one occasion the pedestrian was seen but no action taken (since it was assumed the pedestrian would judge the gap between vehicles correctly).

Entries on the above list are, of course, in some instances not mutually exclusive.

3.3.5 Who was at fault and did a prosecution result?

The relative contribution of the driver and pedestrian to the 'cause' of the accident was scored according to a five point scale:

i driver totally responsible for the occurrence of the accident,

ii driver mostly responsible,

iii equal driver and pedestrian,

iv mostly pedestrian,

v pedestrian totally responsible.

This scale was used to score the statements of both the witness(es)' and the Police view of the role of the driver and pedestrian in each accident.

The author also made an assessment independent of these comments and this summary assessment is listed in Table 3.8.

Table 3.8 – Researcher's assessment of the contribution of driver and pedestrian to 'cause', 50 accidents involving young pedestrian fatalities in Birmingham

	Responsibility for 'cause'					
	Total driver	**Mostly driver**	**Equal driver-pedes-trian**	**Mostly pedes-trian**	**Total pedes-trian**	**Total**
Road type						
Residential street	–	1	1	9	3	14
Other road/ street	1	4	1	7	23	36
TOTAL	**1**	**5**	**2**	**16**	**26**	**50**

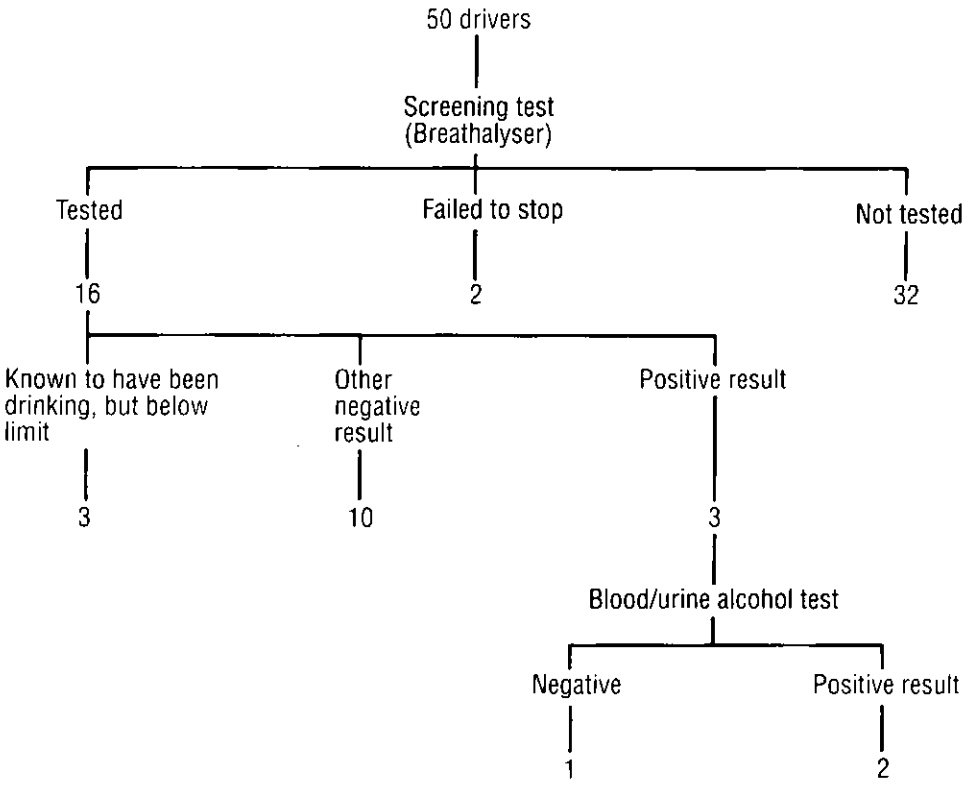
The assessment in Table 3.8 is of course open to interpretation and it is helpful to briefly summarise the rules followed in assessing blame. The one instance where the driver was considered to be completely responsible for the accident involved an incident in which he was driving at very high speed, left the road and struck a group of pedestrians on the footpath. In the 7 accidents where the driver was mostly or equally responsible, the driver was either driving recklessly (and prosecuted for such behaviour on 3 occasions) and/or had previously consumed alcohol in excess of the legal limit (2 occasions). However, the presence and actions of the pedestrian on the highway was interpreted in these 7 instances as a part contribution to the accident.

In the 16 cases which were mostly the responsibility of the pedestrian, the driver was judged to be partly responsible if he was driving slightly in excess of the speed limit, at the speed limit although the conditions would have advised a lower speed, or if he had consumed alcohol but was below the legal maximum level.

It can be seen from Table 3.8 that in 26 (just over half) of the accidents the pedestrian was viewed as being the 'sole contributor' to the accident. It was considered that there was little or nothing that a driver exercising reasonable care, and adhering to generally accepted standards of driving, could have done to modify his behaviour during his journey, or immediately before the impact, to avoid these collisions. This point is developed further later.

Figure 3.3 shows the drink-drive 'tree'. Two of the 50 drivers were prosecuted for being unfit to drive through drink or drugs but study of the records of HM Coroner indicated that it is reasonable to assume that the performance of 5 others was impaired due to alcohol.

Figure 3.3 – The testing for excess alcohol of drivers involved in 50 accidents involving young pedestrian fatalities



Eight of the 50 vehicles involved in these accidents were found to have one or more defects. These were to the brakes (5 instances), bodywork (4), tyres (2), steering (2), lighting (1) and suspension (1). In only one instance was a vehicle defect considered by police officers to have contributed to an accident.

In 29 of the 50 accidents no proceedings were taken by the Police against the driver of the vehicle striking the pedestrian. The Coroner's records indicated that in the other 21 the following prosecutions would be made:

i causing death by reckless driving (4 instances),
ii careless driving (8),
iii documentation irregularities (7),
iv vehicle defects (7),
v fail to stop (4),
vi fail to report (2),
vii excess alcohol (2),
viii other offences (5).

3.3.6 Case studies

There is always a danger of stereotyping and putting too much emphasis into remedial action that is prompted only by the results of a few strong impressions gleaned from research. This has to be balanced against the insight and colour such details can bring to a report. Against this background, 4 case studies of 'typical' accidents to young people of various ages are presented in Table 3.9. In order to preserve anonymity, some details are kept deliberately vague.

Table 3.9 – Case studies from records of HM Coroner

i **A boy aged 3 years**, living in the inner city, goes to the shops with his grandmother. He returns, hand-in-hand, with her to his own house only a few hundred metres from the shops. They walk down the road where he lives, looking for a place to cross. As they are almost directly opposite the house, the young boy breaks free and runs out between parked cars. A car is coming up the road at about 25 mph. The wing of the car catches him a glancing blow and he dies from head injuries.

ii **A girl aged 5** is playing with friends in a terraced street. A delivery van approaches and the group parts to allow it through. The girl appears to realise suddenly she is now not with the particular friend she was and starts to run across the road to join her. The driver brakes, catches her square-on and she dies as a result of head injuries caused by the leading edge of the bonnet.

iii **A boy aged 10** going to the park with a few friends. Perhaps for a dare, when they arrive at the 6-lane dual-carriageway they have to cross, rather than using the subway they go out of their way to go over the road. The others make it across but the 10 year-old, at the back, seems to misjudge the speed of an oncoming vehicle and is caught, thrown in the air and dies instantaneously of head and neck injuries from violent contact with the car's 'B' pillar.

iv **A young man of 18** is out with friends on a Friday night. He's in the pub having a few pints when one of their number summons help on behalf of another of their group who is outside and across the road involved in a fight. The 18 year-old runs out of the pub and crosses diagonally against the oncoming traffic, weaving through the cars. Suddenly he slips and the driver of a car, already braking to allow him through, is unable to stop completely as the youth slips under his vehicle. The youth dies of multiple crushing injuries.

3.4 Discussion

3.4.1 Summary of impressions

It is necessary to be cautious when drawing conclusions from a sample of only 50 accidents, no matter how closely they have been analysed, and there are pitfalls too in measures such as those of blameworthiness which require a degree of interpretation. On the latter issue, it is probably better to have data of limited quality, which may be used cautiously, rather than to have no data at all.

Some of the results from the study confirm what was half-expected – the apparent ordinariness of these events, with both pedestrians and drivers going about their usual activities, in places with which they were familiar before a moment of atypical behaviour or freedom, inattention or misjudgement leads to a tragedy. Other information quantifies issues not previously analysed – high numbers of the very young children of the ethnic minority communities involved in these accidents and the large numbers of these accidents involving pedestrians aged 0-14 years, of all ethnic origins occurring in the inner city areas.

Linked with accidents in the inner city is the strong impression left by many of the photographs in the records of HM Coroner of accident sites in long narrow streets, doors opening onto footways, cars parked on both sides, and children who emerge without warning from behind such obstructions into the path of motorists (see, for example, Figure 3.4).

Figure 3.4 – Victorian housing and on-street parking

The role of alcohol in those accidents involving pedestrians aged 16 years and older is another item of interest emerging from this study and is worthy of further research.

Some parts of the study confirm the results of earlier research (for example, the small contribution of vehicle defects to accidents) but others are more surprising and will need further study – the low incidence of accidents on the journey to and from school being an example.

Greatly simplified, first impressions are of the youngest children completely unaware of the roads or of traffic, and of those slightly older, perhaps aware and but momentarily forgetting. Some of those aged 10-14 years, appeared to be aware and conscious of the dangers but were taking risks and losing. A large number of those aged 15-19 contributed heavily to their own downfall by taking ridiculous risks, engaging in horseplay and/or having consumed alcohol in excess.

Eleven of those killed (typically the older, male casualties) were attempting to cross carriageways of between 4 and 10 lanes width, some within easy reach of a crossing facility.

Another impression worthy of note is the attraction of home to young children having finished an activity or returning from a short journey.

Four instances were recorded of children suddenly dashing across the road, towards their home, from a point close to or immediately opposite the house (on 2 occasions breaking free of the restraint of a parent or relative). It appeared they had nothing on their mind other than reaching home.

3.4.2 Attitudes to blame

The views expressed on pedestrian blameworthiness (just after half of all pedestrians judged as 'sole contributor' to their accident) do not imply a lack of either sympathy for, or will to protect, this road-user, nor should they suggest an attitude of complacency. (This 'independent' assessment is, incidentally, overall more critical than the Police or other witnesses of the role of the driver in these accidents.) It should be remembered also (see Notes and Definitions) that in this study young pedestrians are judged on the standards of the reasonable adult road-user and that attaching blame to a person supervising a young child has not been considered within this context.

The assessment of blameworthiness is perhaps best summed up in unscientific terms by saying that the 26 drivers considered 'blameless' were, prior to the accident, displaying driving attitudes and standards acceptable to all but a very few drivers in this country and that 999 out of 1000 drivers placed in their position would have been unable to avoid the collision.

Although the assessment of blameworthiness is made within a framework of the current road traffic law/*Highway Code*/generally-accepted standards, some questions remain about the extent to which drivers should be behaving so as to anticipate the extremely unpredictable behaviour of the very young pedestrian. Given the more limited cognitive, visual and physical abilities of the young, then perhaps society's allocation of responsibility requires closer study.

Related to this issue of blameworthiness is the question of the consequences for the drivers. It is worthy of note that several drivers were being prosecuted for vehicle defects or documentation offences. Most of these offences, although possibly symptomatic of an unhealthy attitude towards traffic safety, neither contributed to the accident, nor made it more difficult to avoid.

On the other hand, some drivers were not prosecuted for other offences. Just under half (23) of drivers were exceeding the speed limit, however only 9 by more than 10 mph. The latter is an important statistic. There were indications from correspondence with the Crown Prosecution Service, contained in the records of HM Coroner, that the probabilty of prosecution for 'speeding' was small when the speed had been only slightly in excess of the limit. (Average speeds in excess of the speed limit are, incidentally, a common feature on many standards of road, and have been encountered in many traffic and speed counts taken in Birmingham, and in those associated with the TRRL Urban Safety Project).

There are also other matters to consider. For example, a few drivers involved in these 50 accidents received threats of violence from the

family and friends of the deceased. Although matters such as 'unrelated' prosecutions and threats are relatively trivial compared with the death of a pedestrian, drivers should be aware of other possible consequences of their driving.

3.4.3 Possibilities for countermeasures

A major strand of this project is to identify means for treating accidents to young pedestrians and then to select either sites where changes may be made or targets found for education, training and publicity. Within this context it is important to make several points:

i in only one of these accidents did HM Coroner draw attention to an existing feature of the highway environment which he considered to be deficient, this an accident occurring at night when it was thought that a street light 'out' at the time of the accident may have been a small contributory factor in an accident which involved a child running out in front of a heavy goods vehicle. It is unlikely, but not impossible, that better lighting would have meant that this accident did not occur,

ii the 50 accidents in this part of the study were scattered, albeit some of them in certain areas of the city, and certainly did not cluster at particular sites or areas,

iii it would be important not to place too much emphasis on the treatment of a site simply because one fatality has occurred there,

iv however, some of the 'residential' streets on which these accidents occurred would be amenable to the treatments of urban safety management described by the Institution of Highways and Transportation (1990) and using such guidelines it is possible to determine priorities effectively,

v many of the 51 casualties in these accidents were, prior to the accident, exhibiting behaviours of a type described in Section 2 of this report (for example, 'crossing heedless' or dashing out from behind parked vehicles). Many feel a sense of futility associated with analysis of data of this kind which stems from the repetitiveness with which these accidents occur, the waste of life involved and the lack of obvious countermeasures. Engineering countermeasures are available but these accidents are already, and should continue to be, the subject of road safety education, training and publicity.

3.5 Summary of results in context

An objective of this analysis of the records of HM Coroner was to gather information not collected on the Stats 19 form and therefore at a greater level of detail than is generally available.

Of the 51 young pedestrians killed, 26 died as a result of head injuries and another 29 as a result of 'multiple injuries', all but a few of those including head injuries.

Eight of the 9 aged 0-4 years who died were ethnic minorities, all of Asian origin.

An adult was supervising and close at hand to 4 of the 9 aged 0-4 years.

In terms of location, of the 50 accidents, 14 occurred in the inner city. Fourteen accidents occurred on streets described as 'residential', and 9 of these involved parked cars obscuring the driver's view of the pedestrian.

Another 9 accidents occurred on a dual-carriageway, one of these on a motorway. Four of the 51 were trying to cross roads capable of carrying between 6 and 10 lanes of traffic.

Twenty-eight of the pedestrians crossed that particular road 3 or more times per week and the distance of the accident location from the home of pedestrian increased with age of pedestrian, the younger children being injured very close to home. Indeed, 11 of the 30 aged 0-9 years were killed immediately outside their own home,

Similarly, drivers tended to know the site well. Forty of the 50 drivers had driven through the accident scene before. Twenty-four of these 3 or more times each week. Eleven of the 50 drivers were driving as part of their work. Three of the 14 drivers involved in accidents in residential streets were 'rat-running', as were 4 of the 36 on other roads.

In 26 of the accidents the pedestrian was seen as sole contributor to the accident and in another 16 seen as mostly at fault. Related to this, 5 of the 16 pedestrians had consumed alcohol over the prescribed limit for drivers.

There were a total of 39 prosecutions of 21 drivers, including 2 of drivers who had consumed alcohol over the prescribed limit. Nine drivers were travelling at more than 10 mph above the speed limit and another 14 at up to 10 mph above the speed limit.

These results give justification to the subjects of particular interest in this study (described in Section 1.4) as those of the locations at which these accidents occur, aspects common to accidents in our cities and the characteristics both of the drivers involved and 'older' young pedestrians.

It would be particularly useful to gather additional information on the patterns of accidents to young pedestrians crossing major roads such as dual-carriageways, those accidents involving 'young revellers' and the times and places these accidents occur. Additionally, the high incidence of accidents to ethnic minorities (especially those of Asian origin) identified in this part of the study is a matter of concern and to link the latter data to measures of population would be a worthwhile exercise.

4 Questionnaire and interview survey of casualties and drivers

This section goes through the various stages used to enhance the data set with additional data from police records and a questionnaire survey. The survey was undertaken to improve the quality of the information available from a large sample (the Stats 19 data) and to provide a larger sample of data for which good quality information was available (the fatalities study being comprised of only 51 casualties). The original intention was to obtain good quality information on casualties and drivers involved in about 200 accidents. In the event, data were gathered from police booklets (or, in a small number of instances from registration slips and the Stats 19 form) from 417 accidents involving 423 casualties and more information from contact with 251 pedestrians and 192 drivers, this representing a response rate of 71.5% and 55.5% respectively for those whom it was possible to contact. The first parts of the section are concerned with the methodology used in the survey and the response patterns of those involved. This is presented in some detail (4.1 – 4.4) because it is one of the first studies of this particular kind and there is little published information available on the subject. Information is then provided (4.5) about the characteristics of those involved, how the accident happened and what the consequences for the pedestrian and driver participants have been.

4.1 The need to enhance

The study of fatalities gave several ideas for further research and for what had already been discovered to be validated on a larger sample. The preferred means of doing this was to undertake a questionnaire-type survey which would find out more information about the characteristics of those involved in these accidents, the events leading up to the accident, the circumstances at the time, and the consequences of the accident to the casualty.

It was decided to collect data on all police-recorded and police-defined accidents involving serious injury to young pedestrians occurring in the period 1 September 1988 to 31 August 1989. The decision to concentrate on those who were seriously injured was taken on the basis that:

i local data in this time period would provide a suitably-large sample,

ii many of the events occurring immediately before these accidents would differ little in their characteristics from other pedestrian injury accidents already studied, and,

iii that the collision would have been a sufficiently important 'life-event' for those involved to be prepared to participate in the study.

4.2 Additional information from police records

Over a period of 8 weeks in July and August 1989 data were collected from the HO/RT7 police booklets relating to all pedestrian accidents involving serious injury to a pedestrian aged 0-19 years in the period since 1st September 1988. Visits were made to police force headquarters to extract Birmingham data, and to divisional headquarters in each of Coventry, Sandwell, Walsall and Wolverhampton to gather information in each of the other districts. Subsequent visits were made to each in order to collect data for the remainder of the study period (until the end of August 1989) and to go through booklets not available at the time of the original visit. In about 30 instances it was not possible to gather information from the booklet and part of the information was gleaned from a combination of the registration slip and close examination of the Stats 19 form.

Copies of the data collection form used in this part of the work, and all questionnaires and other materials described, are available from the author. Essentially the information collected included details of the accident circumstances, the names and addresses of those involved, and the injuries sustained by the young pedestrian. Importantly, from the HO/RT7 it was also possible to code other information relevant to this study such as the police officer's description of the accident, his allocation of blame and whether or not the names of the casualties were of Asian ethnic origin.

Names and addresses of casualties and drivers of striking vehicles were stored on computer (after appropriate registration under the Data Protection Act) for use in despatch of postal questionnaire and the remainder of the data collection sheet coded and loaded for subsequent analysis.

This data collection exercise by visits to divisonal police headquarters yielded information on 417 accidents involving 423 seriously injured young pedestrians and 417 drivers, the pedestrians and drivers described as accident 'participants'. The precise details of the role played by participants in this study is described in Section 4.4.1

4.3 Method of enhancement

4.3.1 Questionnaire design – methodology

In August and September 1989 work was started on the design of postal questionnaires to be used in approaching drivers and casualties. Although one intention of the study was to validate and corroborate the study of the records of HM Coroner, this survey was also an opportunity to gather additional information beyond that gathered in that project. Accordingly, the questionnaire was divided into 6 main parts – those which asked questions of the pedestrians about :

i what the casualty was doing when the accident happened,

ii the place where the accident happened,

iii the moments immediately before the accident happened and about the striking vehicle,

iv the cause of the accident,

v what had happened since the accident (hospital stay, prognosis and subsequent fears and anxieties),

vi personal details so as to establish characteristics of those at risk.

The driver questionnaire was designed along similar lines. It requested information about the vehicle being driven at the time of the accident and the actions of the pedestrian but did not enquire about injury aspects of the accident. Drivers were asked questions about alcohol consumption prior to the accident, as were pedestrians aged 15-19 years. Two versions of the pedestrian questionnaire were therefore used – one for those aged 0-14 years and the other for those aged 15-19 years. Other than the questions on alcohol, the questions to the 2 age groups of pedestrians were identical, but offered slightly different options in many of the sections as would be appropriate for young people reaching and passing the age of majority – for example, those aged 0-14 years were not asked if they were going to a pub or club when questioned about the origin and destination of their journey.

As far as was possible the questionnaire was designed to take the casualty and driver through the events before, during and after the accident in a logical sequence within the constraints of the overall ideal length of the questionnaire and what could reasonably be expected in terms of recall. Alongside these constraints, great care was taken in using simple language and achieving an attractive and 'undaunting' style in the presentation of the questionnaires.

In the design of any questionnaire there will be questions about its suitability as a measuring instrument and this study was no exception. In particular there was concern that:

i there would be problems of recall since the questionnaires were being despatched to the pedestrian and driver between 3 and 15 months after the accident occurred,

ii many of those questioned would not be prepared to accept or admit guilt for their behaviour or tell the truth about events which reflected badly on them,

iii there would be difficulty in designing a questionnaire which could deal with, and which the respondent could use to describe, all the possibilities of a road accident,

iv that, in leading a participant through the events surrounding their accident, some questions had to be asked even though the answers to these questions were already known from other sources and that this would have the unwelcome effect of lengthening the questionnaire.

In the event it was decided to use the postal questionnaire, but to be conscious of potential problems of this type, to build in checks where possible and to be aware that some responses would give information which would be only suggestive or indicative of the situation around the time of the accident, whilst other information received would be downright misleading.

4.3.2 Piloting

In September and October 1989 the questionnaires were piloted to 30 casualties aged 0-14 years, to 12 aged 15-19 years, and to 30 drivers (all from accidents occurring in Birmingham). This sample was selected so as to get a sample of accidents occurring throughout the time period of the study and, in addition, the pedestrian sample structured so as to achieve an equal sample of the four age bands being considered and an equal split of ethnic minority and non-minority. In piloting, one of the major concerns was to obtain responses in order that these could be used in assessing the design of the questionnaire and in making decisions for re-design. Approaches were therefore not made in the pilot to those whose accident was the subject of legal proceedings.

An 'approach letter' was sent to each casualty and driver saying that in about a week's time they would receive a questionnaire, explaining the purpose of the survey and asking for it to be returned in the pre-paid envelope when it arrived. All drivers and pedestrians aged 18 and 19 years received this and all subsequent correspondence direct, but all correspondence with pedestrians aged 17 and under was through a parent or guardian. If the pedestrian casualty or driver had a name of Asian ethnic origin, then a letter in Bengali, Gujarati, Hindi, Punjabi and Urdu explaining the project was sent with the approach letter.

In the Pilot Study approach letters and questionnaires for one of each of the 3 categories of questionnaire were returned as undeliverable by the Post Office. The response rates of those who were assumed to have received questionnaires was 62.1% and 54.5% for pedestrians aged 0-14 and 15-19 respectively and 79.3% for drivers. There was no statistically significant difference in response rates from Asian ethnic minorities compared with others and no statistically significant difference in response rate by age of pedestrian.

4.3.3 Administration of despatch

All letters both in the pilot and main study were sent from the Accident Research Unit at Birmingham University, in anticipation that response to the survey would be better from an apparently neutral and detached research institution than from any one of the participant local authorities or from a commercial survey centre such as Midland Environment Ltd. Sending from the individual local authorities would not have been an attractive option in any case since it would have multiplied the printing of letters and much of the administration by a factor of 5, that being the number of participating authorities.

4.3.4 Follow-up and re-design

Face-to-face follow-ups were made to non-respondents – 5 pedestrians aged 0-14, 4 aged 15-19 and 2 drivers – in November 1989 in order to discuss why they had failed to respond and which parts of the questionnaire could be amended and improved. In addition, telephone interviews were held with 2 drivers (one of whom had already returned the questionnaire), 2 drivers declined to participate when questioned on the doorstep and 2 were not in when the interviewer called.

A number of minor modifications were made to the questionnaire – some questions dropped, others changed, and a few re-ordered. The decision was also taken at this stage to use a booklet design rather than A4 sheets stapled in the top left hand corner since several respondents had apparently missed questions by not realising all pages had questions on both sides.

4.3.5 Main study

The procedures followed in the main study were similar to those described above with questionnaires to 0-14 year olds being despatched in mid-November 1989 and reminders to non-respondents being sent six weeks later in the period between Christmas and New Year. Questionnaires to 15-19 year olds and drivers were sent slightly later than those to 0-14 year olds, as were the reminders. Patterns for the **postal** response rates are illustrated in Table 4.1.

Table 4.1 – Postal responses (cumulative percentages) by week of study and questionnaire type

Week commencing	Pedestrian 0-14 years	Pedestrian 15-19 years	Driver
20.11.89	Posting	–	–
27.11.89	10.1%	Posting	Posting
4.12.89	23.9%	6.5%	8.0%
11.12.89	26.5%	12.8%	21.3%
18.12.89	30.4%	21.0%	30.4%
25.12.89	Reminder	–	–
1.1.90	35.3%	24.0%	31.7%
8.1.90	43.1%	26.7%	33.3%
	–	Reminder	1st reminder
15.1.90	46.8%	38.7%	42.2%
22.1.90	50.2%	49.3%	46.9%
29.1.90	50.5%	50.7%	48.0%
5.2.90	51.2%	53.3%	49.2%
12.2.90	52.1%	53.3%	49.4%
	–	–	2nd reminder
19.2.90	52.1%	53.3%	50.8%
26.2.90	52.5%	53.3%	52.4%
5.3.90	52.5%	53.3%	53.5%

In addition to those 423 casualties and 417 drivers described above, a small number of accidents, casualties and drivers were not included in the study and are listed below:

i one of the accidents involving serious injury to a pedestrian occurred when a vehicle struck a Remembrance Day march causing injury to more than 20 casualties. It was decided that this accident could not be adequately described by the questionnaire being used in this study and that, in any case, its causes had been discussed fully in the local and and national media and that it was the subject of a detailed legal enquiry,

ii one accident involving both a seriously injured young pedestrian and a fatality,

iii one accident involving a baby in a pushchair on the footway, the baby having been coded (correctly) as a pedestrian and a car having left the highway and struck the pedestrian,

iv 9 accidents were coded as accidents to young (0-19 year-old) pedestrians but there was conflicting information in the HO/RT7 about the age of the casualty both in the numerical entry and in the the accident description, for example, 'Old lady knocked down after leaving bus',

v 3 accidents for which the police officer reported that there had been no injury to the pedestrian, and indeed no vehicle-pedestrian contact.

It should be noted that an informal tally was kept for samples of the HO/RT7 to check on the accuracy of the police officer's severity coding. It is considered that between 10 and 15% of these serious injury accidents would have been more correctly coded as 'slight', but that this figure was probably slightly higher for the district of Coventry.

4.3.6 Face-to-face follow-up

In mid-January 1990 four pairs of interviewers from Midland Environment Ltd. began calling on casualties who had failed to respond to the questionnaires. It was decided not to follow-up on non-responding drivers on the grounds that:

i resources would not permit this,

ii the emphasis of the work should be in obtaining a good response from pedestrians since in the study of fatalities the pedestrian's personal view of the accident was, of course, unable to be told,

iii as a result of the hostile response received from several drivers both in the Pilot Study and after initial receipt of their questionnaire in the main study, doubts existed in the minds of the author and interviewing teams as to the extent to which non-responding drivers would co-operate with the research.

All interviewers had previously worked on other public opinion or market research surveys, had been fully briefed on the nature of the survey and its sensitive nature. The author participated in one session of 7 visits to non-respondents in order to observe protocols and gain a 'feel' for this part of the research.

These interviews were selected so that the total overall response of both postal and face-to-face surveys would be representative of the age distributions of seriously injured pedestrians in the West Midlands and to maintain an equal response rate from each of the 5 participating districts.

It is important to have information about the numbers of pedestrians with whom contact was attempted because this gives data about those who were **not** contacted and therefore any sources of potential bias in the sample. Some of this information is summarised below. There were:

i 26 non-respondents for whom no effort was made to contact face-to-face,

ii 15 people to whom more than one visit was made because either the pedestrian was not at home, or because there was no reply at the door,

iii 4 successful telephone contacts (see below),

iv 109 people with whom contact was made at the first attempt.

4.3.7 Telephone contact

During the last week of January 1990 it was decided to test the effectiveness of telephone contacts as a means of arranging interviews or prompting responses from the pedestrians or parents who would already have received the questionnaire.

The initial reservation about the use of this approach was that, due to the nature of the need to discuss a potentially distressing subject, it offered an easier opportunity for the individual to refuse to participate than would be the case with face-to-face contact.

It was clear, however, that the aim of the follow-up stage was to boost the overall response rate, preferably with the pedestrian completing the questionnaire, rather than it being administered face-to-face. If it had proved to be productive to stimulate responses by a short telephone contact, then a telephone approach would have been adopted as one practical means of follow-up.

From the first telephone follow-up session a random selection of 30 non-respondents from Birmingham were selected. A little over one-third (12) of these were actually listed in the telephone directory or were found via Directory Enquiries. Telephone calls were made to these people between 18.00 and 20.00 hours, when it was discovered that 4 numbers were either disconnected or were otherwise unobtainable and that one family had moved house. Four contacts were successful on the first attempt and the recipient of the call in each case promised to put the questionnaire in the post or asked for it to be collected. There was no answer from 2 numbers and the last said they were too busy to speak now but that the caller should call back later. Repeated attempts at contacting the 2 for whom there had been no answer were unsuccessful.

Questionnaires were eventually received from 3 of the 4 who had promised to complete and return them. The method of telephone contact was not adopted for the remainder of the study because relatively few participants could be contacted by this method and it was considered to be an inefficient use of time.

4.3.8 'Personal responses' from drivers and casualties on receipt of questionnaires

This study had been breaking new ground in that, as far as could be ascertained, there had not been a retrospective study of accidents to **seriously** injured young people designed, conducted and with the objectives of the present one. Not unreasonably, there was therefore some concern about the response a researcher could expect from those involved in these accidents. In the event responses were very good with a majority accepting the rationale of the study and eager to help make

roads safer, but it may be useful to others contemplating similar work to have further details.

Responses from those involved may conveniently be divided into 2 types – those resulting from the despatch of approach letters or questionnaires in which the participant telephoned the author or his colleagues – and those encountered during the doorstep interviews.

It appeared that in some respects the overall response was slightly more 'polarised' than might have been expected with the majority very keen to participate and a very small number objecting strongly to being approached. In general, the high number of parents, casualties or drivers who telephoned was surprising. These people were generally asking for clarification of certain questions (5 people), informing that they had moved house (6), requesting a personal interview (3), or otherwise sending covering letters, additional information such as copies of submissions to insurance companies (4) and even of messages of support for what they perceived as important work (3).

On the negative side, some drivers (2) were advised by their solicitors not to participate because their case had still to come to court and some (5) felt that the survey represented a breach of their personal privacy. Two drivers reported that they had received threats of violence from the families and friends of the casualty at the accident scene and one of these felt unable to participate in the study for fear that they would make contact with him again (although in fact this was not a possibility). One driver threatened physical violence against anyone who persisted with the intention explained in the approach letter of sending him the questionnaire.

Some (3) parents replied saying that they did not wish to ask their offspring to have to go through the events surrounding the accident because they felt the whole affair was best forgotten and that it would 're-open old wounds'.

Unfortunately, there were some casualties whose injuries had not been adequately described in either the police booklet or the data collection sheet and 6 approaches were made to parents of young people who were too severely disabled by their accident to respond. Before the study began the decision had been taken not to approach those who had sustained brain damage or were otherwise clearly unable to respond on their own. In the event, the Police information did not prompt any of the cases to be rejected on the basis of injury severity, but unfortunately 3 parents responded saying that their child could not respond as a result of brain damage sustained in the accident. Correspondingly, 3 questionnaires were returned from parents whose children had been too badly injured to respond but who had pieced together what information they could from the reports of Police and witnesses in order that they could contribute to the study.

In the main, and this was readily apparent during the face-to-face follow-up, families seem to be pleased to share their experience with a third party, discuss and 'work out' some of their concerns in what occasionally appeared to be sessions of almost therapeutic benefit.

Interviewers were offered hospitality, shown wounds and scars from the accident and asked to do what they could to reduce the problem of accidents to young pedestrians. These interviews were also used occasionally by parents to gently remind children of the importance of following road safety advice in crossing the roads.

Some responses reflected that in a few families a road accident was not the rare event that it was in others. In one family confusion arose because a casualty's sister had also been injured as a pedestrian within the period of the study but had sustained 'slight' rather than 'serious' category injury and was not therefore included in the study. Another participant had been involved in 2 pedestrian accidents during the study and was uncertain about which he should be answering questions.

4.3.9 Coding and loading of data

The questionnaires were part multiple-choice response and part open-ended questions. A system of selection of key words was used to code the latter and all data were entered on a dBase III+ system by two coders at Midland Environment Ltd. The dBase III+ package was used as appropriate to manipulate the data and import the data into a form for analysis by both the SPSS PC+, Version 3.0 and Statgraphics Version 4.0 systems. Again, copies of the coding manuals are available from the author. Coding began in January 1990 and was completed in March 1990.

4.4 Response patterns

4.4.1 The survey data set

Information was collected from 423 seriously injured pedestrian casualties and 393 drivers involved in a total of 417 accidents in the five districts. The role these participants played in the study is described in Table 4.2.

Table 4.2 – Responses by type of questionnaire

	Questionnaire			
	Pedestrian 0-14 years	**Pedestrian 15-19 years**	**Driver**	**Total**
Respondents				
Postal	150	39	192	381
Prompted postal	16	5	N/A	21
Interview	35	6	N/A	41
Subtotal respondents	201	50	192	443
Non-respondents				
Unreturned	69	19	143	231
Refused	11	1	11	23
Subtotal non-respondents	80	20	154	254
(Total assumed received: respondents + non-respondents)	**281**	**70**	**346**	**697**
Not contacted in (main) study				
Not traced	23	4	36*	63
'Too sensitive'	4	0	5	9
Part of pilot study	29	12	30	71
Subtotal not contacted	**56**	**16**	**71**	**143**
TOTAL	**337**	**86**	**417**	**840**

*includes 24 'non stop' drivers

Of the 840 participants, 72 pedestrians and 71 drivers were not contacted in the main study. Of these, 63 could not be traced (letters to them being returned 'gone away' or the wrong or no address having been supplied to the police), and it was judged to be inappropriate to contact 5 drivers and 4 pedestrians (because the site at which the accident occurred was 'politically sensitive' and the subject of concerted public debate at the time of the study). In addition, 71 participants were approached in the Pilot Study and could not therefore be asked to take part in the main study. For a further 24 accidents no information was available on the identity of the driver, the driver and vehicle having failed to stop at the scene of the accident.

From the remainder, information was gained from 201 pedestrians aged 0-14, 50 pedestrians aged 15-19 and 192 drivers. Forty-one interviews were held with pedestrian casualties and 21 were encouraged to complete and return their questionnaire after a visit from an interviewer. The personal visits to pedestrians were used in such a way as to boost responses to ensure that the overall response obtained was

representative of the number of casualties in each age group and achieved a response rate of around 70% for each district. The response rate of those who were assumed to have received a request to participate in the main study was 71.5% for pedestrians aged 0-14 years, 71.4% for pedestrians aged 15-19 years (the overall response for pedestrians being 71.5%) and 55.5% for drivers.

A total of 231 questionnaires were unreturned, refusals were received from, or on behalf of, 12 pedestrians and 11 drivers.

In summary, data were therefore available on the following (see also Table 4.2):

i HO/RT7 – details of 417 accidents including information on 393 drivers judged as the driver 'most involved' (typically the **only** driver) in the accident and the 423 young pedestrian casualties sustaining serious injury.

ii Pedestrian questionnaires – 201 either returned by or completed with a pedestrian aged 0-14 years, or on his behalf by an older person, and 50 either returned by or completed with a person aged 15-19 years.

iii Driver questionnaires – 192 returned by a vehicle driver.

There were 133 accidents for which a questionnaire was returned by both pedestrian and driver, 118 for which there was a pedestrian response but no driver response and 59 for which there was a driver response but no pedestrian response. For 107 accidents there was no information from any participants included in the main study, but this includes 42 accidents included in the Pilot Study.

Table 4.3 summarises the responses by district (but includes all participants including those **not** contacted in the main study and response rates therefore appear artificially low).

Table 4.3 – Responses by district and participant category

	Participant category										
	Pedestrian										
	0-4		**5-9**		**10-14**		**15-19**		**Driver**		
District	**R**	**N**	**R**	**N**	**R**	**N**	**R**	**N**	**R**	**N**	**Total**
Birmingham	10	18	45	36	30	22	18	22	87	113	401
Coventry	10	3	24	9	23	7	11	7	53	39	186
Sandwell	1	3	8	4	12	6	5	2	14	26	81
Walsall	2	1	6	6	4	5	7	2	14	19	66
Wolverhampton	4	2	16	9	6	5	9	3	24	28	106
TOTAL	**27**	**27**	**99**	**64**	**75**	**45**	**50**	**36**	**192**	**225**	**840**

R = Respondents
N = Non-respondents plus those not contacted in main study

4.4.2 Reporting conventions

Unless otherwise stated, the convention in reporting the details of these accidents is that the percentages quoted below are of either the 251 pedestrians (often expressed as a percentage of the total in the four

age groups), the 192 drivers responding, or the 423 casualties from the HO/RT7. Explanation is provided when percentages are not mutually exclusive. To minimise the presentation of redundant information, only the major results are given and results for the number of people either not knowing or not providing the answer to a question are generally not listed. Because of the large variance associated with small numbers of accidents or casualties, and also the fact that the use of percentages tends to mask the size of frequencies, some results are given as frequency counts.

The chi-squared test is used to test formally many of the results for independence of attributes, the null hypothesis being that the distributions being tested come from the same population. Statistical significance is reported at $p<0.05$.

Cochran (1952), cited in the review by Siegel (1956), suggests that the chi-squared test can only meaningfully be used if fewer than 20% of cells have an expected frequency of less than 5 and no cell has an expected frequency of less than unity. If these criteria are not met, it is necessary to aggregate data by combining cells. Failure to do this results in a loss of statistical power in the test and a 'blurring' of the ability to make decisions based upon the results of the test. In this analysis, matrix dimensions have been reduced when necessary, re-grouping as appropriate (for example, by combining missing data with 'not knowns'), and generally taking a conservative approach in 'working against' the case being made.

In general, results are given without comment and discussion of results offered in Section 5.

4.4.3 How did those who responded compare with those who did not?

It is important in any survey which does not achieve anything other than an extraordinarily high response rate to have some feel for the characteristics of those who did not respond since this must be borne in mind when making comments about the data received. In this study it was possible to compare respondents and non-respondents using data on certain variables collected from the HO/RT7.

The distributions of HO/RT7 variables for respondents and non-respondents for pedestrians were not significantly different. These results are presented in Table 4.4 and described opposite.

Table 4.4 – Summary comparisons of respondents and non-respondents

No significant difference:		
Pedestrian	by	district, gender, age group, ethnic origin (Asian/non-Asian), hour of day, month of year, Police report of blame, Police accident description, category of road.
Driver	by	district, age group, hour of day, month of year, age group of pedestrian casualty, gender of pedestrian casualty, Police accident description.
Significant difference:		
Pedestrian	–	none.
Driver	by	Police report of blame, prosecution for document or driving conduct offence, category of road, ethnic origin (Asian/non-Asian).

There was no significant difference in response rate (Table 4.3) between districts but there were relatively more repondents from Coventry (27.1% of respondents compared with 15.1% of non-respondents) and fewer from Birmingham (41.0% of respondents compared with 57.0% of non-respondents).

Male pedestrians were as likely to respond as female pedestrians, males forming 62.2% of respondents and 61.0% of non-respondents.

There was no significant difference in response by age group, although slightly fewer responses from those aged 0-4 years (10.5% of all respondents) compared with non-respondents (15.7% of non-respondents).

Of respondents, 22.3% had names of Asian origin compared with 24.4% of non-respondents, these differences again not being significantly different.

There was no significant difference in distributions between respondents and non-respondents by hour of day or, importantly because of the possibility of seasonal bias or the effect of time lapse on the likelihood of a questionnaire being returned, month of year.

The proportion of pedestrians interpreted as being described by the police as most at fault was almost identical for respondents (93.2% of all respondents) and non-respondents (93.0% of all non-respondents), these differences, of course, not being significant.

Similarly there was no significant difference in the distributions of the description of the accident given by the police, although there were relatively fewer respondents (26.7% of respondents) coded as running out from behind parked vehicles compared with 32.0% of all non-respondents.

There was no significant difference in the pattern of respondents and non-respondents by category of road.

The picture for drivers was different, with several significant differences in the distribution of respondents and non-respondents.

Drivers were less likely to respond if they were considered by interpretation of the police report to be more to blame than the pedestrian (1.0% of all driver respondents being held to blame compared with 9.1% of all non-respondents).

Drivers were less likely to respond if their accident occurred on a dual-carriageway.

Drivers were less likely to respond if being prosecuted or likely to be prosecuted for a driving conduct offence (1.6% of all respondents were being prosecuted and 3.6% likely to be prosecuted, compared with 5.2% of non-respondents being prosecuted and 11.3% likely to be prosecuted).

Drivers were less likely to respond if being prosecuted or likely to be prosecuted for a document offence (relating to their licence, insurance or excise duty) with 2.6% of all respondents being prosecuted and 3.6% likely to be prosecuted, compared with 5.6% of non-respondents being prosecuted and 7.4% likely to be prosecuted.

Finally, drivers with Asian names were less likely to respond. Drivers with Asian names formed only 8.9% of respondents compared with 14.7% of non-respondents.

It was **not** possible to reject a null hypothesis that the distributions for the following variables were independent:

i response by district, similar to the picture for pedestrians, 43.8% of all respondents were from Birmingham compared with 50.6% of non-respondents and drivers from Coventry formed 29.2% of all respondents and 16.5% of all non-respondents,

ii age of driver, any differences being largely attributable to more missing data (because of drivers who failed to stop at the scene) in the distribution of non-respondents,

iii hour of day, although relatively fewer respondents from those involved in accidents between 19.00 and 02.59 hours and more from those involved in accidents during the morning and evening traffic peaks,

iv month of year, the distributions being almost identical,

v age of pedestrian casualty,

vi gender of pedestrian casualty, although drivers who knocked down females formed 40.1% of respondents compared with 36.8% of non-respondents,

vii police description of the cause of the accident, 1.6% of all respondents colliding with a pedestrian on a pedestrian crossing compared with 7.4% of non-respondents, and 33.3% of responding

drivers striking pedestrians who had come from behind parked vehicles compared with 25.1% of non-respondents.

4.4.4 More information about pedestrians who didn't respond?

In addition to being able to compare the characteristics of respondents and non-respondents according to variables on the HO/RT7, it is arguably possible to deduce some of their characteristics from variables on the postal questionnaire. From Table 4.2 it can be seen that 189 pedestrians responded to the questionnaire by returning it through the post but that information was only gained from 62 other respondents after they had received a postal reminder, an additional questionnaire and a personal visit from the interviewing teams. Of these 62, postal responses were received from 21 and face-to-face interviews conducted with 41. Had the interviewing teams not made the visits to these people, they would have been classified as non-respondents.

Arguably, the people with whom personal contact was made therefore have characteristics similar to other non-respondents, although they may be more accessible and/or compliant than the 'true' non-respondents. Support for this argument may be gained from the fact that there were very few pedestrians (26) for whom no attempt at contact was made and that there were very few (3) refusals at the doorstep (although 18 offered at the doorstep to complete and return the questionnaire and subsequently failed to do so).

If this argument is accepted, then comparison of the characteristics of the 63 with whom personal contact was made and 189 respondents with whom there was no contact may provide insights into the non-respondents.

Using data from the HO/RT7, null hypotheses were established that respondents with whom personal contact was made came from the same population as respondents with whom there was no personal contact. There was no significant difference between the two groups on the basis of, age of pedestrian casualty, gender of pedestrian, interpretation of police officer's blame, and Socio-Economic Group (SEG).

There was a significant difference in the distributions by ethnic origin with greater proportions of Asian, Afro-Caribbean and other (black) ethnic minority groups being less likely than the white (U.K. and European) population to respond to the postal questionnaire and reminder without a personal visit (Table 4.5). This result should be viewed within the context of the fact that personal visits enabled the proportion of Asian respondents to match their numbers in the population of accidents. Additionally, later findings (Section 5), which compare the populations of those involved, suggest that the number of Afro-Caribbean respondents is not unrepresentative of their numbers in the population.

Table 4.5 – Unprompted versus prompted pedestrian respondents by ethnic origin

Ethnic origin	Unprompted %	Prompted %	Total %
White	143 (75.7)	36 (58.1)	179 (71.3)
Black – Asian	35 (18.5)	17 (27.4)	50 (20.7)
Black – Afro-Caribbean/African /Other	7 (3.7)	8 (12.9)	15 (6.0)
Not known	4 (2.1)	1 (1.6)	5 (2.0)
TOTAL	**189 (100.0)**	**62 (100.0)**	**251 (100.0)**

There was a significant difference in the distributions by length of stay in hospital, with those staying in hospital longer being less likely to respond only to a postal approach. An implication of this result (and this is supported by a small number of refusals received because the casualty was too badly injured to participate in the study) is that the total sample of 251 respondents is slightly skewed in favour of those who were less severely injured.

4.4.5 Who actually completed the questionnaire?

The instructions for completion of the questionnaire for those aged 0-14 suggested that younger children would need help in answering the questions and that one way of doing this was for a parent or older person to ask the questions, for the child to answer and for the parent to fill in the response. Of those aged 0-4 at the time of the accident, 3.7% reported that the questionnaire was filled in just by the person involved in the accident, 40.7% just by a parent or older person and 55.6% jointly by the young person and a parent or older person. Similar statistics for those aged 5-9 are 7.1%, 21.2%, and 70.7% respectively and for those aged 10-14, 34.7%, 10.7% and 54.7% respectively.

Figures for those aged 15-19 were 58.0% completed just by the person involved in the accident, 16.0% by another person and 22.0% mainly by the person involved in the accident but with help from another person.

Questionnaires completed during a face-to-face interview were coded as being filled in by the pedestrian and another person.

4.5 Results: the respondents

4.5.1 Who were the pedestrians?

According to the HO/RT7, 61.8% of participants were male. Male pedestrians accounted for 62.2% of respondents.

The social profile of young pedestrians responding to the questionnaire reflects the higher incidence of lower S.E.G.s identified in earlier studies. The head of household of more than a quarter (26.3%) was unemployed (Category E) and 15.9% in the category unskilled manual (D). The remainder were, 4.4% (A/B), 12.4% (C1), 28.7% (C2) and 12.4% not known. There was no significant difference in the distribution of SEG of head of household by age group.

About half (48.6%) lived in owner-occupied accommodation, 43.4% in council accommodation and 5.2% in private rented accommodation. There was no significant difference in the distribution of type of occupancy by age group.

There was a mean of 2.63 children under the age of 17 living in the house. This may be compared with data extrapolated from the 1981 Census which show that the average number of young people of similar age in any household (with at least one such young person) at that time was about 2.0 for the West Midlands districts and 2.1 for Birmingham.

The great majority (95.0% overall) of pedestrians were injured in the district in which they lived – Birmingham (94.5%), Coventry (96.8%), Sandwell (90.0%), Walsall (100.0%) and Wolverhampton (96.3%). In Birmingham, the percentages contributing to this total of 95.0% were 24.5% living in the Inner City Partnership Core Area, 30.5% living elsewhere in the Inner City Partnership area, and 40.0% living in other parts of Birmingham.

Almost exactly half (50.2%) were at Infant or Junior School, 25.1% at Secondary School, just under one-tenth (8.0%) pre-school and 13.6% either in work or training or unemployed (1.6%).

The ethnic origin of young pedestrian casualties was as follows – White U.K. or European (69.6%), Asian (20.7%), Afro-Caribbean (4.0%) and Other (4.6%). These results are presented by age group in Table 4.6 and examined further in later parts of this report. It is noticeable that Asian children between aged 0-4 and 5-9 are present in relatively high numbers.

Table 4.6 – Pedestrian ethnic origin by age group

	Age of casualty									
Ethnic Origin	**0-4**	**%**	**5-9**	**%**	**10-14**	**%**	**15-19**	**%**	**Total**	**%**
White European/ UK	17	63.0	62	62.6	54	72.0	42	84.0	175	69.7
White Non-European	0	0.0	1	1.0	2	2.7	1	2.0	4	1.6
Black – Asian	6	22.2	25	25.3	16	21.3	5	10.0	52	20.7
Black – Afro/ Caribbean	1	3.7	5	5.1	1	1.3	2	4.0	9	3.5
Black African	0	0.0	1	1.0	0	0.0	0	0.0	1	0.4
Other	2	7.4	2	2.0	1	1.3	0	0.0	5	2.0
Not known	1	3.7	3	3.0	1	1.3	0	0.0	5	2.0
TOTAL	**27**	**(100.0)**	**99**	**(100.0)**	**75**	**(100.0)**	**50**	**(100.0)**	**251**	**(100.0)**

4.5.2 What injuries did they sustain?

Injuries reported by the pedestrians in their questionnaires were accorded AIS (Abbreviated Injury Scale (American Association of Automotive Medicine, 1985)) scores to various areas of the body. These may be expressed in terms of minor injuries (AIS 1) similar to the police 'slight' injury classification, non-minor, non-life threatening, moderate (AIS 2) and serious (AIS 3), severe (AIS 4), critical (AIS 5) and currently virtually unsurvivable (AIS 6).

Overall, injuries were predominantly to areas defined as external (64.5% of all casualties had such an injury), lower extremities (51.4%) and head (28.7%) and upper extremities (14.7%). The percentages of injuries reported to the other body areas were: 2.4% (spine), 2.0% (abdomen), 0.8% (neck), 0.8% (thorax), and 0.4% (face). This split of reported injury by body region is provided in Table 4.7.

Injuries of AIS 2 and 3 were common for lower extremities (49.1% of all casualties had such an injury), with comparatively few reported for the head (14.4%), external (15.5%) areas, upper extremities (12.8%), abdomen (1.2%), spine (0.8%), thorax (0.4%), and none to the neck.

Severe injuries (>AIS 3) were predominantly those to head (9 reports (3.6% of all casualties had such an injury)), 2 of which included fractures, 3 of brain damage and 5 involving the pedestrian being unconscious for between 2 and 7 days), the abdomen (1), upper extremities (1) and the lower extremites (1 – amputation of the foot).

Table 4.7 – Pedestrian reported Abbreviated Injury Scale score by body region (251 casualties)

	AIS Score					
Body region	**1**	**2**	**3**	**4**	**5**	**6**
External	123	39	0	0	0	0
Head	27	30	6	2	7	0
Face	1	0	0	0	0	0
Neck	2	0	0	0	0	0
Thorax	1	0	1	0	0	0
Abdomen – pelvic contents	1	2	1	1	0	0
Spine	4	2	0	0	0	0
Upper extremity	4	31	1	0	1	0
Lower extremity	5	93	30	0	1	0
TOTAL	**168**	**197**	**39**	**3**	**9**	**0**

These data were investigated with respect to multiple injury, with the following results:

i 59 respondents reported one or more AIS 1 injury, but none of greater severity,

ii 135 reported one injury of AIS 2 or 3, but none of greater severity,

iii 44 reported 2 or more injuries of AIS 2 or 3, but none of greater severity,

iv 9 reported one injury of AIS 4 or 5 (and possibly others of lesser severity),

v none of the casualties reported 2 or more injuries of AIS 4 or 5.

4.5.3 How long did they spend in hospital?

As would be expected of casualties defined as seriously injured, 88.4% went to hospital. It is known that all but one was discharged within 6 months of their accident, the exception still in hospital when he received the questionnaire some 4 months after the accident.

Overall, – 30.3% stayed in one night or less, 37.5% between 2 and 13 days, 11.2% between 2 weeks and one month, and 19.1% between one and 6 months.
Length of stay varied significantly by age group:

i those aged 0-4 years – 22.2% stayed in one night or less, 44.4% between 2 and 13 days, 7.4% between 2 weeks and one month, and 25.9% between one and 6 months.

ii those aged 5-9 years – 29.3% stayed in one night or less, 33.3% between 2 and 13 days, 12.1% between 2 weeks and one month, and 22.2% between one and 6 months.

iii those aged 10-14 years – 26.7% stayed in one night or less, 45.4% between 2 and 13 days, 6.7% between 2 weeks and one month, and 20.0% between one and 6 months.

iv those aged 15-19 years – 40.0% stayed in one night or less, 34.0% between 2 and 13 days, 18.0% between 2 weeks and one month, and 8.0% between one and 6 months.

4.5.4 Were the pedestrians disabled or handicapped by the accident?

The majority (66.9%) of those responding said that they had not been left with any residual dysfunction. There was a significant difference by age group, with relatively more of those aged 5-9 years saying they had not been left with residual dysfunction.

Of all respondents, 1.6% had gross motor deficiency due to head injury, 3.6% had difficulty with walking, 3.6% with running, 6.4% said they could not now play sport, 2.8% could not bend or use joints as well as before the accident, 0.8% reported difficulty at work and 2.0% reported miscellaneous other problems. (In addition, it should be remembered that a further 3 declined to participate in the study on behalf of a severely injured casualty.) However, it should be noted that almost all participants received the questionnaire between 3 and 15 months after their accident and that the dysfunction they were experiencing was not necessarily therefore a long-term disability.

As would be expected, other than the head injuries, the injuries causing residual dysfunction were those to the legs.

More than half (56.2%) said that as a result of the accident they had been left with fears or worries about traffic, the place where the accident happened or other matters. There was no significant difference by age group. Almost a quarter (22.7%) of all pedestrians had fears of crossing any road, 12.4% of crossing the road where the accident happened, 7.2% of vehicles and traffic, 6.0% of crossing a road on their own, 2.8% still worried or had nightmares about the accident, and others were scared of the possibility of another accident happening to themselves (2.0%) or to someone else (1.6%).

4.5.5 Case studies

In order to give an impression of the circumstances of the those involved and the nature of these accidents, 4 case studies are presented in Table 4.8.

Table 4.8 – Case studies from face-to-face interviews

i **The mother of a 4 year-old pedestrian** casualty opened the door to the 2 interviewers. Introducing themselves, they explained that they had sent a questionnaire (a reminder had been sent as well) about her daughter's accident, that it had not been returned, and could they help her with the completion of it? At this she became quite aggressive and told them she had, 'put them both in the bin'. The interviewers suggested that they would be happy to go through the questions with her, at which the mother's hostility increased, criticising and questioning the value and benefits of the research. She demanded to know what good it would be and how it would be used practically, to reduce the number of accidents outside her house. She explained that, due to the amount of parking on both sides of the road, there were no 'safe' places for her children to cross their road to visit friends in the house opposite. The interviewers were told that the vehicles parked outside her home were owned by people living many doors away.

After these initial exchanges the interviewers explained some of the background to the research and, from a slightly difficult start, were invited inside. Once inside it quickly became apparent that the pedestrian's mother was, in fact, happy to participate in the study but had reading and writing difficulties. She also had her 'hands full' with looking after four young children.

She described how her daughter had run out into the road from between parked cars. A goods van had slowed down to allow a car to pass and was pulling off as the young girl ran out into the side of the van. She suffered bruising and cuts to the face as well as a fractured wrist.

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ii **The father of an 8 year-old girl** welcomed the interviewers into his home and offered them tea and coffee. His daughter was called from her bedroom, where she had been reading, to answer questions about her accident. She entered the room, shy at first, but soon relaxed in the company of the female interviewers. Her father told the interviewers that they could ask the daughter anything about the accident and that she would answer truthfully.

The girl spoke of how she had been home from school one lunch-time and left in a hurry to arrive in time for afternoon lessons. She needed to cross the busy road in front of her house to get to school and walked to the nearby Pelican crossing. She remembered seeing the 'green man' and stepped out into the road. A car struck her on the left hand side. She was thrown into the air and landed on the pavement. She was in hospital for 3 months recovering from multiple injuries, including a broken leg and arm.

Both father and daughter attributed the accident to the driver who they alleged had driven carelessly and failed to stop at the Pelican. The driver had not been prosecuted.

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iii **The home of a 10 year-old boy** on a post-war council estate was visited. The house looked to be uninhabited and the interviewers were therefore surprised to be greeted by the casualty's older sister.

The sister called for her father, who had just returned home from night shift. He was keen to take part in the study and welcomed the interviewers into the house. Although the interviewer directed all questions to the child, the father frequently interjected by giving greater detail than the child or telling him to 'speak up'. When his son was asked to draw the scene of the accident, the father took the pen from his hand and started to draw. Thus, the accident scene was described mainly by the father, who had not been there at the time of the accident, but had gained all his information from eye-witness reports.

The child had been crossing with friends at a bus turning place/lay-by on his way home from school. A car making a U-turn in the lay-by struck the boy, lifting him into the air and throwing him on to the ground a few metres away. He sustained concussion, causing some memory loss, and minor cuts and bruising.

The father attributed the cause of the accident to the high speed of the vehicle but reported that prosecution of the driver failed in court due to lack of evidence. He was keen to see a Pelican crossing installed at the scene or for there to be supervision by a School Crossing Patrol since it is a site frequently used by children on the way home from school.

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iv **The mother of a 15 year-old boy** answered the door and apologised for not sending the questionnaire back. She agreed to let the interviewers into the house to go through the questionnaire with her son. The father sat watching the television but overseeing the interview. The son was keen to fill in the questionnaire and was also happy to be the centre of attention. In answering the interviewer's questions he would look at his mother for confirmation of what he was saying. The father was rather cynical of the interview and would interject with ridicule and criticism on hearing each question asked.

The son described how he had been waiting with his school friends for a bus to take them home. As the bus had approached a scuffle had broken out amongst the boys and he had been pushed into the road and into the path of the oncoming bus. The offside front wheel of the bus had rolled over his foot causing severe crushing injuries. His foot had been amputated by surgery at hospital, with the result that his patterns of walking were now abnormal.

The reason that this very unfortunate incident occurred was attributed by the family directly to the lack of supervision given to children after school had finished.

4.5.6 Who were the drivers?

Responses were received from 150 male drivers (78.1% of respondents) and 42 (21.9%) female drivers. The ages of drivers were as follows – under 16 years (1.0%), 16-19 (4.7%), 20-24 (18.8%), 25-29 (17.2%), 30-34 (13.0%), 35-35 (10.9%), 40-64 (32.8%) and over 64 (2.6%), this distribution almost identical to that obtained from Stats 19 data in Section 2.

Approximately four-fifths of drivers (79.7%) responding classified themselves as 'White European', 12.0% as Asian, 2.6% as White Non-European and 2.1% as Afro-Caribbean (Table 4.9).

Table 4.9 – Driver ethnic origin

Ethnic origin		%
White European – UK	153	(79.7)
White Non-European	5	(2.6)
Black – Asian	23	(12.0)
Black – Afro-Caribbean	4	(2.1)
Black – African	0	(0.0)
Other	0	(0.0)
Not known	7	(3.6)
TOTAL	**192**	**(100.0)**

The great majority (84.4%) of drivers were in work, 2.1% were students, 3.6% were retired, the remainder filling their time in other ways or not providing the relevant information.

In terms of SEGs (explained fully in 'Notes and Definitions'), 12.5% were from social group A/B (non-manual with supervisory responsibilities), 29.7% from group C1 (non-manual without supervisory responsibility), 33.3% from C2 (skilled manual) and 12.5% D (unskilled manual). Only 3.6% of responding drivers were unemployed (Category E) .

Married people (or people 'living as married' with partners) accounted for 60.4% of drivers, single people for 30.2%, divorced or separated for 5.7% and widowed for 2.1%.

As with the pedestrians, the great majority of drivers were involved in accidents within the district in which they lived – Birmingham (82.5%), Coventry (80.0%), Sandwell (56.1%), Walsall (65.0%), and Wolverhampton (69.2%), with less than 10% living outside the West Midlands metropolitan districts.

4.6 Results: respondents' activities

4.6.1 Where were pedestrians and drivers going and what were they doing at the time of the accident?

Overall, about two-thirds (64.2%) of casualties were going either to or from home (Tables 4.10 and 4.11). Approximately one-third (32.3%) of school pupil casualties were on a trip to or from school, slightly more than half (54.1%) of these on the **return** journey. About one-quarter (27.5%) of all casualties were on a journey to or from the shops, this varying by age group as follows – 40.7% (0-4 years), 33.4% (5-9), 16.0% (10-14) and 26.0% (15-19). About a quarter (25.5%) were going to or from the house of a friend or relative. Very few were going to or from a pub, club or restaurant (5.6%), work (4.8%), were playing in the street (6.4%) or were 'just out in the street' (3.2%).

Table 4.10 – Pedestrian origin by age group

Origin	Age of casualty 0-4	%	5-9	%	10-14	%	15-19	%	Total	%
Home	8	29.6)	31	31.3)	24	32.0)	13	26.0)	76	30.3)
Shops	7	25.9)	15	15.2)	5	6.7)	4	8.0)	31	12.4)
School/college	0	0.0)	12	12.1)	19	25.3)	2	4.0)	33	13.1)
Park/recreation	2	7.4)	20	20.2)	5	6.7)	3	6.0)	30	12.0)
Friend's/ relative's home	5	18.5)	9	9.1)	9	12.0)	5	10.0)	28	11.2)
Work	0	0.0)	0	0.0)	0	0.0)	8	16.0)	8	3.2)
Pub/club/ restaurant	0	0.0)	0	0.0)	0	0.0)	10	20.0)	10	4.0)
Just out in street	0	0.0)	1	1.0)	0	0.0)	0	0.0)	1	0.4)
On a paper round	0	0.0)	0	0.0)	2	2.7)	0	0.0)	2	0.8)
Other	0	0.0)	4	4.0)	1	1.3)	0	0.0)	5	2.0)
Not known	5	18.5)	7	7.1)	10	13.3)	5	10.0)	27	10.8)
TOTAL	**27**	**(100.0)**	**99**	**(100.0)**	**75**	**(100.0)**	**50**	**(100.0)**	**251**	**(100.0)**

Table 4.11 – Pedestrian destination by age group

Destination	Age of casualty 0-4	%	5-9	%	10-14	%	15-19	%	Total	%
Home	8	29.6)	32	32.3)	30	40.0)	15	30.0)	85	33.9)
Shops	4	14.8)	18	18.2)	7	9.3)	9	18.0)	38	15.1)
School/college	0	0.0)	8	8.1)	16	21.3)	4	8.0)	28	11.2)
Park/recreation	2	7.4)	10	10.1)	6	8.0)	3	6.0)	21	8.4)
Friend's/ relative's home	5	18.5)	11	11.1)	7	9.3)	13	26.0)	36	14.3)
Work	0	0.0)	0	0.0)	1	1.3)	3	6.0)	4	1.6)
Pub/club/ restaurant	0	0.0)	1	1.0)	0	0.0)	3	6.0)	4	1.6)
Playing in street	5	18.5)	8	8.1)	3	4.0)	0	0.0)	16	6.4)
Just out in street	2	7.4)	5	5.1)	0	0.0)	0	0.0)	7	2.8)
On a paper round	0	0.0)	0	0.0)	2	2.7)	0	0.0)	2	0.8)
Other	1	3.7)	2	2.0)	3	4.0)	0	0.0)	6	2.4)
Not known	0	0.0)	4	4.0)	0	0.0)	0	0.0)	4	1.6)
TOTAL	**27**	**(100.0)**	**99**	**(100.0)**	**75**	**(100.0)**	**50**	**(100.0)**	**251**	**(100.0)**

Over half of the pedestrians (53.4%) involved said that they were feeling 'happy' just before the accident, 14.7% 'in a hurry', and 10.7% 'excited', the remainder split fairly evenly between 'sad', 'upset', 'bored', 'tired', 'angry' (all fewer than 5% of responses) and 2.0% who felt some other emotion.

Almost four out of five (78.1%) did not report experiencing any 'indicators of stress' in the few weeks before the accident, but the following were cited by the remaining 21.9% – exams (4 instances) general worry (9), trouble at school (8), illness in the family (8), arguments with a friend (10), family arguments (9), having other problems (5). It should be noted that these responses are not necessarily mutually exclusive.

Overall, just over two-thirds of casualties (68.9%) were accompanied at the time of the accident, this varying by age group with 85.2% of those aged 0-4 years, 72.7% (5-9), 66.7% (10-14), and 56.0% (15-19). Of those aged 0-4 years, 55.6% were accompanied by one or more adult, this comparing with 13.1% of those aged 5-9 and 6.7% of those aged 10-14. Of those aged 15-19 years, 32.0% were in the company of friends aged over 14 years, one was in the company of a friend less than or equal to 14 years and none was in the company of a brother or sister or adult other than peers.

There was no significant difference in the total number of accompanying persons by age group, 26.7% being accompanied by one person, 17.5% by 2, 10% by 3, 12.0% in a group of between 4 and 8 and 2.0% being in groups larger than this.

Those who were accompanied were doing one or more of the following – 'Going somewhere with them' (41.8%), 'Talking with them' (17.5%), 'Playing with them' (14.7%), 'Doing nothing in particular' (2.0%), 'Running away from someone' (0.4%).

Almost a third (32.3%) reported that their attention was taken away from crossing the road safely. The most common sources of distraction were listed as, someone calling from the other side of the road (6.4% of all casualties), 'playing with/talking to/looking at friends/others' (6.4%), looking at something on the other side of the road (5.2%), and pre-occupied or thinking about something else (3.6%).

None of the young pedestrians was accompanied by a dog, 32.7% (82) were carrying something and 4.8% were pushing or pulling something. Of those 82 carrying something, 42 were carrying a bag. None was over-laden.

Cars accounted for 91.1% of striking vehicles, light goods vehicles for 4.2% and other types of vehicle for 4.7%.

Drivers were commonly going to or from (Tables 4.12 and 4.13) home (77.1% of trips). More than twice as many were coming from work as going to work (24.0% compared with 9.9%), this probably reflecting the time of day these accidents occur. Almost one-tenth (9.9%) were driving as a part of their work, 28.6% were going to or from a friend's house, 22.4% to or from shops or the bank and relatively few (2.1%) were going to or from a pub, club or restaurant.

Table 4.12 – Driver origin

Origin		%
Home	65	(33.9)
Work	46	(24.0)
At work	19	(9.9)
Shops/bank	25	(13.0)
Pub/club/restaurant	3	(1.6)
School/college	3	(1.6)
A friend's house	20	(10.4)
Nowhere in particular	1	(0.5)
Other	7	(3.6)
Not known	3	(1.5)
TOTAL	**192**	**(100.0)**

Table 4.13 – Driver destination

Destination		%
Home	78	(40.6)
Work	19	(9.9)
At work	19	(9.9)
Shops/bank	18	(9.4)
Pub/club/restaurant	1	(0.5)
School/college	6	(3.1)
A friend's house	35	(18.2)
Nowhere in particular	0	(0.0)
Other	14	(7.3)
Not known	2	(1.0)
TOTAL	**192**	**(100.0)**

Drivers said that they had typically been driving for a short time, 32.3% for 5 minutes or less, 18.8% for between 5 and 10 minutes, and 41.7% for more than 10 minutes but less than one hour.

Comparatively few drivers reported that they were in anything other than a happy frame of mind, which 71.8% of drivers selected. Other feelings described were tired (8 instances), anxious (4), worried (2), in a hurry (2) and 39 other miscellaneous responses.

Under half (40.6%) of drivers were accompanied. Of these, 42 had one other in the vehicle, 20 had 2 others, 13 had 3 others and 3 had 5, 9 and 42 respectively, the latter being a bus driver.

Over a quarter (28.6%) of drivers reported that they were listening to a radio, 11.5% to a tape player and 17.5% were talking or listening to their passengers. None admitted to using a car 'phone or CB radio.

4.7 Results: accident circumstances

4.7.1 Were there adverse or unfamiliar conditions?

As one would expect from the Stats 19 records described in Section 2, according to the pedestrian, the majority of accidents occurred in daylight (70.1%), when the road surface was dry (76.9%) and when the weather conditions were favourable ('Sunny' or 'Cloudy but fine' – 71.3%).

Pedestrians were knocked down at places they knew well (Table 4.14), with 67.7.% crossing the road where the accident happened 3 to 5 times a week or more (a third of the total (35.1%) crossing the road more than once a day), and only 12.0% never having crossed that road before.

Table 4.14 – Pedestrian familiarity (frequency that road crossed) with site by age group

Familiarity	Age of casualty 0-4	%	5-9	%	10-14	%	15-19	%	Total	%
>once/day	12	44.4	36	36.4	25	33.3	16	32.0	89	35.5
About once/day	1	3.7	16	16.2	15	20.0	9	18.0	41	16.3
3-5 times/week	3	11.1	17	17.2	14	18.7	6	12.0	40	15.9
About once/week	2	7.4	13	13.1	4	5.3	8	16.0	27	10.8
About once/month	0	0.0	1	1.0	4	5.3	3	6.0	8	3.2
<once/month	0	0.0	4	4.0	4	5.3	2	4.0	10	4.0
Never before	8	29.6	12	12.1	7	9.3	4	8.0	31	12.4
Other	1	3.7	0	0.0	1	1.3	1	2.0	3	1.2
Not known	0	0.0	0	0.0	1	1.3	1	2.0	2	0.8
TOTAL	**27**	**(100.0)**	**99**	**(100.0)**	**75**	**(100.0)**	**50**	**(100.0)**	**251**	**(100.0)**

Table 4.14 shows that this varied by age:

i those aged 0-4 years – 59.2% crossed the road 3 to 5 times a week or more (44.4% of total crossing more than once a day) and only 29.6% never having crossed that road before.

ii those aged 5-9 years – 69.8% crossed the road 3 to 5 times a week or more (36.4% of total crossing more than once a day) and only 12.1% never having crossed that road before.

iii those aged 10-14 years – 72.0% crossed the road 3 to 5 times a week or more (33.3% of total crossing more than once a day) and only 9.3% never having crossed that road before.

iv those aged 15-19 years – 62.0% crossed the road 3 to 5 times a week or more (32.0% of total crossing more than once a day) and only 8.8% never having crossed that road before.

Data from the HO/RT7 indicated that, of the 423 casualties, about a quarter (24.6%) were knocked down in the street or road where they lived but that, split by age, 43.4% of those aged 0-4 were injured in the street where they lived, the relevant percentages for the other age groups being 34.4% (5-9), 11.6% (10-14) and 12.8% (15-19).

Drivers were also familiar with the locations at which these accidents occurred (Table 4.15), a similar fraction (65.6%) driving through the location three to five times a week or more and almost one-third (32.8%) going through the site more than once a day. Only 3.6% of drivers had never been through the site before the accident.

Table 4.15 – Frequency driver driven through accident site

Frequency		%
>once/day	62	(32.3)
About once/day	27	(14.1)
3-5 times/week	37	(19.3)
About once/week	20	(10.4)
2-3 times/month	13	(6.8)
About once/month	6	(3.1)
<once/month	18	(9.4)
Never before	7	(3.6)
Other	1	(0.5)
Not known	1	(0.5)
TOTAL	**192**	**(100.0)**

4.7.2 What did pedestrians say about immediately before the accident?

Almost half (47.8%) of all pedestrians said they were standing still immediately before they started to cross the road, about one-fifth (22.3%) were walking and just under a quarter either running (21.1%) or jogging (2.8%). The percentage of those aged 0-4 running was 44.4%, 5-9 (30.3%), 10-14 (10.7%) and 15-19 (6.0%).

One-fifth (19.9%) of those crossing said they looked neither right nor left, just over one-third (35.9%) said they looked both ways, the remainder looking only right (13.5%), left (15.1%) or not remembering or responding to the question (15.6%). Of those aged 0-4 years 33.3% reported that they looked neither right nor left, 25.3% of those aged 5-9 years, 16.0% of those aged 10-14 years and 8.0% of those aged 15-19 years.

Under half (47.0%) of all casualties did not see the vehicle before the accident, 9.6% before they started to cross and 22.3% after they started to cross. Of the total, 17.9% were able to estimate the distance of the vehicle from them when they first saw it – 9.9% of the total said they saw it when less than about 5 metres away, 3.6% at between 5 and 10 metres, 2.4% at more than 10 and less than or equal to 50 metres, and 2.0% of distances greater than this.

Less than half (43.5%) of the casualties were able to comment on the speed of the striking vehicle, – 11.6% said the vehicle was travelling fast and 3.6% very fast.

Comparatively few – 75 – (29.5%) were able to report what action the driver took before the accident. From these people there were 73 (29.1% of the total) reports of braking, 15 (6.0%) reports of the horn being blown, 19 (7.6%) of the drivers steering to left or to right, and 68 (27.1%) of the driver doing 'Nothing'.

About one-quarter (21.9%) reported that they heard the squeal of tyres before the vehicle hit them and 12.7% (32) said that they realised an accident was going to happen. Of this 12.7%, 18 said they had no time to do anything, and the others that they tried to take some form of evasive action.

4.7.3 What did drivers say about immediately before the accident?

Very few of the variables available to 'explain' the incidence of the accident appeared to be used by the drivers in describing their accident. In only 6.3% of cases was the road surface described as either wet, damp, or slippery, only 5.2% thought that the road surface or weather conditions contributed to their accident and only 9.4% said that something made it difficult for them to see the pedestrian.

Just under half (42.7%) said that they were passing another vehicle at the time of the accident, and about one-fifth of all drivers (20.8%) said that this vehicle was stationary on their left.

About a quarter (23.4%) (45) of drivers were behind another vehicle at the time of the accident. Of these, 14 estimated they were the equivalent of 10 metres or less from that vehicle, 16 between 10 and 30

metres from it and 10 more than 30 metres from it. The other 5 could not estimate the distance.

Only 12 (6.3%) drivers said that they were distracted before the accident, 6 by another pedestrian on the roadside, 3 by another vehicle, 2 by an object thrown into the road and one by a pedestrian in the middle of the road.

Well over half (58.3%) of drivers said that they were looking at the road ahead before the accident occurred, 13.0% at a pedestrian on the footway, 5.7% at the vehicle in front and 2.6% at an oncoming vehicle. Others were looking at parked vehicles (2.1%), pedestrian(s) waiting to cross (2.6%), pedestrian(s) in the middle of the road (1.0%), shops and buildings by the side of the road (0.5%), traffic lights (2.6%), pedestrians running out into the road (2.6%) or simply looking out for children (1.6%).

Almost exactly two-thirds (66.1%) of all drivers said that they saw the pedestrian before the accident happened, 23.3% of all drivers seeing them on the pavement to their left, 14.6% in the road to their left, 5.2% in the centre of the road, 9.4% in the road to the right of centre and 6.3% on the pavement to the driver's right.

However, although two-thirds of drivers said that they saw the pedestrian before the collision, almost exactly a third (33.6%) of all drivers said that they saw the pedestrian when he or she was only 5 metres or less away. Just under a quarter (22.7%) of all drivers saw the pedestrian when he was between 5 and 20 metres away and the remainder (9.6%) at distances greater than this.

The pedestrian was described by the driver as running (by 42.2% of all drivers), standing still (13.5%), walking (4.2%), jogging (2.1%) and another 4.2% doing miscellaneous other activities such as skateboarding.

One-third (34.9%) of drivers described the pedestrian as crossing straight across the road, 11.5% as crossing diagonally, and 6.7% as making some other manoeuvre, the remainder not reporting on the action of the pedestrian.

Only 16.1% of drivers thought that the pedestrian was aware that a collision was going to occur, 3.6% thinking that these pedestrians then took no avoiding action, 5.2% started to run, 4.2% stopped, and 3.1% took some other avoiding action.

Just over a third of drivers (34.9%) said they had no time to take avoiding action. The avoiding action taken by others can be summarised as follows – braked (66.7% of all drivers – this clearly including some drivers who did not interpret this as 'avoiding action'), took foot off accelerator (22.4%), steered to right (18.2%), steered to left (14.1%), sounded the horn (3.6%).

Almost a third (30.2%) said that their vehicle skidded before the impact.

4.8 Results: respondents' views on contributory roles

4.8.1 What did pedestrians and drivers think caused the accident?

Pedestrians and drivers were asked, 'What do you think caused the accident?'. A 'keyword' analysis was used to analyse the data obtained and the details of this are provided in a more extensive report (Midland Environment Ltd, 1990), but outlined here. In a literal sense, the form of this analysis is the computer-based equivalent of having the ability to say, 'All those pedestrians (having certain characteristics or being involved in accidents of a specified type), step forward and tell us in your own words what caused the accident'.

The framework used for analysis was that of contributory factors attributable to one or more of the pedestrian, driver, environment or vehicle. Computer-based searches were made of the most commonly cited contributory factors in accidents.

The most commonly cited truncated descriptors of the accident for the pedestrian were:

i in describing his own behaviour – 'LOOK' (as in, 'didn't look', 'wasn't looking', or 'should have looked more carefully'), 'PARK' (as in, 'parked cars'), 'PLAY', 'RUN', 'RAN', 'CARE', 'STUPID',

ii in describing the driver's behaviour – 'FAST', 'SPEED', 'CARE', 'LOOK', 'DRINK', 'DRUNK',

iii in describing environmental contributors – 'PARK', 'OBST', 'BLIND', 'STATIONARY' (all of these refering to the obstruction of the pedestrian or driver's view by parked or stationary vehicles).

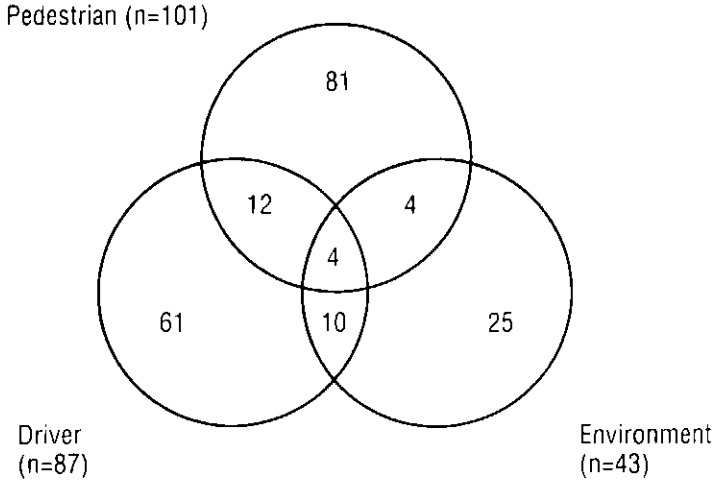
Only 3 drivers made any statement about their own conduct as a contributory factor in these accidents, but, their most commonly cited truncated descriptors of the pedestrian's behaviour and of contributory environmental factors were:

i pedestrian's behaviour – 'LOOK', 'RUN', 'RUSH', 'SENS' (as in, 'no road sense' or 'lack of common sense', 'ATTEN' (as in, 'didn't pay attention'),

ii the environment – 'PARK', 'OBST'.

Of the pedestrians, 78.5% (197 of the 251) attributed the cause to one or more of their own behaviour, the driver or the environment, 21.5% not offering a cause of the accident. The Venn diagram (Figure 4.1) represents these statements, with 51.3% (101 of the 197 attributing some cause) of pedestrians accepting some blame for their own behaviour, 44.2% (87 of the 197) blaming the driver in whole or in part, and 21.8% (43 of the 197) describing the environment as a contributory factor.

Figure 4.1 – Pedestrians attributing 'cause' to at least one of either their or the driver's behaviour, or the environment



From Figure 4.1 it can be seen that 51.3% (101) of the 197 pedestrians held themselves at least partially to blame for the accident, and 41.1% (81), wholly responsible. Keyword searches of the 101 pedestrians holding themselves wholly or partially responsible revealed that 61 pedestrians used one or more of the truncated 'roots' used in Figure 4.2. This diagram shows, for example, that 9 pedestrians used the keyword 'LOOK' **and** 'RUN' or 'RAN' in their description of how they had caused the accident.

It is clear from Figure 4.2 that the act of (not) LOOKING was frequently referred to by the pedestrian, along with the act of RUNNING. The action of taking CARE and attempting to cross from behind PARKED vehicles were less common.

Of the drivers, 85.4% (164 of the 192) attributed the cause of the accident to at least one of his own behaviour, that of the pedestrian, or some feature of the environment (Figure 4.3), with 14.6% not offering a cause.

From Figure 4.3 it can be seen that the overwhelming majority of drivers (75.0% – 123 of the 164) attributed the cause of the accident entirely to the pedestrian with only 1.8% (3 of the 164) describing their driving as a contributory factor. Keyword searches of the truncated 'roots' of the drivers' descriptions provided a Venn diagram similar to Figure 4.2.

Figure 4.2 – The frequency of use of keywords by pedestrians attributing 'cause' to themselves

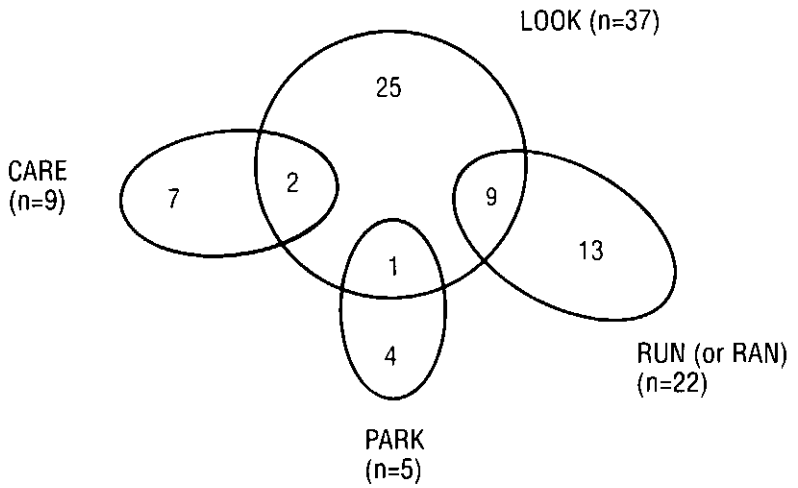
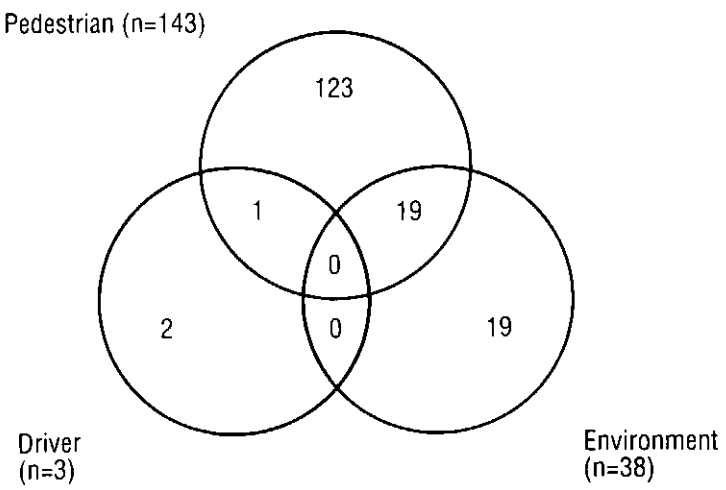


Figure 4.3 – Drivers attributing 'cause' to at least one of either their or the pedestrians' behaviours, or the environment



4.8.2 What drivers said they and the pedestrians should have done

Asked, 'Do you think there was anything you could have done to avoid the accident?', 87.5% said, 'No', 4.2% they could have braked, used the horn (0.5%), not overtaken (0.5%), been more careful (0.5%) or miscellaneous other courses of action (3.1%). The percentages for positive courses of action are not necessarily mutually exclusive.

Similarly, drivers said that they felt that pedestrians could have looked more carefully (32.3%), been more careful (21.4%), could have used a pedestrian crossing/subway or more suitable site (8.9%), chosen a better crossing place (for example where visibility was better)(8.3%), waited for others for help across the road (5.7%), not played in the street (3.6%), walked instead of running (2.6%). Only 4.7% of drivers either did not know or did not respond.

4.8.3 What pedestrians said they and the drivers should have done

Almost half (49.4%) of pedestrians said that there was nothing they could have done to avoid the accident, 8.0% offered no response, and 14.7% said they could have looked more carefully. The remainder said they could have been more careful (4.4%), should have waited for someone to help (2.0%), crossed where visibility was better (1.6%), been more careful when playing in the street (2.4%), walked instead of run (2.4%), waited for help in crossing (2.0%), crossed where visibility was better (1.6%), or other miscellaneous responses (7.2%).

Approximately a third (33.5%) of pedestrians said there was nothing that the driver could have done to avoid the accident and a further 6.8% did not respond to the question or did not know what he could have done (11.2%). Other responses included, 'Should have been more alert/taken more care/not driven recklessly' (10.0%), could have braked (5.6%), should have used his horn (2.0%) should not have consumed alcohol (2.0%), not have gone through an amber/red light (0.4%), not have overtaken (0.8%), should have used lights/trafficators on the vehicle (0.4%) and other miscellaneous suggestions (2.4%).

4.8.4 What pedestrians and drivers said the Council should do to reduce these accidents

About three-quarters (76.1%) of pedestrians or those who responded on their behalf offered suggestions about what the local authority could do to reduce accidents at that site in the future. The most common only-suggestions or first-offered suggestions related to the provision of pedestrian crossings (26.3%), enforcement of the speed limit (6.4%), parking prohibition (6.4%) or better control (2.0%), wider or improved road layout (5.6%) or the use of physical speed restriction such as speed humps (4.8%).

Slightly fewer (62.5%) drivers offered suggestions for what the Council could do to reduce accidents at the site in the future. The most common of their suggestions included provision of a pedestrian crossing (14.6%), double yellow lines (13.5%), fences or guard-railing to restrict pedestrians (7.8%), education of young pedestrians (7.3%), better designed (for example, wider) roads (6.3%) and safer parking places (3.1%). Only one driver suggested the use of physical methods of speed restriction and none that speed limits should be enforced !

4.8.5 What part did 'seeing and being seen' play?

Almost a third (31.1%) of pedestrians said that something made it difficult for them to see the striking vehicle, the most common of which being a parked vehicle (42 reports), followed by a stationary vehicle (15), a moving vehicle (9), another object at the side of the road (2), adverse weather conditions (2), difficulties with their eyesight (2) or some other reason (9). The percentage of each age group citing a parked vehicle as a source of obstruction was 29.6% (0-4), 22.2% (5-9), 10.7% (10-14) and 8.0% (15-19).

Less than half (41.7%) of drivers said that something made it difficult for them to see the pedestrian, the most common of these being a vehicle parked at the side of the road (21.9% of all drivers), 12.0% another stationary vehicle, 3.1% an object at the side of the road, 2.6% obscuration by another pedestrian, 2.6% the colour of the pedestrian's clothing, 2.1% a moving vehicle, 1.0% part of the driver's own vehicle and 1.6% by miscellaneous other causes. These percentages are not mutually exclusive.

Pedestrians provided details of the clothes they were wearing at the time of the accident. In 18.8% of cases it was not possible to assess the conspicuity of this. A further 18.7% were coded as wearing predominantly light/bright clothing, 34.3% as predominantly dark clothing and 28.3% as between these two extremes.

Pedestrians wearing predominantly dark clothing accounted for 41.9% of those injured in the dark (or when getting dark) and 31.1% of those injured in daylight (or when getting light).

4.9 Results: alcohol as a contributory factor

4.9.1 What part did alcohol play in these accidents?

For the pedestrians, only those aged 15-19 were asked whether they had consumed alcohol in the six hours before the accident. Of these, 11 (22.0% of the 15-19 year-olds who responded) reported that they had consumed alcohol, 9 at a pub, one at his own home, and another at a club. Six had drunk 4 units or fewer, 2 had drunk 8 units, one had consumed 12 units and another reported that he had consumed 27 units!

These figures may be compared with the information obtained from the Stats 19 (Section 2) and the records of HM Coroner and are discussed further in Section 5.

Five of those admitting to having consumed alcohol were knocked down between 22.00 and 01.59 hours and more qualitative descriptions of their accidents are described in Section 4.11.3.

Only 8 drivers responding admitted to having consumed alcohol in the 6 hours before the accident.

4.10 Results: other issues related to accident causation

4.10.1 Who did the Police consider to be 'at fault'?

The Police thought that the accident was the fault of the pedestrian in all but a few of the accidents studied (Table 4.16). Of the 423 cases the Police blamed the pedestrian for the accident on 93.1% of occasions. On 5.4% of occasions the driver was assessed to be mainly at fault and for 1.4% of casualties it was not possible to make a reliable assessment of blame from the documentation available.

Table 4.16 – Police allocation of blame from HO/RT7 by age group

	Age of casualty									
Blame	**0-4**	**%**	**5-9**	**%**	**10-14**	**%**	**15-19**	**%**	**Total**	**%**
Driver	3	5.7)	8	4.9)	4	3.3)	8	9.3)	23	5.4)
Pedestrian	50	94.3)	153	93.9)	116	95.9)	75	87.2)	394	93.1)
Not known	0	0.0)	2	1.2)	1	0.8)	3	3.5)	6	1.4)
TOTAL	**53**	**(100.0)**	**163**	**(100.0)**	**121**	**(100.0)**	**86**	**(100.0)**	**423**	**(100.0)**

Of the 423 casualties, Table 4.17 shows that the Police described the pedestrian as running into the road without looking in well over a third (39.0%) of cases. The other descriptions were running (implicitly without looking) from behind or between parked vehicles in more than a quarter (28.8%) of accidents, using a pedestrian crossing (4.7%), weaving between vehicles to cross the road (4.5%), playing in the road (3.5% – this including horseplay), chasing after something (1.9%), some other activity (9.0%), and for 5.9% of casualties no information was available.

There was no significant difference in this description by gender.

Table 4.17 – Contributory roles in responsibility for accidents by gender of young pedestrian (HO/RT7 data)

	Gender of casualty					
Description	**Male**	**%**	**Female**	**%**	**Total**	**%**
Ran without looking	111	42.5)	54	33.3)	165	39.0)
Ran from between parked vehicles (without looking)	71	27.2)	51	31.5)	122	28.8)
Accident on pedestrian crossing	11	4.2)	9	5.6)	20	4.7)
Running towards attraction on other side of road	7	2.7)	4	2.5)	11	2.6)
Running after someone/thing	5	1.9)	3	1.9)	8	1.9)
Play or horseplay in/near road	12	4.6)	3	1.9)	15	3.5)
Misjudge vehicle speed/ pedestrian weaving	9	3.4)	10	6.2)	19	4.5)
Other	24	9.2)	14	8.6)	38	9.0)
Not known	11	4.2)	14	8.6)	25	5.9)
TOTAL	**261**	**(100.0)**	**162**	**(100.0)**	**423**	**(100.0)**

At the time of data collection it was not always certain whether or not the driver would be prosecuted as a result of his involvement in the accident, this being either as a result of delay by the Police in making this decision or of incomplete recording in the HO/RT7.

Only 3.5% of drivers in this study were definitely to be prosecuted as a result of their driving conduct, 4.3% for offences relating to documentation and 1.2% for offences relating to a defective vehicle (these drivers not necessarily being mutually exclusive). A further 7.8% were likely to be prosecuted for offences relating to one or more of their documentation, their driving conduct or for a defective vehicle. It is worth noting that the majority of these prosecutions would be likely to arise from a documentation offence rather than driving conduct or a defective vehicle.

4.10.2 Were those drivers at fault different?

Analysis of the HO/RT7 data showed that only 23 (5.5%) of the 419 drivers involved in the accidents were considered by the Police to be mainly to blame for the accident.

Those drivers held to be at fault did not differ significantly from those not at fault with respect to the age, gender, and ethnic origin of the driver (Asian/non-Asian) the age and gender of the pedestrian struck.

Those held to be at fault were more likely to be prosecuted for their driving conduct and for document offences and matters relating to the roadworthiness of their vehicles.

4.11 Results: other specific issues

In Section 3 it was noted that it would be useful to gain additional information on the patterns of accidents to young pedestrians crossing major roads such as dual-carriageways, those accidents involving 'young revellers' (those 15-19 years-olds injured between 22.00 and 01.59 hours), the times and places these accidents occur and the incidence of accidents to ethnic minorities (especially those of Asian origin). These and other topics are considered below.

4.11.1 The role of the road hierarchy

The location of the accident site of the 423 casualties was coded according to whether the accident occurred on a Non-network road, (Network) dual-carriageway or a (Network) single-carriageway.

As one would expect from the results of Section 2, there was a higher proportion of older than younger pedestrians injured on dual-carriageways (18.6% of 15-19 year-olds compared with 18.2% (10-14), 9.2% (5-9) and 7.5% (0-4)). Similarly, 67.9% of those aged 0-4 were injured on Non-network, 56.4% of those aged 5-9, 36.4% (10-14), 24.2% (15-19).

There was no significant difference in the gender of those injured by type of road, the percentage of male and female casualties on Non-network roads being 48.3% and 41.4% respectively, single-carriageway roads 39.1% and 43.8% and dual-carriageway roads 12.6 and 14.8%.

It was noticeable that, compared with the overall breakdown of 45.6% of casualties injured on Non-network roads, 40.9% on single-carriageway Network roads and 13.5% on dual-carriageway Network roads, at certain times of the day there are significant deviations from

these figures. These results may in part reflect the level of activity of both the pedestrians and drivers. For example, 52.8% of all casualties injured between 07.00 and 08.59 hours, were on Non-network roads, and between 15.00 and 19.59 hours the figure was 49.5%. Similarly, between 19.00 and midnight, 21.5% of casualties were injured on dual-carriageway routes.

Formal analysis of the Police description of the accident by type of road is not possible but it should be noted that, although only 45.6% of casualties were injured on Non-network roads, 63.1% of those injured after emerging from behind a parked vehicle were injured on Non-network roads.

Again, analysis by type of road of pedestrian origin and destination and the frequency with which the road was crossed by the pedestrian was inconclusive because of the large size of the matrix.

There was no significant difference in the distributions by type of road for the:

i ethnic origin of the casualty,

ii overall severity of injury (Maximum AIS),

iii the length of hospital stay,

iv the gender of the driver.

It is interesting to illustrate some of these accidents occurring on different types of road with analysis of key words used by responding participants.

Firstly, details of some accidents which occurred on dual-carriageways.

For example, describing how an accident happened involving a child in the 0-4 age group, a parent wrote, 'Crossing Pelican Crossing a car stopped in nearside lane and half way across a car overtook in the other lane' and as a cause, 'Reckless driving'.

Similarly, for a child aged between 5 and 9, 'Stephen's friend called him from other side. Stephen started to cross without looking. Lights already changed. Car hit him as it went through the green light'. and as a cause, 'Stephen didn't look before crossing'.

Another aged 5-9, 'Out of park running, catching up brother across road. Started across without thinking'.

The impression of speed is given in another case, 'Walking home from school, saw car quite far away, next thing car was on top of me'.

Older children tended to be more aware of what was going on. One aged between 10 and 14, 'Waiting to cross carriageway, saw car had its left indicator on, assumed it was turning left', and stated as a cause, 'Too fast, ambiguous indication'.

Elements of other behaviours creep in to those accidents involving the 15-19 year-olds. For example, 'Got off bus, ran in front of it, car hit me'.

And another, 'Beaten up and dazed, walked into road'.

Using the keyword analysis it was also possible to examine another 'stereotype' accident, that of the driver going to or from work, travelling on a Non-network road and injuring a child who lived in that street. Only 6 of the 192 drivers fulfilled these criteria, but their descriptions are interesting – none blamed any aspect of highway design or their own conduct, placing the blame entirely on the actions of the pedestrian.

'Little girl ran from between the houses between parked cars and straight into road, she had seen her little friend over other side of road'. 'Children of that age shouldn't be playing in built up area'.

'Travelling down road, child ran between parked cars, knocked onto my rear, spin over to far pavement'. 'Child with no roadsense running across road without looking'.

'Pedestrian dressed in slippers and night clothes ran from shop behind bus straight into path of car, didn't see her until too late'. 'Pedestrian in a hurry to get back to house didn't stop to look for approaching traffic'.

'Child of 4 years ran out from behind ice cream van and collided with side of car'. 'Child didn't stop to see if any traffic'.

4.11.2 Differences by ethnic origin

Using the HO/RT7 data, there was no significant difference in the gender of casualties by Asian and non-Asian ethnic origin, with male casualties accounting for 64.3% of Asian and 60.9% of non-Asian casualties.

Non-Asians formed 76.8% of all pedestrians involved in these accidents and Asians 23.2% of pedestrians. The name (and therefore ethnic origin) of 7.6% of drivers was not known.

There was a significant difference in the HO/RT7 report of the nature of the accident by Asian and non-Asian ethnic origin. Young pedestrians of Asian origin were more likely to be injured emerging from behind parked vehicles (40.8% of all young Asians compared with 25.2% of non-Asians) and correspondingly less likely to 'dash out' with no parked vehicle being present (31.6% of all young Asians compared with 41.2% of non-Asians).

Table 4.18 shows a crosstabulation of the 'Asian name' and 'non-Asian name' of the driver by a similar split for the pedestrian.

Table 4.18 – Involvement of Asian ethnic origin and non-Asian ethnic origin pedestrians and drivers (HO/RT7 data)

	Driver			
Pedestrian	**Asian** %	**Non-Asian** %	**Not Known** %	**Total** %
Asian	21 (41.2)	74 (21.8)	3 (9.4)	98 (23.2)
Non-Asian	30 (58.8)	266 (78.2)	29 (90.6)	325 (76.8)
TOTAL	**51 (100.0)**	**340 (100.0)**	**32 (100.0)**	**423 (100.0)**

From Table 4.18 it can be shown that:

i Non-Asian named formed 80.4% of all drivers (involved in these accidents),

ii 81.1% of non-Asians were knocked down by non-Asians,

iii 75.5% of Asians were knocked down by non-Asians,

and that similarly:

iv Asians formed 12.1% of drivers involved in these accidents,

v 9.2% of non-Asians were knocked down by Asians,

vi 21.4% of Asians were knocked down by Asians.

These figures must of course be compared with the numbers that Asian ethnic minorities form of the two road-user groups and of the population (see Section 5) but are important statistics in absolute terms because of the potential these collisions have as a source of conflict.

Analysis of the questionnaire data showed there was no significant difference by ethnic origin in the gender of pedestrian respondents or the type of road on which the casualty was injured.

Although not tested formally because of missing cell values, there was no difference in the distributions of the frequency with which pedestrians had crossed the road before the accident and, the percentages for the two largest groups ('White – UK' and 'Black – Asian') were almost identical.

Small values in the cells meant that differences in origin and destination by ethnic origin could not be analysed in detail but it is worth noting that the distributions for the two categories described in the preceding paragraph were similar. Similar results held true for the number of people accompanying the pedestrian at the time of the accident.

Casualties of Asian ethnic origin have been studied in detail largely because they formed the largest category of minority group in the accident sample and because the group could be identified from the HO/RT7 which was generally not the case for other ethnic minorities. The second largest group of ethnic minority pedestrian casualties was that of Afro-Caribbeans, of whom 9 were identified from the questionnaire survey. Their ages were 3 years (1 casualty), 7 (3), 8 (2), 11 (1) and 16 (2). Their accidents occurred at times which did not differ significantly from the norm, 7 involved a journey to or from home, 4 were to or from shops, one to or from school, and 3 to or from some other place.

A keyword analysis was made of the view of the pedestrian in the types of accidents which had raised concern in the study of the records of HM Coroner – those accidents occurring to non-White children aged 0-9 years knocked down in the (Non-network) street where they lived. These reports are somewhat typical of the stereotypes of accidents to

young people and certainly do not have aspects 'special' to members of ethnic minorities. A few are listed below:

The description of the accident – 'Going to shop, looked up road, ran across, next thing lots of people around me', and the cause, 'Couldn't see properly, thought road was clear'.

'Went to shops, looked both ways before crossing, was on pavement, went to cross, didn't hear anything, can't remember anything else'.

'Riding a bike, put bike down, saw ball in road, went to fetch it, car came knocked me down' and, 'Didn't look left and right, ran across road, shouldn't have fetched ball'.

'Sister calling me, I couldn't see any cars, looked left, ran across road, car hit me'.

'Excited to meet friend from across the road'.

And some reports from parents:

'Looked before running across road but her view of car coming very fast was blocked by a parked lorry'.

'Running to catch up with brother and sister, ran from between 2 parked cars, car came and hit him'.

4.11.3 'Young revellers'

Of the 423 casualties, there were 20 aged 15-19 years knocked down between 22.00 and 01.59 hours. Four occurred on Non-network roads, 12 on single-carriageways and 4 on dual-carriageways. They were aged 16 (3 casualties), 17 (3), 18 (8), and 19 (6). Two were of Asian ethnic origin.

The police officer attending the scene made specific mention in his report that 4 of the casualties had consumed alcohol. Nine of the casualties were described as simply 'dashing out' into the front of the striking vehicle.

In 5 of the instances the vehicle driver was seen as being largely to blame for the accident. Two of the drivers were being prosecuted for their driving conduct, one for a document offence and another 3 likely to be prosecuted for one or more of driving conduct, a document offence or a defective vehicle.

Of these 20 casualties, 13 returned their questionnaire. Nine were male and 4 female and their distribution in terms of SEG of household head did not differ significantly from the norm – A/B (1 casualty), C1 (1), C2 (1), D (4), E (2), retired (1) and not known (4).

Of the 13 casualties, 7 were going home at the time of the accident, 5 were going to the house of a friend or relative and one to a pub, club or restaurant. Seven were returning from a pub, club or restaurant, 2 from a friend or relative's house and one from each of home, shops and park

or recreational activities. Almost half (6) of these casualties crossed the road once or more a day at the place where the accident occurred. Only 2 were crossing the road at that location for the first time.

Some of these accidents can be illustrated with an analysis of key words.

For example, 'Running from taxi, car hit me head-on, unconscious until next morning' and as a cause, 'Alcohol stupidity on my part'.

Another, 'Crossed road, car came up hill didn't see it until after been hit, driver tried to steer round me but wasn't enough time.' and as a cause, 'Distracted by friends'.

And another, 'Standing by roadside, 4 lanes wide, hardly any traffic, visibility very good, sickening bang, picked myself off pavement.' and as causes, 'Should not have been standing in the road'. and, 'Driver did not give any warning, did not see any lights, driver didn't stop'.

4.11.4 Differences by gender

Using the HO/RT7 data, there was no significant difference by gender in the type of road on which the casualty was injured.

Similarly, the pattern of casualties by time of day was similar for male and female.

The description of cause accorded by the police officer did not differ significantly by gender.

Checks on gender from respondents to the questionnaires provided similar results, there being no significant difference by gender on the origin of the pedestrian, the destination, the frequency they crossed the road at the site where the accident happened, or the length of time spent in hospital.

In summary, checks on several characteristics of the accident by gender failed to discern any significant differences between male and female casualties. Of course, this does not imply that such differences do not exist, merely that the measuring techniques used in this study were not sufficiently sensitive to identify them.

4.11.5 Matched data

Much of the analysis thus far has been concerned with either the details of the 423 casualties and 417 drivers obtained from the HO/RT7, or the 251 pedestrian casualties or 192 drivers responding to the questionnaire. It was possible to extend this analysis by matching and comparing the responses for those 133 accidents for which there is a response from both the driver and the pedestrian involved. Such an analysis is dependent upon the accuracy of reporting and the perceptions of those involved, the actualities of the accident and the quality of the data in the study. However, it is difficult, if not impossible, to distinguish between these aspects of the data.

The analysis was undertaken by comparing those parts of the questionnaires administered to the drivers and pedestrians which were common to both participants. These questions generally referred to the time just before the impact and the avoiding action taken by both parties.

At a very simple level, this could involve assessing whether the driver and pedestrian gave the same answer as to whether it was light or dark at the time of the accident. It is an interesting comment on the nature of these conflicts that 91.9% of pedestrians thought it was light at the time of the accident but only 86.6% of drivers!

Where questions to drivers and pedestrians were identical, it was possible to produce crosstabulations of the driver versus pedestrian response and to expect, in the case of perfect agreement in responses to what had happened in the accident, the leading diagonal of such matrices to have entries, but for there to be zeroes elsewhere. Not unexpectedly, agreement was generally poor, with the Contingency Coefficient (a measure of agreement) varying between about 0.2 and 0.6 (unity representing perfect agreement).

There was little consistency in the patterns of response. For example, before the collision occurred, 59.8% of drivers said that they sounded their horn, but only 17.8% of pedestrians reported hearing the horn. This result is not altogether unreasonable since pedestrians may have no awareness whatsoever of the vehicle before the impact occurs. However, it is more difficult to explain why 29.5% of drivers reported that their vehicle skidded before the accident but that 38.2% of pedestrians reported that they heard the squeal of tyres before the impact.

It may be that aspects of the recall or honesty of the respondents, or simply their very different perceptions of the accident, meant that comparisons of their **detailed** responses did not produce strong agreement. However, much better responses were gained from a keyword analysis of their descriptions of how the accident happened. In this instance the keyword analysis offers the researcher the computer-based equivalent of hearing the account (albeit a very brief one) of the driver and pedestrian, with the accident participants giving their accounts in separate interview rooms. A full report of this analysis is available elsewhere (Midland Environment, 1990), but a few examples are presented here.

The comment of a pedestrian, 'Going to shop, looked up road, ran across, next thing lots of people around me'. can be compared with that of the driver, 'Parked car, something darted across, started braking, couldn't avoid hitting him with side of car'.

Similarly, another pedestrian said, 'Coming home in a hurry, ran into road.' and the driver, 'Driving along 25 mph, child came behind parked vehicle unaccompanied by adult'.

Another pedestrian conveys the impression of speed and impetuosity encountered elsewhere in this report, 'Out of park, running, catching up brother across the road, stopped, across without thinking' and the

driver's view, 'Boy running along pavement continued to run into road, I braked, wheels locked, stopped right away, struck him'.

4.11.6 Analysis of child drawings

One section of the questionnaire asked, 'Can you draw a simple plan or sketch of where and how the accident happened? You may like to start by drawing the road and add any: junctions, Zebra or Pelican Crossings, traffic lights, pavement, subways, and other things such as buildings shops or parked cars'. Many of these drawings were completed by parents of those involved in the accidents, but a small analysis was made of the 105 drawings which were considered to have been completed by, or almost entirely by, the young pedestrian.

Each picture was graded and scored as belonging to one of 3 groups in terms of complexity – those which contained:

i only principal elements – those pictures having only those objects directly involved in the accident directly, such as the victim, the car/ ice cream van, and the ball being chased by the victim, (2 points were awarded to drawings of this level of detail),

ii contextual elements – including the contours of the road, the weather conditions, vegetation, houses, other cars and people, and street furniture (4 points),

iii spatial relationships – estimates of distance and the direction in which people or vehicles were travelling (16 points).

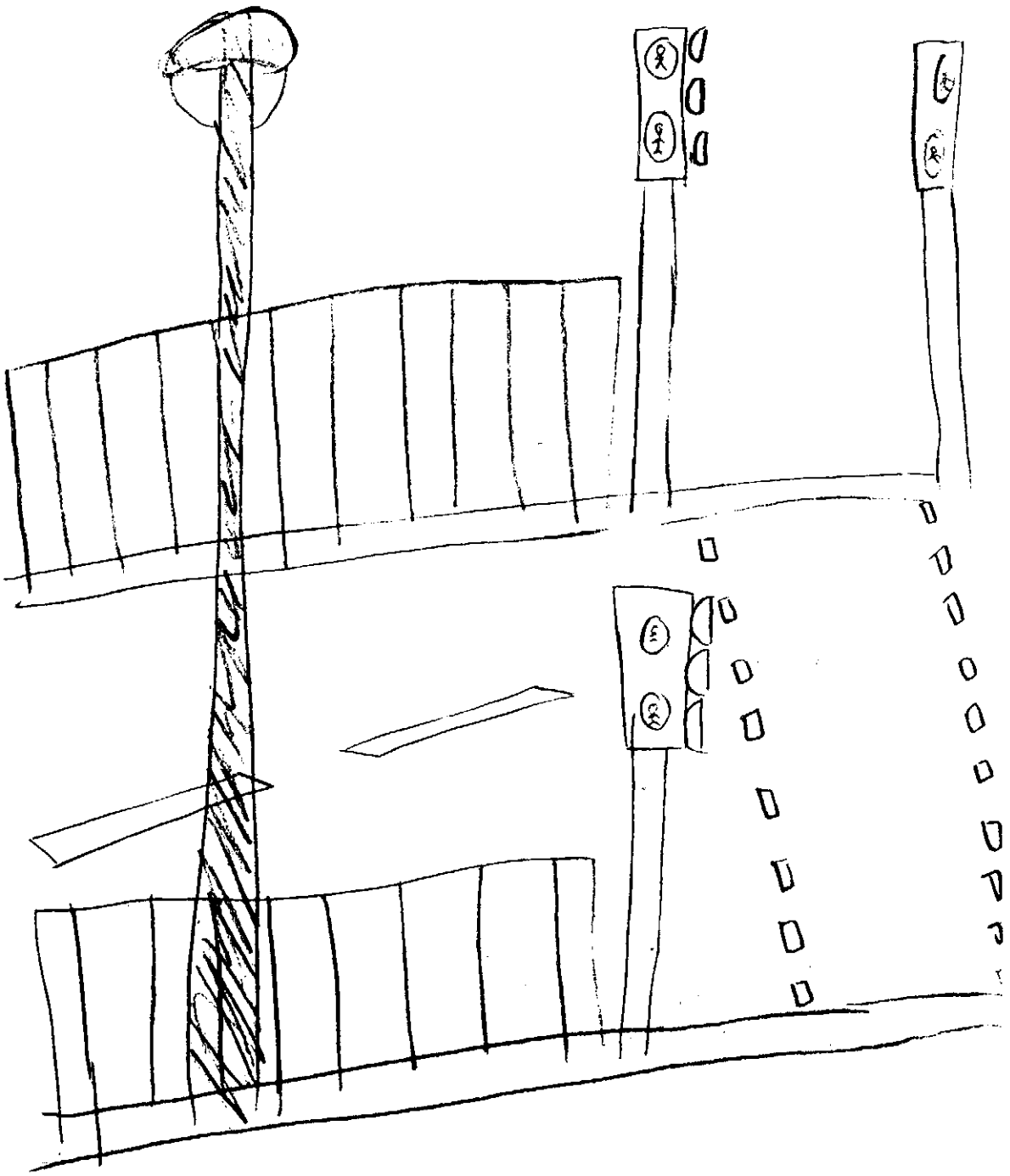
The mean scores for drawings in each of the four age bands was 9.7 points for 6 drawings by those aged 0-4 years (all of whom received some help from an older person), 7.5 points (48 drawings (25 assisted) from those aged 5-9 years), 12.8 points (37 drawings (8 assisted) from those aged 10-14 years), and 17.0 points (14 drawings (none assisted) from those aged 15-19 years). It can be seen that older children tended to score higher than younger ones, and it would seem likely that the performance of those aged 0-4 years was boosted to a large extent the assistance received from parents.

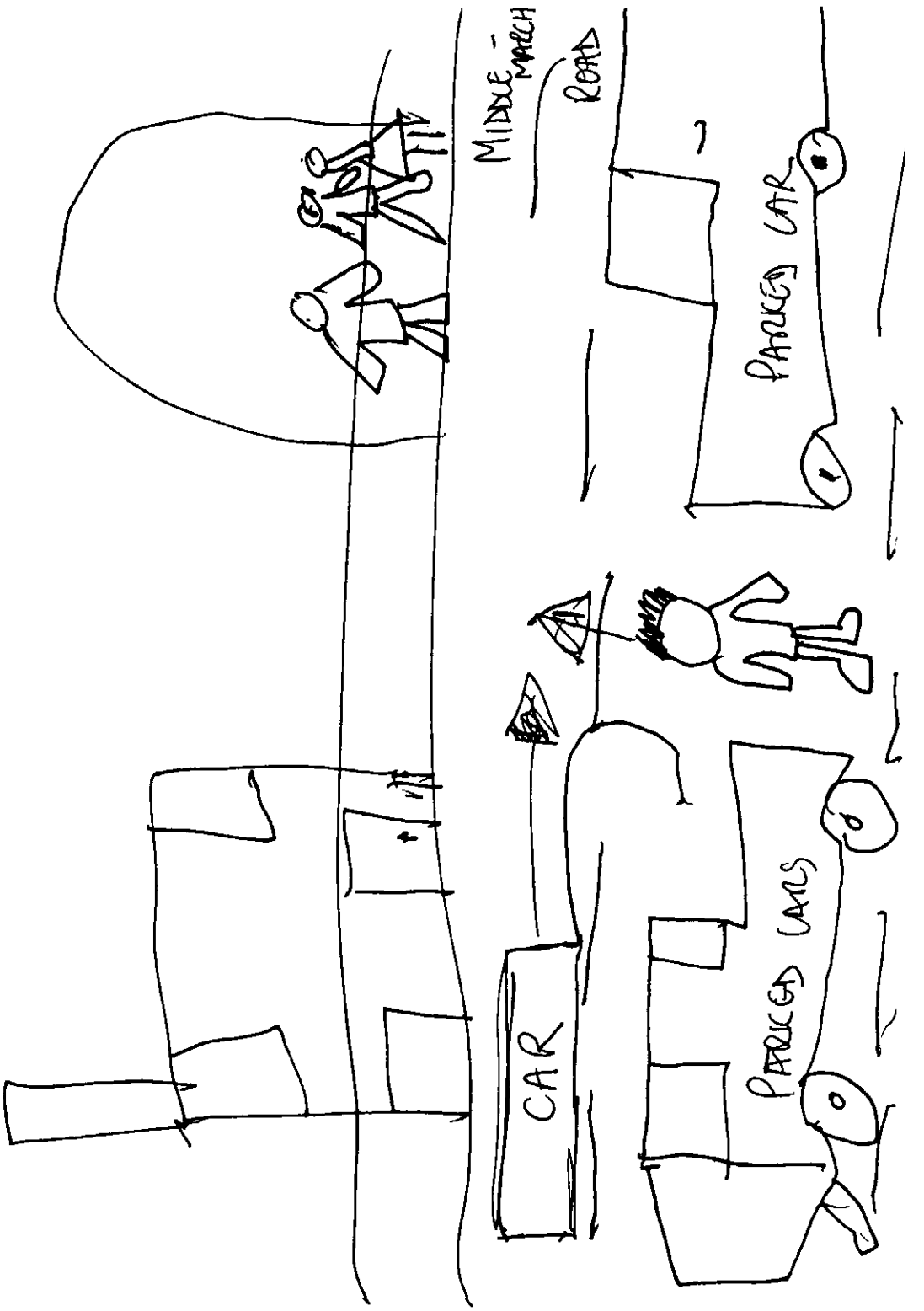
In general the drawings provided a checklist of objects present rather than statements of their actual position. Additionally, the size of the representation of the object was often an indicator of the importance or significance of the object in the child's mind – for example, some of the pictures included cars with large front ends and aggressive-looking bumpers.

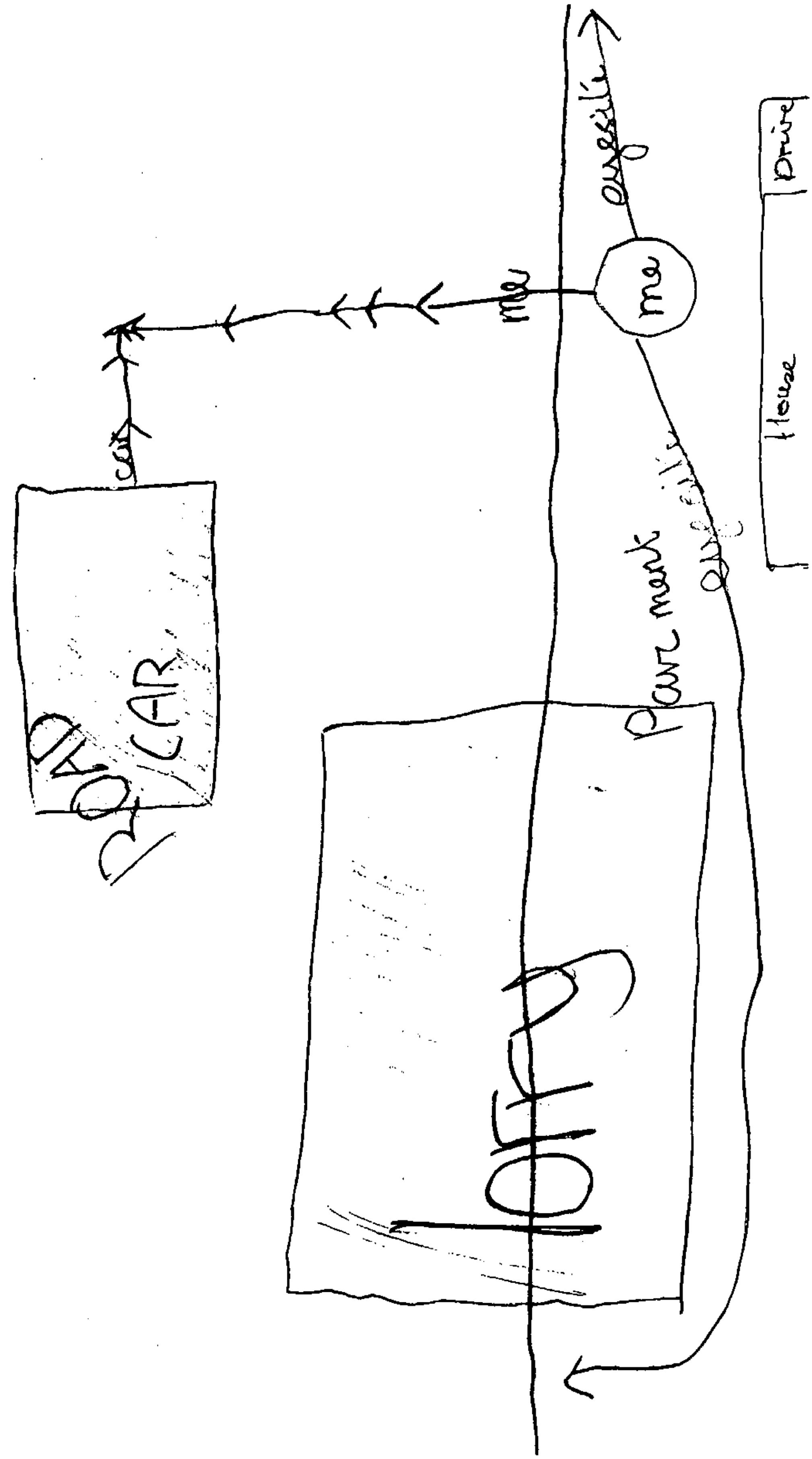
The drawings added considerably to the information gained from the written details. For example, an 8 year-old, who with the help of an adult, wrote, 'Car hit me, I could not move. Never saw the car until I started to move', illustrated his picture with a Zebra Crossing near the scene of his accident which he had not used. Similarly, a 17 year-old wrote simply, 'Run over by two cars', as the cause of the accident but drew in road markings, the path of the cars and the pedestrian, road junctions and layout.

A selection of these drawings are presented in Figure 4.4. Note in particular the simplicity of the pictures, the annotations (often added by parents) and the presence of parked vehicles.

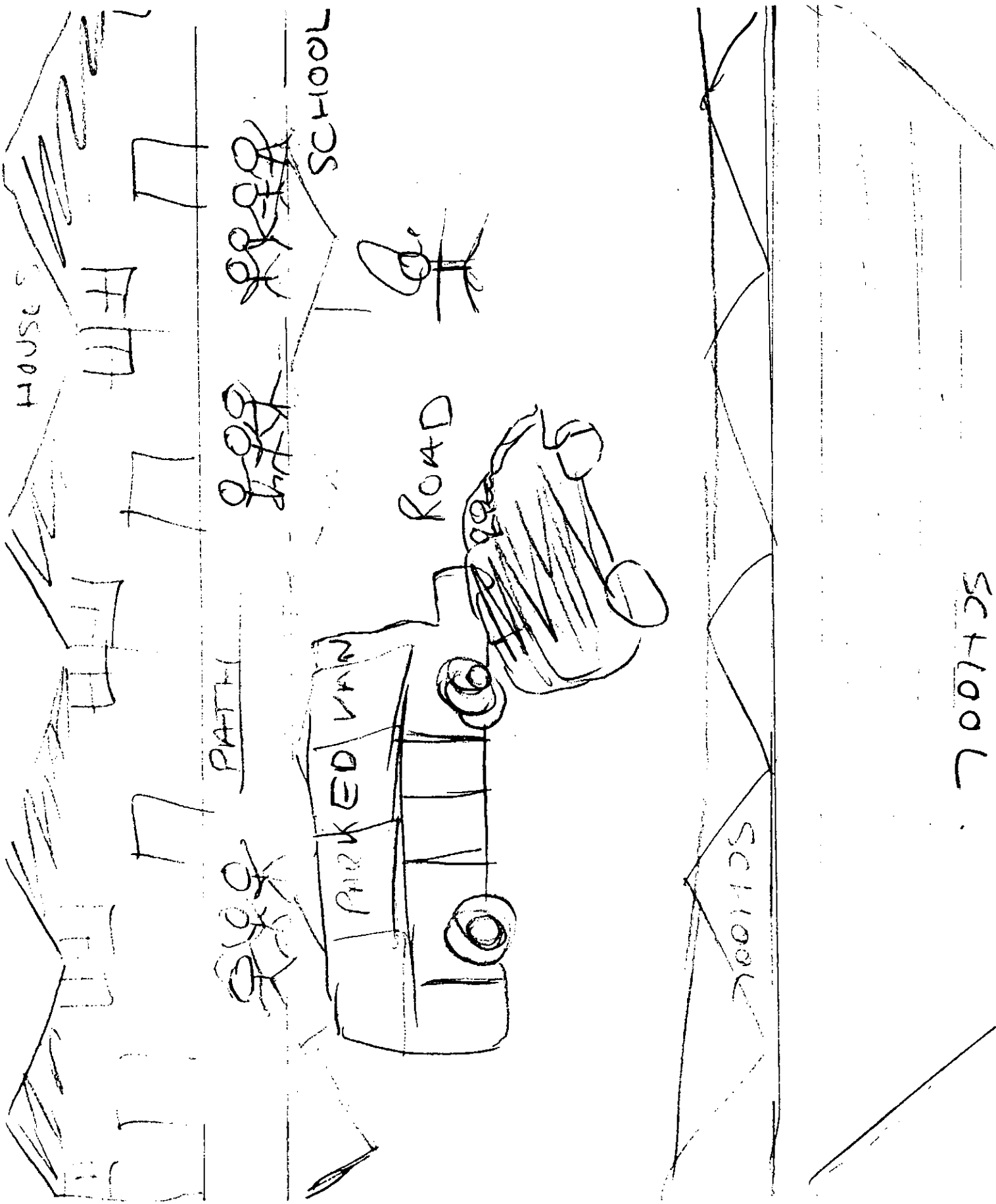
Figure 4.4 – Examples of drawing




MIDDLE MARCH
ROAD
PARKED CAR
CAR
PARKED CARS



Drive
House
me
me
CAR
ROAD
Pavement
lorry


HOUSE
SCHOOL
PATH
ROAD
PARKED VAN
SCHOOL

4.12 Summary of main results

Data were gathered from police files on 423 casualties and 417 drivers from 417 accidents involving a young pedestrian who sustained a serious injury in Birmingham, Coventry, Sandwell, Walsall and Wolverhampton. Questionnaires were sent to casualties and drivers asking for information about before, during and after the accident.

The response rate of those who were assumed to have received a request to participate in the main study was 71.5% for pedestrians aged 0-14 years, 71.4% for pedestrians aged 15-19 (the overall response for pedestrians being 71.5%) years and 55.5% for drivers.

Characteristics of pedestrian respondents were compared with those of non-respondents and were found to be representative for all measures which were checked, these including age and gender, the district they lived in, and the ethnic origin of the pedestrian in terms of being Asian or non-Asian. Similarly, respondents and non-respondents did not differ significantly with respect to measures of when and where the accident occurred, the blame attributed by the Police for the cause the accident, and other descriptions made of the accident by the Police of how the accident happened.

The picture for drivers was different. They were less likely to respond if they were considered by the Police to be mainly responsible for the accident or were being prosecuted for their driving conduct at the time of the accident or for a document offence. Drivers were also less likely to respond if they were of Asian ethnic origin.

The head of household of more than a quarter (26.3%) was unemployed (Category E) and 15.9% in the category unskilled manual (D). About half (48.6%) lived in owner-occupied accommodation, 43.4% in council accommodation and 5.2% in private rented accommodation. There was a mean of 2.63 children under the age of 16 living in the house, this slightly higher than the average for Birmingham and the West Midlands.

For the highway authority these accidents are very much a local problem with the majority (90% or more in each district) of pedestrians being injured in the district where they lived.

Half (50.2%) were at Junior or Infant School, 25.1% at Secondary School, just under one-tenth (8.0%) pre-school and 13.6% either in work or training or unemployed (1.6%).

The ethnic origin of young pedestrian casualties was as follows – White UK or European (69.6%), Asian (20.7%), Afro-Caribbean (4.0%) and Other (4.6%). Asian children between aged 0-4 and 5-9 were injured in relatively high numbers.

Most casualties sustained severe but non life-threatening injuries for lower extremities (49.1% of all casualties had such an injury), with comparatively few reported for the head (14.4%), external areas (15.5%), upper extremities (12.8%), abdomen (1.2%), spine (0.8%), thorax (0.4%), and none to the neck. Life-threatening injuries were predominantly those to the head (3.6% of all casualties had such an injury). A few (1.6%) had gross motor deficiency due to head injury; 3.6% had difficulty with walking, 3.6% with running, 6.4% said they

could not now play sport, 2.8% could not bend or use joints as well as before the accident.

Casualties' length of stay in hospital varied by age with the older pedestrians staying in a shorter period of time than the younger ones. Overall, 19.1% of pedestrians stayed in hospital for between one and 6 months.

Responses were received from 150 (78.1%) male and 42 (21.9%) female drivers, this distribution, and that of the driver ages, very similar to those obtained from Stats 19 data (Section 2); 79.7% responding classified themselves as White UK or European, 12.0% as Asian, 2.6% as White Non-European and 2.1% as Afro-Caribbean.

Drivers tended to be from higher SEGs than the head of household of the struck pedestrian – 12.5% were from social group A/B, 29.7% from group C1, 33.3% from C2 and 12.5% from group D. Only 3.6% were unemployed (Category E). Drivers were either married or 'living as married' with partners (60.4%), single (30.2%), divorced or separated (5.7%) and widowed for (2.1%).

Again, reflecting the local nature of this problem, overall, less than 10% of drivers involved in these accidents lived outside the West Midlands metropolitan districts.

The activities of the pedestrians at the time of the accident were analysed. About two-thirds (64.2%) of casualties were going either to or from home and about a third (32.3%) of school pupil casualties were on a trip to or from school with slightly more than half of these (54.1%) on the **return** journey.

About a quarter (27.5%) of all casualties were on a journey to or from the shops, this varying by age group as, younger children more likely to be going to or from the shops. Similarly, 25.5% were going to or from the house of a friend or relative.

Very few were going to or from a pub, club or restaurant (5.6%), work (4.8%), were playing in the street (6.4%) or were 'just out in the street' (3.2%).

About half (53.4%) of those involved said that they were feeling happy just before the accident, 14.7% in a hurry, and 10.7% excited; 21.9% said that they had been experiencing some 'indicator of stress' in the week or two before the accident occurred.

Two-thirds (68.9%) of casualties were accompanied at the time of the accident. Of those aged 0-4 years, 55.6% were accompanied by one or more adult, this comparing with 13.1% of those aged 5-9 and 6.7% of those aged 10-14.

Pedestrians were knocked down at places they knew well with 67.7% crossing the road where the accident happened 3 to 5 times a week or more (a third of the total (35.1%) crossing the road more than once a day) and only 12.0% never having crossed that road before (this varying by age with younger pedestrians more likely never to have crossed the road at the scene of the accident before).

Of the total of 423 casualties, 24.6% were knocked down in the street or road where they lived (43.4% of those aged 0-4 and 34.4% of those aged 5-9).

Cars accounted for 91.1% of striking vehicles, light goods vehicles for 4.2% and other types of vehicle for 4.7%, with drivers commonly going to or from home (77.1% of trips).

More than twice as many drivers were coming from work as going to work (24.0% compared with 9.9%), 9.9% were driving as a part of their work, 28.6% going to or from a friend's house, 22.4% to or from shops or the bank and 2.1% to or from a pub, club or restaurant.

Drivers were also familiar with the locations at which these accidents occurred, 65.6% travelling through the location 3 to 5 times a week or more, 32.8% going through the site more than once a day and only 3.6% never having been through the site before the accident. As would be expected from the previous results, less than 10% of the drivers did not live in the West Midlands metropolitan districts and the great majority of drivers were involved in an accident in the district in which they lived.

Pedestrians and drivers gave information about the moments leading up to the accident with 19.9% of pedestrians admitting they looked neither right nor left and younger pedestrians being more likely to admit to this.

About half (47.0%) of all casualties did not see the vehicle before the accident, 9.6% before they started to cross and 22.3% after they started to cross, but most when it was less than 5 metres away.

Some 21.9% reported that they heard the squeal of tyres before the vehicle hit them and 12.7% said that they realised an accident was going to happen, more than half of these saying that they had no time to take evasive action.

Although two-thirds of drivers said that they saw the pedestrian before the collision, almost a third (33.6%) of all drivers said that they saw the pedestrian when he or she was only 5 metres or less away.

About a third (34.9%) of drivers said they had no time to take avoiding action.

Again, about a third (31.1%) of pedestrians said that something made it difficult for them to see the striking vehicle, the most common of which being a parked vehicle and the incidence of this decreasing with the age of the pedestrian.

Viewed from the other side, 41.7% of drivers said that something made it difficult for them to see the pedestrian, the most common of these being a vehicle parked at the side of the road (21.9% of all drivers).

Compared with those injured in daylight, relatively more pedestrians knocked down in the dark were wearing predominantly dark clothing.

Of the pedestrians, 78.5% attributed the accident cause to one or more of his own behaviour, the driver or the environment, with 51.3% of all

pedestrians who offered a reason for the accident accepting some blame for their own behaviour, 44.2% blaming the driver in whole or in part, and 21.8% describing the environment as a contributory factor.

The majority of drivers (75.0%) who offered a reason for the accident attributed the cause entirely to the pedestrian and only 1.8% described a feature of their own driving as a contributory factor.

Drivers and pedestrians were asked if there was anything they or the other party in the accident could have done to avoid the collision. Most (87.5%) drivers said, 'No', 4.2% they could have braked, used the horn (0.5%), not overtaken (0.5%), or been more careful (0.5%).

Drivers said pedestrians should have looked more carefully (32.3%), been more careful (21.4%), could have used a pedestrian crossing/ subway or more suitable site (8.9%), chosen a better crossing place (8.3%), waited for others for help across the road (5.7%), not played in the street (3.6%), walked instead of run (2.6%).

About half (49.4%) of pedestrians said that there was nothing they could have done to avoid the accident and 14.7% said they could have looked more carefully (the remainder saying they could have been more careful (4.4%), been more careful when playing in the street (2.4%), walked instead of run (2.4%), waited for help in crossing (2.0%), crossed where visibility was better (1.6%), or other miscellaneous responses (7.2%)).

Almost exactly a third (33.5%) of pedestrians said there was nothing that the driver could have done to avoid the accident and a further 11.2% did not know what he could have done. Other responses included, should have been more alert/taken more care/not driven recklessly (10.0%), could have braked (5.6%), should have used his horn (2.0%), should not have consumed alcohol (2.0%), not have gone through an amber/red light (0.4%), not have overtaken (0.8%), should have used lights/ trafficators on the vehicle (0.4%) and other miscellaneous suggestions (2.4%).

Asked what the local authority could do to reduce accidents at the site in future, pedestrians said they wanted pedestrian crossings (26.3%), enforcement of the speed limit (6.4%), parking prohibition (6.4%) or better control (2.0%), 'wider' or improved road layout (5.6%) or the use of physical speed restriction such as speed humps (4.8%).

Drivers wanted the provision of a pedestrian crossing (14.6%), double yellow lines (13.5%), fences or guard-railing to restrict pedestrians (7.8%), education of young pedestrians (7.3%), better designed (for example, wider) roads (6.3%) and safer parking places (3.1%). Only one driver suggested the use of physical methods of speed restriction.

About a fifth (22.0%) of those pedestrians aged 15-19 had consumed alcohol in the six hours before the accident.

In terms of responsibility for the accident, of the 423 cases, the Police blamed the pedestrian for the accident on 93.1% of occasions. On 5.4% of occasions the driver was assessed to be mainly at fault.

The Police described the pedestrian as running into the road without looking in well over a third (39.0%) of cases, running (implicitly without looking) from behind or between parked vehicles in more than a quarter (28.8%) of accidents, weaving between vehicles to cross the road (4.7%), using a pedestrian crossing (4.5%), and engaging in play or horseplay in or near the road (3.5%).

A handful (3.5%) of drivers were to be prosecuted as a result of their driving conduct, 4.3% for offences relating to documentation and 1.2% for offences relating to a defective vehicle (these drivers not necessarily being mutually exclusive). A further 7.8% were likely to be prosecuted for offences relating to one or more of their documentation, their driving conduct or for a defective vehicle.

A series of further analyses on disaggregations of the data were made, one such analysis of the characteristics of accident and casualty by type of road showing no difference in the gender of those injured. However, casualties were slightly more common on Non-network roads between 07.00 and 08.59 hours and between 15.00 and 19.59 hours and on dual-carriageways between 19.00 and midnight.

Further analysis of accidents involving people with names of Asian ethnic origin showed that, in addition to the high numbers of Asian children between aged 0-4 and 5-9 injured in relatively high numbers, young pedestrians of Asian origin were more likely to be injured emerging from behind parked vehicles (40.8% of all young Asians compared with 25.2% of non-Asians).

Correspondingly young Asians were less likely to 'dash out' with no parked vehicle being present (31.6% of all young Asians compared with 41.2%) of non-Asians.

Non-Asians formed 80.4% of all drivers (involved in these accidents), 81.1% of non-Asian young pedestrians being knocked down by non-Asians and 75.5% of Asians being knocked down by non-Asians. Similarly, Asians formed 12.1% of drivers involved in these accidents, 9.2% of non-Asians being knocked down by Asians and 21.4% of Asians being knocked down by Asians. Non-Asians formed 76.8% of all pedestrians and Asians 23.2% of pedestrians.

It is important that these results are viewed within the context of the fact that information has not been collected in this study (and, indeed is not available) on the exposure of Asian and non-Asian drivers and pedestrians.

Particular attention was paid to the characteristics of the 20 young people aged 15-19 years who were knocked down between 22.00 and 01.59 hours. This showed that the police officer attending the scene made specific mention in his report that 4 of the casualties had consumed alcohol and that in 5 of the instances the vehicle driver was seen as being largely to blame for the accident.

Two of the drivers were being prosecuted for their driving conduct, one for a document offence and another 3 were likely to be prosecuted

for one or more of their driving conduct, a document offence or a defective vehicle.

Of these 20 casualties, 13 returned their questionnaire. Nine were male and 4 female. Their distribution in terms of SEG of household head did not differ significantly from the norm.

Seven were going home at the time of the accident, 5 were going to the house of a friend or relative and one to a pub, club or restaurant. Seven were returning from a pub, club or restaurant, 2 from a friend or relative's house and one from each of home, shops and park or recreational activities.

Six crossed the road once or more a day at the place where the accident occurred. Only 2 were crossing the road at that location for the first time.

Checks on several characteristics of the accidents and casualties by gender failed to discern any significant differences between male and female casualties in the circumstances of the accident.

5 Discussion of results and scope for countermeasures

This part of the report is concerned with drawing together the results of the research and showing how the data obtained from various sources compare. Following the title of the report, this discussion is conducted within a framework of the distributions, circumstances and consequences of these accidents. Emphasis is on describing in overall terms what the study has shown about the characteristics of the pedestrian and driver, what they were doing before the accident occurred, where, when and how the accident happened. The contributory roles of the pedestrian and driver are examined, as are what the consequences of the accident have been for these participants. Supplementary analyses are used to examine in greater detail issues raised by parts of the research and to provide a slightly broader perspective on both who is involved and, particularly, where these accidents happen. Such locational analyses, together with other data from various parts of the study, are used to examine what countermeasures may be possible. The general format of parts 5.1 to 5.3 will be to draw upon previous research if it has been referred to in the literature review, to make comparisons with national and local Stats 19 data from Sections 1 and 2, examine issues raised in the study of the records of HM Coroner in Section 3, and make use of the enhancement of the data gained from the questionnaire survey in Section 4 and the supplementary analyses referred to above. In 5.4 comment is offered on the methodology of the research. Part 5.5 goes through a series of steps local authorities could use in identifying opportunities for engineering remedial measures; parts 5.6 and 5.7 examine possibilities for behavioural and other countermeasures.

5.1 Distributions and patterns

5.1.1 The characteristics of the pedestrian

The review by Tight (1987) and the perspectives obtained in Table 1.4 were useful in showing both who is involved in these accidents and what characteristics they have. A theme to be found throughout this work is that, not only are these young people road accident casualties, many are also likely to have experienced other misfortunes and disadvantages associated with being amongst the less privileged in society.

The incidence of accidents to young pedestrians is clearly associated with indicators of urban, and other, deprivation. This is a consistent result from research stretching over more than 30 years from Backett and Johnson (1959), and probably from before that, through to more recent work such as that by King *et al* (1987). Over the years many researchers have added to this finding but the basic picture remains the same now as ever, and is unlikely to change drastically in the immediate future.

The present study, representative in the sense that it included total populations of specific types of casualties in large geographical areas,

showed that the head of household of a quarter of all seriously injured casualties (Section 4) was not in work. Similarly, the graph plots (Figures 2.1 to 2.4) showed that accidents to the younger casualties were especially common in the inner city and the study of the records of HM Coroner that 40.0% of those aged 0-14 years were in the inner city when killed. The HO/RT7 data (Section 4) showed that 24.5% of all casualties lived in the Core Area of the Inner City Partnership scheme, and another 30.5% elsewhere in the Partnership area.

It is particularly unfortunate, and certainly worthy of mention, that the overall trend in accidents to young pedestrians is that the casualties and their families often have much poorer domestic and social circumstances than the the drivers of the striking vehicle.

Another consistent thread of research in this area is that of boys being more at risk than girls. This is not due solely to the fact that they spend more time outside or cross more roads, but more that they behave less safely and take greater risks (see, for example, Howarth *et al* (1974), Routledge *et al* (1974) and Scottish Development Department (1989)).

This study has shown from national data that male casualties formed 60.5% of casualties, 61.5% from local data, 68.6% from the study of fatalities (Section 3) and 61.8% of those included in the study of those seriously injured (Section 4). The research from these studies has shown that, for example, boys tend to be less likely to look before they cross and more likely to cross between parked cars. In addition, boys are less likely to be accompanied.

Not surprisingly, age of the pedestrian is an important factor in these accidents. National and local data showed that the split by age group was approximately one-tenth of the total for those aged 0-4 years, one-third (5-9 years), one-third (10-14 years), between a quarter and a fifth (15-19 years). The sample of the records of HM Coroner was distorted in that, during the 5 year period used, only 5 (9.8%) of those killed were aged 10-14 years.

Figure 1.1 showed the 5-9 year-olds to have the greatest risk per head of population and Lawson and Proctor (1989) found a similar picture in the West Midlands. Analysis of the 2470 casualties studied in Section 2 by individual year of age (Figure 2.5) showed particularly high numbers of casualties amongst those aged 7 and 11 years. Interestingly, 7 year-old male pedestrians, and the accidents they have, were highlighted in the Scottish Development Department report as being typical of many of the problem characteristics of the young road-user and as a potential target for countermeasures.

Apart from showing that the actual numbers of casualties varies by individual year of age, this study has shown that the likelihood of certain accident types varies also. For example, Figure 2.6 showed that

the percentage of casualties of a certain age group injured on a dual-carriageway increased after the age of 9 years.

The percentage of casualties masked by a stationary vehicle was shown to decrease after age 3 (Figure 2.8). This probably reflects both that older casualties tend to be injured on higher standards of roads than younger ones (on-street parking being less prevalent as the standard of road increases) and the role of the pedestrian's stature and his ability to see the driver, and the driver to see him.

Similarly, the percentage of school pupil casualties injured whilst on a journey to or from school was greatest between 11 and 16 years of age. This possibly reflects differences in accompaniment patterns or may be associated with the fact that pedestrian journeys to secondary schools tend to be longer than those to junior and infant schools, this possibly providing relatively more accident opportunities per journey made.

In the discussion of the study of the records of HM Coroner (Section 3) some relatively qualitative impressions were given of how these accidents varied with age. These showed young children as being completely unaware, but that, as awareness grows, so does the ability to take risks, until, in teenage years, many take excessive risks.

These impressions were gained from time-consuming analysis of detailed and extensive records but are difficult ideas to measure and to confirm from Stats 19 data and from a questionnaire survey. Some of these issues are examined in the discussion of the circumstances of these accidents (5.2) but it is clear that more information on how the use of roads changes with individual year of age would be useful. This would be helpful both in an absolute sense, and also as an indicator of exposure when making statements about how accident types change with age.

5.1.2 The characteristics of the driver

There is little mention in the literature of the characteristics of the drivers involved in young pedestrian accidents. This study has shown that their age distribution is similar, and their gender split almost identical (about three-quarters being male), to those of drivers involved in all accidents. The study of drivers involved in 'serious' young pedestrian accidents showed similar patterns.

Compared with the head of household of the injured pedestrian, drivers were, overall, from higher SEGs. Less than one-tenth of drivers lived outside the West Midlands metropolitan districts, the great majority living within the district in which the accident occurred.

Because of biases in the response patterns of drivers it is not possible to make general comments about the ethnic origin of drivers but it is clear from the HO/RT7 data (Table 4.18) that Asian drivers (identified by name) formed 12.2% of all drivers involved in these accidents and that this is of the same order of magnitude as the estimated percentage they form of the population in the study area.

5.1.3 Where young pedestrians are injured

In part 1.2.5 the comment was made that there is little information available on a locational basis about where accidents to young pedestrians occur.

The graph plots in Figures 2.1 to 2.4, and several authors quoted in the literature review, point to the occurrence of accidents to young pedestrians, in the areas of greatest population density such as inner city areas. The graph plots show that this is certainly true for those aged 0-9 years, is less so for those aged 10-14 and that accidents to those aged 15-19 years are more widely distributed. Other research has shown that in smaller towns and cities accidents to the younger age groups are common in residential areas.

This is as would be anticipated from the other results in this study – the standard of road on which a casualty was injured increased with age (Section 2), as did the casualty's distance from home (Section 3) and likelihood of being injured on a road other than the one in which he lived (Section 4).

The analysis of casualties by individual year of age (Section 2, Figure 2.6) showed that, although demonstrating some variation, the percentage of those pedestrians injured on a dual-carriageway was relatively constant until age 9, but increased therafter until the age of 17 years.

Comparing the results of the local Stats 19 analysis (Section 2) with study of the records of HM Coroner, 17.2% of all casualties were injured on a dual-carriageway compared with 9 of the 51 (17.6%) fatalities. Similarly, viewing this issue slightly differently, 11 (21.5%) of those killed were crossing a carriageway capable of carrying between 4 and 10 lanes of traffic, this comparing with 28.4% of those examined in Section 2.

However the problem remains very much a local one. At one extreme the study of the records of HM Coroner showed that 11 (36.7%) of the 30 aged 0-9 were killed immediately outside their own home HO/RT7 data supporting this and showing that 43.4% of casualties aged 0-4 years and 34.4% of those aged 5-9 were knocked down in the street in which they lived. Even allowing for older pedestrians being knocked down further from home, 95.0% of pedestrians were injured on the roads of the district in which they lived.

5.1.4 When young pedestrians are injured

Analysis of the national Stats 19 data in Section 1 and the fact, reported in Section 2, that they showed great similarity with local data, meant that it was not necessary to make additional basic descriptions in Sections 3 and 4 of when accidents to young pedestrians occurred.

Briefly re-capping on the national data, young pedestrian casualties aged 0-4 years were most common in the summer months from May to August, those aged 5-9 also common at these times but also in September and October and those aged 10-14 common in the spring and autumn. The pattern for those aged 15-19 years was more evenly

distributed throughout the year, with slight increases in the winter months.

There were more casualties in each of the four age groups considered who sustained injury on Friday compared with any other single day of the week. Similarly, fewer pedestrians sustained injury on Sunday than on any other day. This pattern was least pronounced for those aged 0-4 years, accidents to these casualties being distributed more evenly throughout the week. Relatively high numbers of those aged 15-19 years were injured on Thursday, Friday and Saturday.

By time of day, those aged 0-4 years had a relatively 'flat' distribution with a peak in the early afternoon. Pedestrians aged 5-9 and 10-14 years showed a small peak coincident with the morning traffic peak but were most common in the late afternoon and during the evening traffic peak. The distribution for those aged 15-19 years was relatively evenly distributed throughout the day but there were noticeable peaks coinciding with time of the journey to and from school or work and late evening.

5.1.5 Overall, how many casualties are 'young revellers'?

The small peak described above involving those aged 15-19 years and occurring in the late evening and early morning was identified as a source of concern during the study of the records of HM Coroner and has been studied further using data relating to the 2470 casualties from the same time period used in Section 2 (1 December 1985 – 30 November 1988).

Of the 584 casualties aged 15-19 years, 98 (16.8%) were injured between 22.00 and 01.59 hours, most (88.8% of the 98) between 23.00 and 23.59.

Of this total of 98 casualties, 53 young people were injured between the hours of 22.00 and 01.59 on either Friday or Saturday nights. These 53 casualties formed 54.1% of the 98 casualties. Similarly, 45 were injured between 22.00 and 23.59 on either Friday or Saturday night, these 45 representing 45.9% of the 98 casualties.

Disproportionate numbers are being injured in certain periods of the week. For example, as indicated above, between the hours of 22.00 and 01.59 on Friday and Saturday night there were 53 casualties – this represents just under 10% of **all** 15-19 year-old casualties being injured in just under 5% of the week. (The discrepancy is even more marked between 23.00 and 23.59 and on Friday and Saturday nights with 7.7% of all 15-19 year-old casualties being injured in 2.4% of the week.) Correspondingly, there were 43 (7.4%) of casualties injured between 22.00 and 01.59 hours on other days of the week, these hours representing 11.9% of the week. Outside these hours the balance between percentage of casualties injured compared with 'available time' is very even with 83.2% of casualties being injured in 83.3% of the week.

Splitting all 2470 young pedestrian casualties down by individual years of age, the number of casualties injured between 22.00 and 01.59 hours tended to increase with age, 64.3% of the group injured being either 18

or 19 years. It was not possible to identify any difference in injury severity between the individual years of age.

Between the hours of 22.00 and 01.59, a total of 34 (34.7%) of the 98 casualties were injured whilst crossing a dual-carriageway. This compares with 165 (28.3%) of those 15-19 year-olds injured at all times of the week. The percentage of male casualties aged 15-19 years injured between 22.00 and 01.59 hours on dual-carriageways was 71.0%, this figure higher than the percentages of 60.5% (Section 1) and 61.8% (Section 2) males form of all those young pedestrians injured.

5.1.6 Ethnic origin of road accident casualties

In seeking to provide an appropriate service of road safety education, training and publicity to at-risk road-users, King *et al* (1987), HETS (1988) and Lee (1986) have drawn attention to the potential and actual traffic threat to ethnic minorities and particularly to those of Asian origin. The study of the records of HM Coroner showed that 8 of the 9 children age 0-4 years and 8 of the 21 aged 5-9 years (but none of those aged 10-19 years) were of Asian ethnic origin. Those 16 therefore formed 31.4% of the sample of fatalities but this compares with only 23.2% (Table 4.18) of all those seriously injured pedestrians.

The little research done in this field has tended to use the name of the the casualty to determine ethnic origin. This has meant that most research has concentrated on those of Asian ethnic origin since it is generally recognised that those of other racial origin cannot readily be identified in this way. This study has had additional sources of data from the records of HM Coroner (various parts of which referred to ethnic origin) and, also, the questionnaire survey which asked direct questions relating to ethnic origin.

As a result of having access to these additional data sources, it was possible to show that 2 of the 51 (3.9%) in the study of fatalities and 3.5% of respondents to questionnaire survey were of Afro-Caribbean origin. The response patterns to the questionnaire survey indicated that the true percentage of young pedestrians of Afro-Caribbean origin injured may be **slightly** higher than this figure but around the percentage they form of the population in Birmingham (4.8% according to the 1981 Census but probably slightly higher (7.0%) in 1988 – see Table 5.2).

The opportunity was taken to look in more detail at the issue of the risk to those with an Asian name (as a proxy measure of Asian ethnic origin) in **all** road accidents in Birmingham between the period 1st September 1988 and 31 August 1989, that being the most recent 12 month period for which data were available at the time of the study.

The West Midlands Police road accident data registration slips were used as the data source for this study and frequency tabulations made of Asian origin casualties by age, road-user type and area (police division) of the city. (This part of the research was conducted by a student of Asian origin employed on a temporary contract during his summer vacation.) These casualty totals have then been subtracted

from the total of all casualties injured during that period and the data presented in simplified form in Table 5.1.

Table 5.1 shows that, overall, in the age band 0-9 years, about 3 in every 10 road users injured was of Asian origin. This reduces in later years – about 2 in 10 for those aged 10 to 14 and about one in 10 for those aged 15-19, 20-24 and 25-64. For those aged over 64 years, approximately one in 20 casualties was of Asian origin. In total, about one in 8 was of Asian origin.

Road-users of Asian ethnic origin formed about one in 5 of all pedestrians injured, one in 10 of all car drivers or occupants injured and about one in 50 for each of Public Service Vehicle/Goods occupants, TWMV (two-wheeled motor vehicle) riders, and cyclists.

Young pedestrians of Asian origin were particularly at risk – about 4 in 10 of those aged 0-4 years and 5-9 years were of Asian origin, decreasing to one in 10 of those aged 10-14 years and only 3 in 20 of those aged 15-19 years.

An estimate of exposure for these casualties is presented in Table 5.2, these figures being derived from data provided by the Information Group of Birmingham City Council's Development Department who in turn have used information from the Commission for Racial Equality and the Labour Force Survey (OPCS, 1986). It is important to note that these figures are only estimates, derived from the 1981 Census data on residents by birthplace of head of household, the Office of Population Censuses and Surveys' (OPCS) latest Population Monitor (February 1990) which provided mid-year population estimates for Birmingham. They are in no sense 'official' population figures for Birmingham. The main assumptions made in deriving Table 5.2 are that:

i the OPCS population figures for Birmingham for 1988 are correct,

ii the number of children aged 0-14 years per household by ethnic origin in 1981 (from the 1981 Census) are similar to 1988,

iii the percentage increases that the Asian and Afro-Caribbean populations form of Birmingham (of about 3% and 2% respectively) have been balanced by a fall of about 5% in the percentage the White European/UK form.

iv that age distributions of residents by birthplace of household head for 1981 are similar for 1988.

It is accepted that these are therefore relatively crude estimates but that they are within acceptable tolerances given the use to which they are to be put.

Translated into casualties per thousand of population, these figures show that, overall, the number of casualties per thousand of population is virtually identical, and certainly within error tolerances, at 5.0 (Asian) and 4.9 (non-Asian).

Small sample sizes in many of the cells and weaknesses inherent in some of the assumptions mean that reliable statements about many of

Table 5.1 Number of casualties of all severities (and, in parenthesis, estimates of casualties per thousand of relevant population age group) by road-user type, Asian and non-Asian ethnic origin and age group, Birmingham, September 1988 – August 1989

	Age of casualty							
Road-user casualties	**0-4**	**5-9**	**10-14**	**15-19**	**20-24**	**25-64**	**65+**	**Total**
Pedestrian								
Asian (per thousand)	41 (2.2)	125 (7.4)	52 (3.4)	27 (2.7)	11 (1.0)	58 (1.3)	13 (2.2)	327 (2.7)
Non-Asian (per thousand)	57 (1.0)	192 (3.8)	187 (4.1)	142 (2.3)	121 (1.6)	349 (0.8)	167 (1.1)	1215 (1.4)
Percent Asian	41.8	39.4	21.8	15.9	8.3	14.3	7.2	21.2
Car/taxi occupant								
Asian (per thousand)	11 (0.6)	11 (1.7)	10 (0.7)	34 (3.4)	56 (5.3)	127 (2.9)	2 (0.3)	251 (2.1)
Non-Asian (per thousand)	60 (1.1)	70 (1.4)	46 (1.0)	224 (3.7)	461 (6.1)	1039 (2.4)	113 (0.8)	2013 (2.3)
Percent Asian	15.5	13.6	17.9	13.2	10.8	11.9	1.7	11.1
TWMV rider								
Asian (per thousand)	0 (–)	0 (–)	0 (–)	2 (0.2)	1 (0.1)	4 (0.1)	0 (–)	7 (0.1)
Non-Asian (per thousand)	0 (–)	0 (–)	1 (‹1.0)	107 (1.8)	100 (1.3)	149 (0.3)	3 (‹0.1)	360 (0.4)
Percent Asian	0.0	0.0	0.0	1.8	1.0	2.6	0.0	1.9
PSV/goods vehicle occupant								
Asian (per thousand)	0 (–)	0 (–)	0 (–)	0 (–)	1 (0.1)	4 (0.1)	1 (0.2)	6 (‹0.1)
Non-Asian (per thousand)	12 (0.2)	5 (0.1)	7 (0.2)	22 (0.4)	46 (0.6)	184 (0.4)	64 (0.4)	340 (0.4)
Percent Asian	0.0	0.0	0.0	0.0	2.2	2.1	1.5	1.7
Cyclist								
Asian (per thousand)	0 (–)	5 (0.3)	1 (0.1)	2 (0.2)	0 (–)	1 (‹0.1)	0 (–)	9 (0.1)
Non-Asian (per thousand)	0 (–)	19 (0.4)	56 (1.2)	71 (1.2)	59 (0.8)	117 (0.3)	9 (0.1)	331 (0.4)
Percent Asian	0.0	20.8	1.8	2.8	0.0	0.9	0.0	2.7
Other								
Asian (per thousand)	0 (–)	0 (–)	0 (–)	0 (–)	0 (–)	2 (‹0.1)	0 (–)	2 (‹0.1)
Non-Asian (per thousand)	0 (–)	0 (–)	0 (–)	1 (‹0.1)	0 (–)	46 (0.1)	2 (‹0.1)	49 (0.1)
Percent Asian	0.0	0.0	0.0	0.0	0.0	4.3	0.0	4.1
TOTAL								
Asian (per thousand)	**52 (2.8)**	**141 (8.3)**	**63 (4.2)**	**65 (6.6)**	**69 (6.6)**	**196 (4.6)**	**16 (2.7)**	**602 (5.0)**
Non-Asian (per thousand)	**129 (2.3)**	**286 (5.6)**	**287 (6.3)**	**567 (9.4)**	**787(10.4)**	**1884 (4.3)**	**358 (2.4)**	**4308 (4.9)**
Percent Asian	**28.7**	**33.0**	**17.5**	**10.3**	**8.0**	**9.4**	**4.3**	**12.3**

the road-users and age groups may not be made. However, it would appear that, unless the numbers of the Asian ethnic minority aged 0-9 are more than double the estimates contained in Table 5.2, then Asian pedestrian casualties aged 0-4 and 5-9 years are higher per head of population than their non-Asian counterparts.

The figures suggest that this group of the Asian ethnic minority is approximately twice as vulnerable as the non-Asian population. It is also worth noting that, for the other pedestrian age groups with which this report is directly concerned, the rate for those Asians aged 10-14 is slightly lower than for their non-Asian counterparts, and those of the 15-19 year-olds slightly higher.

Within the different police divisions in Birmingham (these data not being presented in tabular form), there were either greater or lesser concentrations of accidents to people of Asian origin, this reflecting the fact that many of Asian ethnic origin live in inner city Birmingham.

It is important to note that, although the figures in Table 5.2 have been linked to exposure in terms of population, they have not been linked to such measures as distance travelled, amount of time spent travelling by any mode or ownership of any class of vehicle. Additionally, it must be emphasised that, for example, many of the factors which may cause child pedestrians of Asian origin to be at risk stem from the fact that they dwell in the inner city (with its high incidence of narrow streets, on-street parking and through traffic) rather than necessarily any aspect of their behaviour, response to traffic or attribute of race. In conclusion, it appears that, with respect to population, ethnic minorities of Asian origin are, overall, not over-represented in road accidents, but that pedestrians and especially young pedestrians aged 0-4 and 5-9 are over-represented by a factor of about 2.

Table 5.2 Population estimates (thousands) by ethnic origin and age group, Birmingham, 1988

	Age								
Ethnic Origin	**0-4**	**5-9**	**10-14**	**15-19**	**20-24**	**25-64**	**65+**	**Total**	**%**
White	46.1	42.1	37.6	51.5	67.3	390.9	143.2	778.7	78.4
Asian	18.6	16.9	15.1	9.9	10.6	43.1	6.0	120.2	12.1
Afro-Caribbean	7.7	7.0	6.3	6.7	6.6	34.5	1.2	70.0	7.0
Other	1.9	1.7	1.5	1.9	2.1	12.0	3.7	24.8	2.5
TOTAL	**74.3**	**67.7**	**60.5**	**70.0**	**86.6**	**480.5**	**154.1**	**993.7**	**100.0**

5.2 Circumstances

5.2.1 Activities and behaviour of pedestrian and driver

Results from both the study of the records of HM Coroner and the questionnaire survey showed that drivers and pedestrians tended to be involved in accidents at locations they were at several times each week.

Other than home-based trips, journeys to and from shops or friends were relatively common in both the study of the records of HM Coroner and the the questionnaire survey. Comparatively few of those responding to the questionnaire were playing in the street (6.4%) or 'just out in street', although 13 (25.5%) of those killed were reported to have been 'playing' at the time of the accident. It is possible that the latter figure is a more accurate percentage of the number at play when an accident occurred, those responding to the questionnaire being reluctant to admit to this activity in the street.

Eleven (22.0%) of the 50 drivers in the study of fatalities were recorded as being at work when the accident occurred, with only 3 (6.0%) on a journey to or from work. These figures compare with the questionnaire survey of 9.9% drivers at work and 33.9% going to or from work.

Several studies have shown that about one-third of those school-age children injured are on a trip to or from school. This study is no exception, finding as it has that 31.0% of school puils were injured whilst on a journey to or from school (Section 2). The questionnaire survey indicated that relatively more were on a return journey from school. This may be due in part to such things as differences in accompaniment patterns, the greater variety of start and end points to the journey compared with the morning, the greater possibility of pupils making detours or 'dawdling' compared with the morning, fatigue effects and differences in traffic patterns.

Only 2 of the 51 (3.9%) of the fatalities considered were killed in a journey to or from school. Even allowing for about one-third of those killed not being school pupils, this figure is low.

From the questionnaire survey, 18.5% of those aged 0-4 were accompanied by an adult from their own family, 9.1% of those aged 5-9 and 4.0% of those aged 10-14 years. Of those who were killed, 4 (44.4%) of the 9 aged 0-4 were accompanied by an adult, 4 (19.0%) of the 21 aged 5-9 and none of those aged 10-14 years. Two of the fatalities involved children breaking free from the hand of a parent.

National figures (Department of Transport, 1989b) indicate that about 38% of **all** pedestrians killed on roads in Great Britain in 1986 had been drinking. The study of the records of HM Coroner showed that 6 of the 51 (11.8%) young pedestrians (this being 37.5% of those age 15-19) had consumed large amounts of alcohol. Only those aged 15-19 were asked if they had consumed alcohol. Of those responding to the questionnaire, 22.0% admitted to having consumed **any** alcohol, 4 (8%) had drunk 6 or more units of alcohol in the 6 hours before the accident and the judgement of at least 2 of these casualties would be likely to have been affected by the alcohol at the time of the accident.

The study of the records of HM Coroner indicated that a number of these accidents involve the pedestrian in some form of 'horseplay'. Other than the specific example given in Table 3.9, there were others who died after returning in high spirits from a night out. Some were at dangerous locations, most with friends, and it is clear their minds were not fully occupied with the task of crossing the road. The opportunity was taken to code the nature of the accident from the HO/RT7 (Table 4.17). From this it can be seen that 3.5% of all casualties were involved in play or horseplay in or near the road and that this contributed to the accident. It is worth noting that relatively more of those involved were male.

From the study of fatalities, 9 drivers (18.0%) were estimated to have been driving at more than 10 mph above the speed limit and another 14 (28.0%) at up to 10 mph above the limit. Four (8.0%) of the 50 were prosecuted for causing death by reckless driving and a further 8 (16.0%) for careless driving. Two (4.0%) had consumed alcohol in excess of the prescribed limit (this compares with only 1.0% of drivers from the Stats 19 data examined in Section 2). The HO/RT7 data used in Section 4 showed that 3.5% of drivers were certain to be prosecuted as a result of their driving behaviour and possible that some of another 7.8% would be so prosecuted.

5.2.2 Contributory roles

The term 'contributory role' is used in this context to include discussion on 'blame', 'fault in', 'responsibility for', or 'cause of' the accident.

It is generally accepted that human behaviour is usually the main contributory factor to road accidents but that aspects of the environment and vehicle also play a part (Sabey and Taylor, 1980).

Carsten *et al* (1989) have shown more recently that in urban areas failure of the pedestrian to 'yield' to a vehicle was the main causal factor in 66% of adult pedestrian accidents and 78% of child pedestrian accidents. They also showed that only 23% of adult pedestrians and 11% of child pedestrians were innocent victims of others' mistakes.

The police officer (Section 2) completing the Stats 19 form, and faced with fewer options of 'causation factors' than Carsten *et al*, attributed blame to the young pedestrian on 89.0% of occasions and the driver in 9.4% of accidents. The most common 'causes' involved crossing without due care and from between parked vehicles.

In the study of the records of HM Coroner the author's assessment was that the largest contributory role was that of the pedestrian in 84.0% and the driver in 12.0% of accidents, with the remainder being shared equally between the 2 participants. In only 8.0% of accidents was the driver's behaviour judged by the Police to be sufficiently extreme for him to be prosecuted for causing death by reckless driving. In only one instance did HM Coroner point to a deficient feature of the existing road environment as a contributory factor in these accidents.

The HO/RT7 data described in Section 4 shows a similar picture with 93.3% of pedestrians and 5.4% of drivers as mainly at fault, it not being

possible to allocate fault to the remainder. Again, simply 'running into the road' or from behind parked vehicles were the primary contributory factors. Interestingly, 42.2% of drivers said the pedestrian was 'running' when first seen by the driver; this is of the same order of magnitude as the figures published by the Scottish Development Department (1989) for casualties (48.2% of males and 40.9% of females were running).

In summary, data from a variety of sources show child and young pedestrians to have the largest contributory role in somewhere between about 8 and 9 out of every 10 of these accidents.

Looking at the issue slightly differently, comparatively few (12.5%) drivers responding to the questionnaire felt that there was anything they could have done to avoid the accident. All but a few were critical of the behaviour of the pedestrian.

Almost half (49.4%) of pedestrians said that there was nothing that they could have done to avoid the accident but, interestingly, almost a third (31.1%) accepted some responsibility for the accident in offering suggestions for what they should have done to avoid it. About a third (33.5%) of pedestrians said there was nothing the driver could have done to avoid the accident and another 21.2% made some criticism of the behaviour of the driver.

Additionally, in the keyword analysis of the description used by the pedestrian of why the accident happened, 40.2% of all pedestrians accepted some blame for their own behaviour.

Other than the matter of alcohol discussed above, only one of those pedestrians described in Section 3 could be said to be pre-disposed to accident involvement, he being a 'slow learner' in educational terms. The Scottish Development Department study's result about the greatly increased likelihood of accidents to the deaf was not a feature examined in this study and only one of the 251 respondents to the questionnaire survey made mention of deafness as a major contributory factor in these accidents.

Vehicles parked at the side of the road were deemed to be a major contributory factor in many accidents. They were recorded as a contributory factor by the police officer completing the Stats 19 form (36.6% of all young pedestrian accidents), in the fatalities study (9 (64.3%) of the 14 accidents occurring on residential streets), from the HO/RT7 data used in Section 4 (28.8% of casualties), and from Section 2 (47.2% of those injured on Non-network roads and 59.0% of those aged 0-4 on Non-network roads). Parked vehicles also figured prominently in some of the pictures of accidents submitted by children.

It is interesting to reflect on some of the results of contributory roles in the light of the findings of Thompson *et al* (1985) and the remarks made towards the end of Section 3. On the one hand Thompson *et al* showed that drivers tended not to modify speed or road positioning as they passed child pedestrians at the kerbside. Thompson *et al* argue that drivers take little account of the unpredictable behaviour of young people.

Correspondingly, in commenting on impressions gained from the study of the records of HM Coroner, it was said that most drivers seem to be driving at generally-accepted speeds and in a reasonable manner. Other information gathered in this study showed that, although about two-thirds of drivers responding to the questionnaire said that they saw the pedestrian before the accident happened, it was clear from them that most saw the pedestrian very late (33.6% of drivers when the pedestrian was less than 5 metres away) and similarly, in the fatalities study, 58.0% of drivers were not able to take any avoiding action.

The general picture that emerges from this discussion of contributory roles is that researchers, and those who report accidents on society's behalf (the Police), usually see young pedestrians as mainly 'at fault', as indeed does society itself. Young pedestrians may in common parlance, 'have the right of the road', but only if this fits in with the same standards of reasonable road-user behaviour of adults and what has evolved to become understood as 'reasonable' through the development of Case Law.

Although the behaviour of young pedestrians will occasionally contribute to a road accident, drivers do not appear to acknowledge this in their driving, probably because the actual risk of an accident is very low. Society does not seem to be very critical of the conduct of drivers and so, when an accident occurs, unless the behaviour of the driver is atypical and extreme, it is the typical and often childlike behaviour of the young pedestrian where blame is directed.

5.3 Consequences

Although several studies have looked at the immediate consequences of a road accident in terms of injury and hospitalisation, few have given any attention to these issues in the longer term, and to factors such as residual dysfunction and subsequent fears. Similarly, very few studies have examined the prosecution of the driver after the accident. The present study provides data on such matters and, in addition, a wealth of information has been gained, some of it anecdotal, about how pedestrians and drivers feel about their accident some time afterwards and the effect that this conflict, like any other, has had on them.

5.3.1 Consequences for the pedestrian

Reference to the national data in Section 1 shows that 1.3% of young pedestrian casualties in 1988 were killed. The figure is identical for the local data (Section 2).

Another 25.6% of casualties from the national data sustained an injury described as 'serious', this generally, but not always resulting in the young person being detained in hospital. The study of seriously injured young pedestrians (Section 4) showed that 30.3% stayed in hospital one night or less, 37.5% between 2 and 13 days, 11.2% between 2 weeks and one month and 19.1% between one and 6 months.

Galasko *et al* (1986) showed in their study that pedestrians had the highest incidence of long-term disability of all traffic accident casualties. The present study has shown that 1.6% of all those responding to the questionnaire survey had gross motor deficiency as a

result of the accident and, between 3 and 15 months after the accident, another 3.6% were having difficulty with walking. In addition, more than half of those responding said that as a result of the accident they had been left with fears or worries about traffic, the place where the accident happened or other accident related matters.

There has also been evidence (only some of which has been included in the results) from personal contact with those involved of the harrowing effect that an accident can have on the individual concerned, the family, and the stresses an accident has placed upon the integrity of this unit.

5.3.2 Consequences for the driver

In addition to the prosecutions described above, drivers in the fatalities study were prosecuted for documentation irregularities (7 of 50 drivers (14.0%)), vehicle defects (7 (14.0%)), and 11 (22.0%) other offences, these not necessarily being mutually exclusive. The HO/RT7 data from Section 4 indicated that, other than the 3.5% of drivers described above who would be prosecuted as a result of their driving conduct, another 4.3% would be prosecuted for offences relating to documentation, 1.2% for a defective vehicle and some of another 7.8% for one or both of the latter 2 offences.

It was very clear from the personal contact with drivers described in Section 4 that for many the accident had been a major event in their lives. Although some were undoubtedly guilty of driving badly or having consumed alcohol in excess, the majority were almost passive participants as a source of great trauma – physical to the pedestrian and mental to both the pedestrian and themselves. It is interesting to note also that some of these drivers, behaving reasonably within the law as far as their driving was concerned, and certainly a relatively innocent party to the accident, found themselves being prosecuted for matters such as the state of their vehicle or a documentation offence which in the main had little or nothing to do with how the accident occurred or how they were able to take steps to avoid the collision.

In addition, there were a small number for whom the threat of repercussions existed in terms of threats of violence from the family or friends of the pedestrian involved (indeed the family of one driver from the study of the records of HM Coroner had been forced to move house to an address he intended to keep secret because of such threats).

5.4 A comment on the study methodology

Before offering comment on the scope for countermeasures, it is important to make some remarks about the quality of the information collected and the methods used in the study.

One of the advantages the workplace-based researcher has is that he is able to immerse himself in his subject within the day-to-day workings of people who are able to use any information produced. These colleagues also act as a direction, guidance and evaluation mechanism, ensuring that the researcher's feet are kept 'firmly on the ground' and that the emphasis of the research is to an extent 'market-led' in the

sense that the researcher should know which questions answers are required for.

Essentially, this research has involved the classic problem of how best to look at and describe a lot of data, which to consider in greater detail and what new information to look for. The preferred means of doing this has been to take an inductive, iterative approach. Firstly, 'global' data were looked at in a fairly superficial way, then a small sample examined in great detail and a slightly larger sample used to examine some of the interesting aspects of the detailed work. This information was then used to look at the opportunities for treating accidents at sites and by behavioural means.

There is a danger in adopting this style – in gaining impressions in this way the researcher risks sensationalism and distortion. Alternatives are that he deals only in dry statistics and never gets a 'feel' for the accidents which occur, or, as in this study, tries to find the middle ground.

As regards the quality of the information obtained, a few comments should be made:

i the disadvantages of using the Stats 19 data are fairly well understood (see Section 1) and relate mainly to the under-reporting of something like 15% or more of pedestrian accidents and that these data are very much the interpretation of the police officer who attends the scene. The data relate more to basic details of who was involved and where the accident occurred, rather than what caused it.

ii the records of HM Coroner used in Section 3 are probably the most detailed generally-available data source but, of course, take no account of the opinion of the casualty in the occurrence of the accident,

iii the questionnaire and interview survey gave good information which would not have been available from any other source, but, responses may be distorted in, for example, the amount of blame people are prepared to accept for their accident, and also by the fact that fewer blameworthy drivers responded. Information provided about participants' activities at the time of the accident is probably 'suggestive' rather than definitive, not only because of what people are prepared to tell, but also because of what they remember.

5.5 Scope for engineering countermeasures

5.5.1 Identification and analysis of sites

With several thousand road accidents happening every year in each of our large urban areas, for many there is an almost overwhelmingly bewildering confusion of data. For those new to the subject it is difficult to know where to start in the identification and analysis of sites for treatment. Although there have been guidelines for accident investigation in general available for some time, once one moves into treating specific types of accident there are fewer sources of help to which to turn.

The Guidelines on Urban Safety Management produced by the Institution of Highways and Transportation provides answers to many questions in this area and has been written in an effort to increase available information and impose a structure on the management and application of safety in urban areas. The document shows how to find and analyse suitable locations for treatment and illustrates how cost-effective these measures can be.

Production of these guidelines is a recognition of the way in which the field has developed and moved on. Briefly, the identification, analysis and treatment of sites, as a subject to which highway authorities devoted energies, began in the 1950s (see, for example, Gilmour (1956) and Leeming (1957a and b)) but has until recently concentrated on treating accidents of a common type which cluster at individual sites. The 1960s and '70s saw strategies being developed for treatment of individual routes for accidents of a common type (for example, those involving loss of control) on a particular route, and for accidents for which there was a particular treatment (for example, crash attenuation). In the late 1970s and early 1980s methods of identifying and treating small areas (about 7 square kilometres in size) were developed (see, for example Dalby (1979) and Dalby and Ward (1981)).

Within the context of the need to consider ways to analyse locational aspects of accidents, in the remainder of Section 5.5, various means of assessing priorities for treating the accidents to the 2470 casualties described in Section 2 are described. Illustrations are provided of ways of determining priority for treatment, and structured comment offered on the potential for savings.

5.5.2 How the data are held

Developments in computing and the storage, manipulation and presentation of data mean that the accident 'pin maps' of earlier years have now been replaced by graph plots such as those shown in Figures 2.1 to 2.4. Any one of the variables on the Stats 19 form, and any combination thereof, can be represented on such graph plots and this is perhaps as good a place as any to start an analysis since it gives a good overall picture of the accidents.

For Network roads, accident records in the West Midlands (and in many other authorities) are held according to 'kilometreage' and a 'moving cursor' may be used by the computer to search the network and find the parts of the network with the highest concentrations of accidents of a given kind on a stretch of road. Similarly, accidents at large junctions are also held according to the number of that junction and therefore junctions may be compared using this facility.

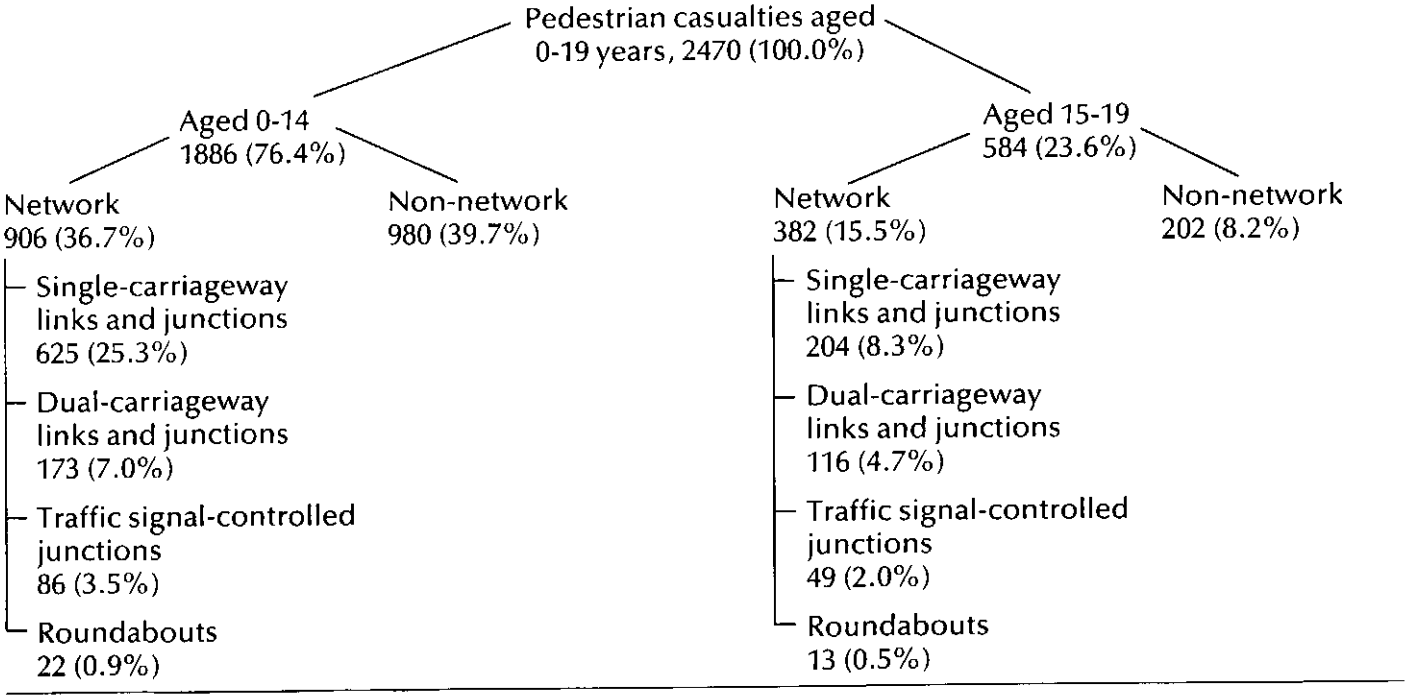
Additionally, all accidents are held by grid reference and, in the West Midlands, according to the number of the Network or Non-network road. Use of the grid reference enables accidents to be associated with 100 metre grid squares and the number of accidents in squares to be ranked and considered in order of priority. This is particularly useful if the graph plot does not give any clear picture of clusters or even if the clusters are particularly dense.

5.5.3 Spatial distributions

The nature of the spatial distribution of accidents is crucial to their potential for treatment. Re-iterating the results of Section 2, almost half (47.9%) of all young pedestrians injured are involved in accidents on Non-network roads. The percentage is higher for those aged 0-4 and 5-9 years. Furthermore, accidents to young pedestrians tend to be widely scattered and do not cluster at individual sites as some do.

Figure 5.1 takes this description slightly further, indicating the types of locations at which the 2470 casualties described in Section 2 were injured. Casualties are split into child (0-14 year-old) pedestrians and older (15-19 year-old) pedestrians, the justification for this age split being on the similarities in the spatial distributions and characteristics of accidents within these groups. The percentages illustrate that part of the total number of 2470 casualties injured at the various types of site. From Figure 5.1 it can be seen that the largest group of casualties (39.7%) involved those child pedestrians on Non-network roads. Arguably, if suitable treatments are available, this then means that there is a substantial number of accidents to target.

Figure 5.1 – Young pedestrian casualties by Network and Non-network location and selected age group, Birmingham, December 1985 – November 1988



5.5.4 Ranking of hazardous Network locations

Using the framework of Figure 5.1, rankings of accidents have been prepared for single- and dual-carriageway links (including the junctions these routes pass through) and Network junctions (Tables 5.3, 5.4 and 5.5), searching over 100 metre lengths. In keeping with practice in this area, data for the most recent 5 year period available at the time of the analysis have been used.

Table 5.3 – High frequency young pedestrian accident locations on single-carriageways, Birmingham, 1985-89

Rank	Location	Kilometreage	Number of accidents	Accidents/ Kilometre
1	U0064	0.15/ 1.04	32	36.0
2	A34	13.02/14.12	28	25.5
3	U3234	0.17/ 0.88	24	33.8
4	B4126	0.03/ 0.63	22	36.7
5	A38	4.00/ 4.07	22	31.4
6	U0171	0.22/ 0.88	18	27.3
7	U0172	0.91/ 1.25	13	38.2
8	U0169	1.97/ 2.42	13	28.9
9	B4145	0.03/ 0.39	11	30.6
10	B441	9.30/ 9.62	10	31.3
11	U1355	0.63/ 0.99	10	27.8
12	A435	13.73/14.12	10	25.6

Table 5.4 – High frequency young pedestrian accident locations on dual-carriageways, Birmingham, 1985-89

Rank	Location	Kilometreage	Number of accidents	Accidents/ Kilometre
1	B4128	2.74/ 3.31	11	19.3
2	A34	15.67/16.00	9	27.3
3	A34	17.17/18.54	9	24.3
4	A4540	8.76/ 9.18	9	21.4
5	A38	3.79/ 4.06	7	25.9
6	B4149	1.60/ 1.99	7	18.0
7	A38	9.02/ 9.25	6	26.1
8	A34	20.22/20.50	6	21.4
9	A38	2.54/ 2.84	6	20.0
10	A453	2.91/ 3.30	6	15.4
11	A456	0.72/ 1.15	6	14.0
12	A456	1.95/ 2.40	6	13.3

Table 5.5 – High frequency young pedestrian accident locations at Network junctions, Birmingham, 1985-89

Rank	Location	Number of Accidents
1	A34/Aldridge Road	13
2	A34/School Road	9
3	A41/Walford Road	9
4	A38/Church Road	8
5	A435/St Mary's Row	8
6	A34/Park Lane	7
7	A34/Warwick Road	7
8	A41/Boulton Road	7
9	U0064/Eastfield Road	6
10	A45/Outer Ring Road	6
11	A41/Grove Lane	6
12	B4137/Witton Road	6

The single-carriageway ranking shows large numbers of accidents and comparatively dense concentrations of accidents per unit length of route. The accidents on dual-carriageways involve smaller numbers and less dense concentrations. All ranked lengths are on Network roads.

Accidents to young pedestrians on dual-carriageways has been one of the concerns of the present work. From Table 5.4 it can be seen that 12 stretches had 6 or more accidents in a 5 year period. Lists such as this have been used in the past as a starting point in deciding which lengths of route may be analysed first with a view to encouraging other methods of crossing the road (for example by erecting fencing to make passage more difficult) and by Road Safety Officers for targeting appropriate adjacent schools in efforts to discourage crossing of roads.

However, these rankings provide no information about the ease or cost of treating these accidents, nor do they suggest what the effect, and likelihood of success, of treatment is likely to be. Simply because a site has large a number of accidents does not imply that the greatest treatment benefits will come from treating that site. Experience suggests that it is particularly difficult to provide suitable treatment for accidents to young pedestrians on roads which carry high volumes of traffic and at junctions where the priority is usually to keep vehicles moving through the site with minimum delay.

5.5.5 Where do 'young revellers' get knocked down late at night?

Another concern of the present study has been accidents to those pedestrians aged 15-19 years occurring late at night and early in the morning. Recently, Birmingham City Council made an effort to tackle such accidents by education, training and publicity and, at a few sites, by making it difficult for pedestrians to cross by erecting fencing of height 2 metres. One method used in this analysis was to find out those 100 metre stretches with the greatest number of pedestrians aged 15-19 knocked down between the hours of 22.00 and 01.59 hours. Details of these sites (of which there are only 2) are provided in Table 5.6.

Table 5.6 – Accident locations with more than one accident involving pedestrians aged 15-19 years and occurring between 22.00 and 01.59 hours, Birmingham, 1985-89

Rank	Location	Number of accidents	Accidents/ Kilometre
1	A38	4	1.33
2	A38	3	0.81

Interestingly, these 2 sites are on radial routes adjacent to two of Birmingham's most popular public houses, one situated between the Northfield and Longbridge areas of the city and used by young people, the other in Selly Oak and serving the students of one the City's universities.

Figure 5.2 – Accident site rank number 2 for 'young revellers'

There are few obvious solutions to accidents at these sites. Both have Pelican Crossings at or near to the sites where the accidents occur and have been analysed for treatment many times in the past. However, accidents happening at a site adjacent to a night club in the City Centre have, in the past, been tackled by the Road Safety Unit of the City Engineer's Department working with the management of the club in including a road safety message as part of the evening entertainment. It is possible that such methods could be used elsewhere, but there is an element of doubt as to the extent one can influence the behaviour of the young at these times and places.

5.5.6 How many minor roads have one child pedestrian accident per year?

This research has shown that accidents involving those aged under 15 years have many common features, occur frequently on Non-network roads and, indeed, may have common treatments. To illustrate the ranking of road numbers, the number of accidents involving children

aged 0-14 on Network roads during the period 1985-89 is shown below (Table 5.7). That table shows a typical quasi-Poisson distribution, with most roads (89.6%) having no accidents, some (621 – 7.9%) having one or 2, a substantial number (180 – 2.3%) of roads having between 3 and 9, and relatively few roads having many accidents (for example, only 6 (<0.1%) roads had more than 10 accidents). This type of negatively-skewed distribution with a long tail is encountered frequently in accident analysis.

Table 5.7 – Frequencies of child (0-14 years) pedestrian accidents on Non-network roads, Birmingham, 1985-89

Number of accidents	Number of roads	Cumulative total	Cumulative %
0	7005	7005	89.6
1	465	7470	95.6
2	156	7626	97.6
3	77	7703	98.6
4	40	7743	99.1
5	22	7765	99.4
6	18	7783	99.6
7	9	7792	99.7
8	7	7799	99.8
9	7	7806	99.9
10	3	7809	99.9
11	2	7811	99.9
12	0	7811	99.9
13	0	7811	99.9
14	2	7813	>99.9
15	1	7814	>99.9
16	0	7814	>99.9
17	1	7815	100.0
TOTAL	**7815**	–	–

It is interesting to note from Table 5.7 that there are 810 (10.36%) Non-network roads in Birmingham with at least one child pedestrian accident in the 5 year period and 72 (0.9%) Non-network roads in Birmingham which have had 5 or more accidents, an average of 1 or more per year. The roads with 10 or more accidents in 5 years are listed in Table 5.8. The analysis thus far has not considered road length – some of the roads on this list will be there not simply because the roads are in themselves 'dangerous' but mainly because they are long roads, thereby giving more opportunities for accidents to occur than on short roads. (However, it is known that the average length of these roads is about 0.23 kilometre and that about 15% are longer than 0.40). The next stage of this analysis would therefore be to find out more about the nature of the roads in Table 5.8, and about the accidents occurring on them.

Table 5.8 – High frequency child pedestrian accident locations on Non-network roads, Birmingham, 1985-89

Rank	Identifying Number	Location	Number of accidents
1	00517	Charles Road, Small Heath	17
2	02589	Slade Road, Erdington	15
3	01795	Mansel Road, Small Heath	14
4	00072	Anderton Road, Sparkbrook	14
5	02607	Somerville Road, Small Heath	11
6	07316	Tangmere Drive, Castle Vale	11
7	01381	Holly Road, Handsworth	10
8	00437	Beeches Road, Perry Barr	10
9	02844	Turves Green, Northfield	10

5.5.7 Where might area-wide measures be implemented?

Elsewhere in this report it has been said that some of the greatest benefits of treating accidents to young pedestrians will come from the systematic treatment of Non-network roads. This may be done using methods such as those described in the Guidelines on Urban Safety Management, where small areas of the city are divided up and considered as a unit for treatment.

The most usual point to start identifying areas for treatment is by using graph plots similar to Figures 2.1 to 2.4 but of a larger scale.

However, if a graph plot facility is not available, many highway authority systems will permit a ranking of accidents to be made on the basis of grid squares. This is not ideal, because it can take no account of the boundaries provided by Network roads which are often used to define areas being treated in this way, but a grid square analysis can identify those squares of 100 metre side with more than a certain number of accidents and whether or not there are two or more of these squares adjoining. The next step after such a ranking has been provided must be to identify manually the precise location of these accidents on a large scale map.

The grid square ranking enables a formal quantification of accident concentrations. However, because small numbers are involved, such squares will exhibit some year-to-year variation in the number of accidents they have and to some degree it will be only chance that they appear on the list where they do.

A ranking for the 5 years 1985-89 for squares with 5 or more accidents is shown in Table 5.9. Interestingly, the squares numbered 3, 5 and 8 are relatively close to each other geographically.

Table 5.9 – 100-metre grid squares with 5 or more child pedestrian accidents, Birmingham, 1985-89

Rank	Grid square	Area	Number of accidents
1	41012858	Small Heath	7
2	41032872	Saltley	6
3	40922849	Sparkbrook	5
4	40112795	Northfield	5
5	40912844	Sparkhill	5
6	41002800	Yardley Wood	5
7	41522852	Sheldon	5
8	40862853	Sparkbrook	5

5.5.8 A case study – identification of an area for treatment

Thus far, discussion of the identification of locations has been restricted to what can be done by access to the computer. However, in reality, the essence of being able to select locations for treatment depends not only upon systematic methods of determining priorities but also upon being able to draw upon local knowledge and information about the geography of, and activity in, the area. With such knowledge and, again, purely as an illustrative example, the area of Birmingham boxed in Figure 5.3 and shown in detail in Figure 5.4 has been selected for further study.

The area shown in Figure 5.4 is one of those with the greatest concentrations of child (0-14 years) pedestrian accidents in Birmingham (see Figures 2.1 and 2.2 particularly); it also includes the top-ranked 100 metre grid square (Table 5.9) and roads 1, 3 and 5 in the rankings of accidents to children (Table 5.8). Figure 5.5 shows a typical scene in the area. Note in particular the style of terraced dwellings and the incidence of on-street parking.

A summary of accidents, and pedestrian casualties involved, in the area in Figure 5.3 is shown in Tables 5.10 and 5.11. Table 5.10 shows that on Network roads (marked) pedestrian accidents accounted for 42.9% of accidents and that, from Table 5.11, almost half of the casualties involved in these accidents were over 19 years-old. Table 5.10 also shows that on Non-network roads pedestrians were involved in about two-thirds (67.5%) of accidents and Table 5.11 that 80.5% of the casualties were aged 0-14 years. As would be expected, the greatest benefits to young pedestrians would arguably be to treat accidents to those aged 0-14 years occurring on Non-network roads within all or part of the area.

Figure 5.3 – Location of potential treatment area, Small Heath, Birmingham

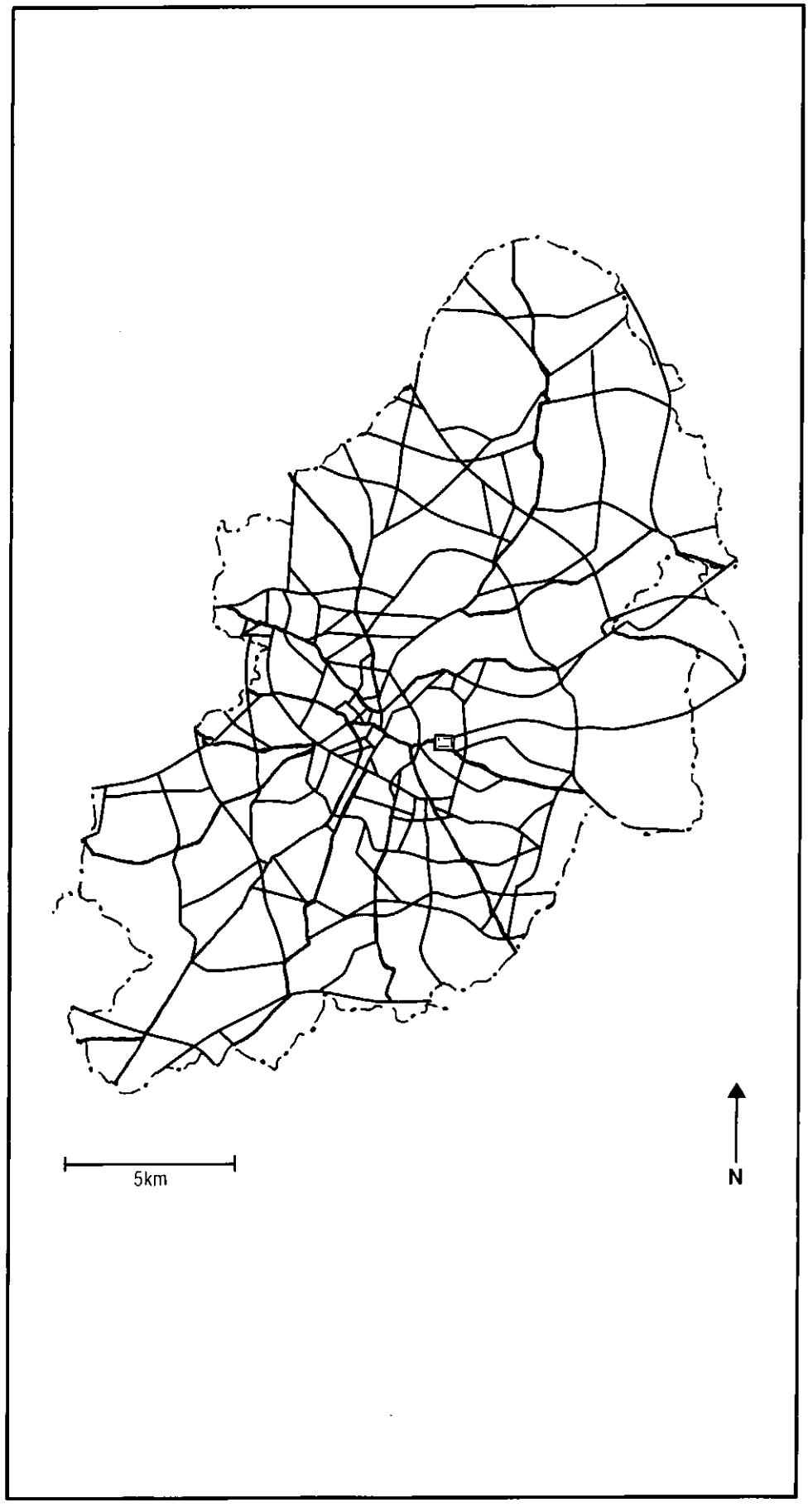


Figure 5.4 – Detail of potential treatment area, Small Heath, Birmingham

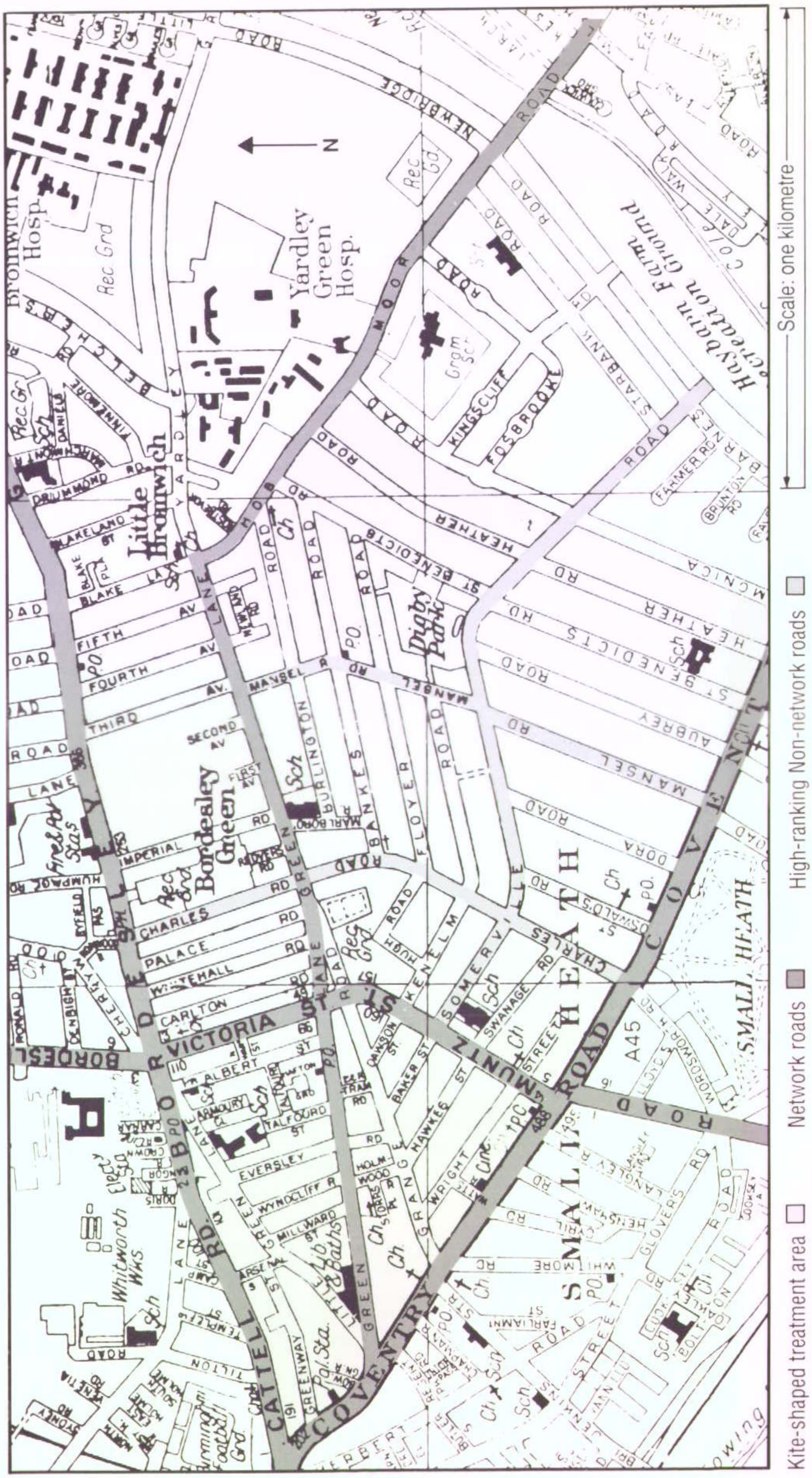


Figure 5.5 – Scene of typical street in Small Heath, Birmingham

Table 5.10 – Accidents by type and category of road in selected area of Small Heath, Birmingham, 1985-89

	Road category		
	Network	Non-network	Total
Type	%	%	%
Pedestrian accident	185 (42.9)	195 (67.5)	380 (52.8)
Pedal cycle accident	43 (10.0)	12 (4.2)	55 (7.6)
TWMV accident	53 (12.3)	11 (3.8)	64 (8.9)
Other vehicle – vehicle accident	150 (34.8)	71 (24.6)	221 (30.7)
TOTAL	**431 (100.0)**	**289 (100.0)**	**720 (100.0)**

Table 5.11 – Pedestrian casualties by age group and category of road in selected area of Small Heath, Birmingham, 1985-89

	Road category		
	Network	Non-network	Total
Age	%	%	%
0-4	7 (3.7)	32 (16.4)	39 (10.2)
5-9	44 (23.3)	83 (42.6)	127 (33.1)
10-14	34 (18.0)	42 (21.5)	76 (19.8)
15-19	14 (7.4)	4 (2.1)	18 (4.7)
>19	90 (47.6)	34 (17.4)	124 (32.3)
TOTAL	**189 (100.0)**	**195 (100.0)**	**384 (100.0)**

The philosophies being expounded from the results of the Guidelines on Urban Safety Management suggest that one option would be to consider the area (or, more likely, **part** of the area) within the kite-shaped area bordered by Cattell Road/Bordesley Green and Coventry Road and roads linking these such as Blake Lane/Hob Moor Road and

Monica Road as suitable for area-wide treatment. After appropriate study of such factors as traffic flows in the area, origin and destination surveys and intensive public consultation, opportunities could be taken to re-inforce the road hierarchy in part of that area, placing emphasis on restricting entry except for access via a structure of purely-local distributor roads.

The measures most likely to be used will be determined after careful diagnosis of the accident problem, the nature of the area and road-user activity therein. In access only/pedestrian streets within the area treatments could include turn bans and road closures, threshold treatments at the bellmouth of side roads such as raised areas with distinctive surfacing, raised junctions, road humps, 20 mph speed limits (which should be combined with measures of physical restraint) and improved lighting. The Department of Transport provide a good example of suitable treatment in *Chidren and Roads: a Safer Way* (Department of Transport, 1990).

Similarly, there is a range of treatments suitable for local distributor roads within the area – pedestrian refuges, peninsulas, school crossing patrols, guardrails, mini-roundabouts, ramped narrows, width restrictions, rumble strips, carriageway markings and signing.

In addition to the measures described above, it would seem likely that, with the development of initiatives such as the pan-European DRIVE project, there will be newer, electronic technologies available to assist. These may be used, for example, to stop all but residents' vehicle's entering a residential area or to enable vehicles to carry cost sensors which charge at a higher rate when 'rat running'. Alternatively, electronic speed gates may be another option, with on-board vehicle sensors able to forcibly control the speed of vehicles passing them and ensure vehicles do not exceed a pre-determined speed.

Given that the area within the kite in figure 5.3 forms around half of the total area of the rectangle for which accidents and casualties have been analysed (Tables 5.10 and 5.11), but that the Non-network roads in the area are particularly densely concentrated, the opportunity would exist to treat over half the Non-network accidents listed. As already mentioned, the greatest beneficiaries would be pedestrians aged 0-14 years, of whom it is estimated there are around 16 casualties per year within the kite-shaped area.

Even if it were considered that an area-wide approach were not appropriate, some benefits are likely to be obtained by considering treatment of Charles Road, Mansel Road and Somerville Road (see Table 5.8) since, in the last 5 years, these 3 roads have had almost 3 accidents per year to pedestrians aged 0-14 years.

5.5.9 Local issues related to engineering treatment

This study has shown how accidents to young pedestrians may be assessed and steps taken to remedy the problem. In the course of this work, a few related issues have been identified as being of particular relevance to the treatment of young pedestrian accidents in this and other areas.

The Guidelines for Urban Safety Management emphasise the need for public participation in gaining acceptability for area-wide measures and this may be supported by the results of the present study. For example, when asked what the local council could do to reduce similar accidents at the site in the future, very few drivers or pedestrians offered solutions relating to speed reduction measures, physical control of vehicle access or of parking. Most participant drivers and pedestrians wanted pedestrian crossings (when arguably few of the accidents would have been amenable to such treatment and few of the locations suitable). This probably indicates a lack of awareness of the opportunities offered by some of the treatments listed in Section 5.5.8, but may also be resistance to their use.

It is important that measures put in nominally for safety are not simply cosmetic and, although related to other quality of life issues such as greening and beautification, have no proven safety benefit. For example, some streets in the otherwise excellent booklet produced by the Department of Environment (1986) include newly demarcated parking bays and other attractive features and are presented as Woonerf residential precincts. In reality, some are rat-runs with accident records that are not particularly good, and include the 'dash-out' type of collision described in this study. Compromise solutions to accidents tend not to work. Schemes not designed specifically for accident reduction may not improve the accident record of a street and may in some situations make matters worse.

Similarly, urban safety management should be tied in closely with other schemes such as Housing Action Areas or General Improvement Areas. Account should be taken of accidents occurring on roads in the area and should be discussed at the initial stage of any such schemes. Treatments must be **tailored** to the specific needs of any problem.

The road network in Birmingham and many other large cities operates at near full capacity for many hours of the day and changes in the use of roads will need to take account of this. This is an area in which traffic modelling may help and there are opportunities here to increase knowledge related to urban safety management. Research on the basics of relationships between accidents and traffic flow is in its infancy. However, as the approximate effects of increases and decreases in flow become known, they should be incorporated into the decision making process much in the way that the work of Maycock and Hall (1984) is now used in roundabout design. Rough estimates of the effect of changes in traffic flow on accidents to young pedestrians would, if included on traffic models, and shown to be scientifically credible, increase the level of public and professional discussion. It would also provide useful information about the likely incidence of vehicles diverting to avoid areas of 'traffic calming' and the role of route guidance systems.

Another issue is linked to this subject of pressure in the urban environment. In the earlier report in this series (Lawson, 1989) the comment was made that, initially, it may be that speed reduction measures would be easier to implement in suburban areas (because of fewer physical constraints) rather than in the inner city. This may be so even though the need for treatment may be greater in the latter areas. It

may be that treatment, initially in suburban areas, possibly accompanied by other 'sweeteners' such as an associated rise in house prices brought about by increased public popularity for the schemes, would increase their acceptability in inner areas.

5.6 Scope for behavioural countermeasures

Some of the most important results from this work relate to the provision of information in order to target 'at-risk' road-users. Some of this information has been available in the past but not for the local area of Birmingham and parts of the West Midlands metropolitan districts.

5.6.1 Saliency

Behind the statistics of low SEGs, comparatively large numbers of children in households etc. is the message for Road Safety Officers, not only that their material must be designed to carry the message, but that it must be designed for a relatively unsophisticated road-user with a series of competing demands on his or her time. Indeed, the issue of saliency, or the prominence with which the topic of traffic safety features in people's lives, is important within this context and was discussed in earlier work by King *et al* (1987). Essentially, this is linked to the idea that many of the road-users who are most in need of road safety education are those for whom it is the lowest priority because they are, for example, parents living on Income Support in a council flat and trying to feed and educate 3 or more children.

Road Safety Officers are generally familiar with the need to target their clients but this study provides a sharp reminder of this audience and some of the difficulties of putting the road safety message across.

5.6.2 Accompaniment and links with other needs for protection

Other studies (see, for example, Scottish Development Department (1989) and the work in Leeds by Carsten *et al* (1989)) have stressed the importance of accompaniment of young children and emphasised the need to encourage this. The Scottish study showed 7.8% of child pedestrians were accompanied by an adult at the time of the accident and the Leeds work that 10% of child pedestrians who responded were accompanied by an adult.

Encouragement of accompaniment would be supported by the results of the present study but it should also be noted that accompaniment was relatively high for the youngest of those involved in accidents – 55.6% of casualties aged 0-4 and 13.1% of those aged 5-9 were accompanied by an adult when the accident occurred. In addition, 2 of the fatalities from the study of the records of HM Coroner involved children breaking free from the hand of an adult so it may be important to emphasise what some parents already practise – that accompaniment is not sufficient and that restraint of some form is necessary. The evidence suggests that on occasions even that may not be enough.

It would seem likely that ideas about accompaniment of young people have changed over time – for example, Tight (1987) quotes Sadler (1972) saying that 13% of parents in his study in England considered that their 2 year-old child could cross a road which they themselves classified as 'very busy'. Similarly, Morton-Williams *et al* (undated, but circa 1970)

showed that 40% of mothers questioned would let their child of 7 years cross unaccompanied a road carrying 1000 vehicles during the peak hour.

There is anecdotal evidence to suggest that in recent years there has been an increase in the accompaniment of young children on such journeys as those to and from school. Since the early 1970s there has been a decrease in accidents to those aged 0-4 and 5-9 and it would be interesting to know more about parental views on accompaniment and the extent to which this has increased because parents are concerned about risks to their children other than those from traffic. It may be that there are opportunities to gain road safety advantages by 'riding on the back' of campaigns designed to promote accompaniment for other reasons.

5.6.3 The role of parents

It is difficult to gather information about the role and whereabouts of parents at the time of an accident. Such information is not available on the Stats 19 and would have been difficult to collect by means of a questionnaire since parents would probably not have been happy about providing information which either reflected badly on them and/or about which they had feelings of guilt. Impressions gained from the study of the records of HM Coroner indicated that there was no consistent pattern to the role of parents in these accidents – some were accompanying their child at the time of the accident, others knew where their child was going and did not disapprove of the intended journey or route, while in other cases a child escaped from close supervision and was unable to cope with the subsequent situation.

Other than promoting effective supervision by parents, it is suggested that this report provides many opportunities to give parents good information about how and when their children are at risk, but it is essential that this is provided to them in a suitable form.

5.6.4 Crossing roads near home

Related to accompaniment is the concern identified in the study of the records of HM Coroner of young children returning to their home with a parent and, once opposite their house, suddenly dashing towards a place that they recognise with apparently nothing on their mind than reaching home. It has been suggested (Belcher, 1989) that a campaign be organised to draw attention to this and that an alternative and less risky place to cross may be at some distance from the home, the last part of any journey being made on the same side of the road as the place where the young person lives.

5.6.5 'Young revellers' on foot and in vehicles

Continuing on the theme of using data to target particular road-users, it is interesting to note the similarities in the characteristics of accidents involving young pedestrians with those single-vehicle non-pedestrian accidents (see, for example, Lawson *et al*, 1987) and the role of alcohol, risk-taking behaviour and with large proportions of accidents concentrated on Friday/Saturday and Saturday/Sunday nights. It may be that there are opportunities here to combine campaigns to tackle those

who drive and those who walk towards injury.

5.6.6 Conspicuity

About 31.1% of casualties were injured in the dark (Section 4), with relatively more people, than in daylight, wearing clothing coded as predominantly dark. It is evident that there are continuing opportunities to increase the conspicuity of pedestrians. It is also noticeable than a large number of pedestrians were carrying a bag of some form and, although this has already received attention in the past, it would appear to be an an area worth pursuing in the future.

5.6.7 Familiarity with highway features

One of the issues raised by the present study but already familiar to some Road Safety Officers is that, because pre-school children do tend to have experience only of roads nearer to home, and indeed tend to have their accidents on Non-network roads, they are completely unfamiliar with features of roads of a higher standard such as pedestrian crossings.

5.6.8 Drivers as targets for behavioural countermeasures

It is slightly disappointing that there is comparatively little distinctive information on the characteristics of those drivers involved in these accidents. Broadly speaking, they have similar characteristics of gender and age and (probably) SEGs as drivers involved in road accidents in general. However, it is considered that more could be done to make them aware of the unpredictable behaviour of young pedestrians and of the hazards associated with driving on Non-network roads and past parked cars.

5.6.9 Access to data

Engineers and Road Safety Officers are sometimes criticised by colleagues in the Police and rescue services for being too remote from the data and the actualities of an accident. As mentioned above, contact with participants in these accidents had the effect of sharpening the awareness of those conducting interviews and responding to queries from those involved in these accidents. This opportunity is rightly available to very few who work in the field but it is disappointing to note that in many authorities practitioners do not have even direct access to Stats 19 data and they must, for example, write a memorandum and wait a week until they may have sight of even the simplest matrices such as those produced in Section 2. This has the effect of making it difficult to target particular problems and is a block to evaluation.

5.6.10 Expectations of behavioural countermeasures

Less easily-quantified aspects of the subject of accidents to young pedestrians which the methodology was not really designed to elicit, but nevertheless for which information was gathered during this study, relate to impressions of how the topic is viewed by fellow-professionals and the public.

In the course of conducting this work, and from contact with some 'front-line' police and road safety officers, a sense of frustration at the

traffic safety profession's inability to effect change in the behaviour of young pedestrians has been detected. This, combined with the fact that it is also remarkably difficult to assess the efficacy of education, training and publicity, or implement effective engineering remedial measures for young pedestrians, and the repetitiveness and similarity in the pattern with which these accidents occur, induces a sense of futility in those involved.

This is particularly unfortunate because of the stark contrast between this and the high public expectation of the potential for countermeasures and the acceptability of the protection of young people on the roads as a course of action for public bodies and politicians.

5.6.11 Action being taken resulting from the present study

In spite of the above comments, it is satisfying to note that Road Safety Officers in Birmingham, other West Midlands metropolitan districts and neighbouring shire counties have been quick to pick up the results of this study. In Birmingham, in April 1989, a campaign based on the results of Section 3 was launched by the then Minister for Roads and Traffic, Peter Bottomley MP. This campaign was sponsored by the CO-OP and featured a character 'Bobby Bottle' who went into schools to draw attention to the particular characteristics of accidents to young people. In June 1990 this campaign was extended to include other West Midlands metropolitan districts and neighbouring shire counties.

However, despite the very best efforts of behaviour modification, many of the types of accidents encountered in this study will remain untreatable and it is important also to consider the opportunities afforded by alternative strategies.

5.7 Summary

Enhancement of the data base using a questionnaire survey of pedestrians and drivers injured in serious injury accidents provided results consistent with all but a few of those from analysis of Stats 19 records and the survey of the records of HM Coroner.

Pedestrians at risk have many clearly defined characteristics. Further study of this topic has shown that those of Asian ethnic origin aged 0-9 years are about twice as likely to be injured as pedestrians as their non-Asian counterparts. However, this may in part be a function of the fact that many of Asian ethnic origin live in the inner city and that accidents to pedestrians are common in these areas for reasons associated with such factors as traffic activity, land-use and parking patterns.

Some information has been provided of the characteristics of the drivers involved in these accidents. They are generally of the same age and gender as drivers involved in other road accidents and from higher SEGs than the family of the pedestrian.

Accidents to young pedestrians are essentially a local problem with the

great majority of pedestrian casualties living in the district where the accident occurs, the drivers similarly, if not living in the same district, tending to live in one of the other West Midlands metropolitan districts.

Other details of when, where and how these accidents occurred have been examined and certain high-risk features of these accidents identified.

Pedestrians are assessed to play the largest contributory role in the great majority of these accidents. Many accept some or all of the blame for the fact that these accidents occur. However, it seems likely that drivers could be encouraged to be made aware of the high risk of collisions with young pedestrians in some areas and that they should modify their driving behaviour accordingly.

The effect of these accidents for a small fraction of pedestrians is profound. A few percent are killed and a similar number suffer grave injuries which seriously affect the quality of the remainder of their lives. The drivers are not unaffected by the mental trauma associated with these accidents.

Many of the greatest benefits in treating accidents to young pedestrians are likely to come from concentrating on minor roads, and groups of these roads in small areas, where recently-developed strategies of urban safety management may be used. Carefully targeted behavioural and other countermeasures are also likely to reap rewards.

6 Conclusions, policies and recommendations for action

This section includes a brief summary of the conclusions of the research and indicates how these relate to aims and objectives Birmingham City Council have outlined in the authority's Road Safety Plan. Recommendations for action, based upon the results of this study, and from observations gained whilst conducting it, are then provided. These are of 5 main types and consider the way in which data are or may be collected or presented, the analysis and use of data, education, training and publicity, engineering approaches, and future research needs.

6.1 Main conclusions

This research has demonstrated that there are benefits to be gained in drawing information from a variety of data sources to build up a picture of accident occurrence.

Large proportions of accidents to young pedestrians involve the typically unpredictable and impetuous behaviour of young people. Society, and those who act on society's behalf, consider that in less than 10% of these accidents is the driver of the striking vehicle a major contributor to the cause of the accident. Many pedestrians accept some degree of responsibilty for their accident and, for a few percent of those involved, the consequences of these accidents are grave.

For some pedestrians it is a combination of unaware, childlike behaviours leading to a disaster. For others, it is risky and hopeless gambles resulting in injury or loss of life. These are the extremes and between them there is a range. As would be expected, some of these accidents do indeed involve a young person apparently dashing out into the street. However, there are also other characteristics of these accidents highlighted in this study. These involve, for example, those who are older, taking reasonable but probably conscious risks, and apparently losing, and those who contribute heavily to their own downfall in outrageous behaviour.

Many of these accidents can be loosely categorised as young people being unaware, unlucky or unthinking or some combination of these – from the young toddler without any knowledge of traffic who wanders from a doorstep, straight onto the footway and into the road, to the older teenager out for a good time and a few beers who, full of high spirits and with judgement impaired, ignores pedestrian crossing facilities and attempts to cross many lanes of traffic.

As would be expected, comparatively few pedestrians have any opportunity to take avoiding action once involved in the sequence of events leading up to the collision and, similarly, drivers have little warning that an accident is going to occur.

Just as some pedestrians behaved badly, so did some drivers. About a fifth of drivers examined in part of the study were travelling at more than 10 mph above the speed limit when the accident occurred. In accidents involving serious injury to a pedestrian, less than 5% of drivers would be prosecuted for an aspect of their driving conduct. In those where a fatality had resulted, about a quarter of drivers were being prosecuted for careless or reckless driving.

Only about 1% of all drivers involved in young pedestrian accidents had consumed alcohol above the prescribed limit.

It does not appear that in the majority of cases the drivers were behaving in any way differently from the generally-accepted norm but that, on the occasion concerned, events led to a collision.

In many respects the driver appears to be living up to society's standards of behaviour and expectations of him, but it is likely that such expectations should be higher.

The pedestrians involved in these accidents are often some of the most disadvantaged people in society.

Education, training and publicity must be designed to take account of the fact that, not only must a road safety message be conveyed, but parents and children most in need of it may not see it as a high priority because of what they perceive as more important and more pressing concerns in their lives. There are also opportunities for providing a road safety message for types of drivers involved in these accidents.

There are severe limits in the extent to which the behaviour of children can be changed but there are opportunities to feed the road safety message through parents.

Pedestrian accidents are also one of the most difficult types of road accident to find an engineering treatment for. This is mainly because it is so difficult to curb or control the pedestrian's flexibility in movement, manoeuvrability and direction, agility and acceleration.

In addition, these accidents are widely scattered and tend not to cluster, as some accidents do, at particular locations. Some occur on classified (major) roads and such factors as a lack of suitable treatment-types and the competing needs of keeping the traffic flowing mean that they are particularly difficult to deal with. About two-thirds of accidents to those aged 15-19 years occur on these roads.

Approximately half (more for those involving younger children) of accidents to young pedestrians occur on minor roads, some originally designed mainly for access. For example, in Birmingham just under 1% of minor roads have had, on average, one pedestrian accident per year involving a child of under 15 years over the last 5 years.

There are parts of Birmingham, and many other towns and cities, where there are small areas, including several minor roads, where there will have been high numbers of accidents to young pedestrians, especially to those under 15 years. Using emerging techniques and technologies,

there will be opportunities to reduce these accidents by urban safety management including methods of restraint of vehicles, segregation of pedestrians from vehicles, and other methods of 'traffic calming'.

6.2 A local authority's policies, aims and objectives

Birmingham City Council, in common with some other local authorities in the UK, has recently published a Traffic and Road Safety Plan (Birmingham City Council, 1990) which contains details of the Council's policies, aims and objectives as they relate to traffic safety. Some of these result from this, and other, research conducted within the City Engineer's Department and have particular relevance to accidents to young pedestrians. Details of the aims related to accidents to young pedestrians have been taken directly from the Traffic and Road Safety Plan and are listed below as an example of the way in which an authority may use information to allocate resources to young pedestrians.

6.2.1 Long-term targets

It is an objective of the Council to reduce the severity of accidents. In the period used for comparison (1981-85), fatal and serious accidents comprised 27% of injury accidents in Birmingham. This should be reduced to 22% by the year 2000.

The risk of injury to vulnerable road-users should be reduced. Pedestrians, who form the great majority of these casualties, accounted for an annual average of 1728 during the comparison period and this should be reduced to 1100 by the year 2000.

6.2.2 Implementation beyond 1990

Of particular relevance to the results of this study, the Traffic Management Division's Road Safety Unit should, 'Continue a programme of education, training and publicity that takes account of a multi-racial community in the most cost effective manner'.

Schemes associated with urban renewal, and carried out by the Urban Development Division, should be designed so that traffic speeds in residential areas are kept low so as to minimise the risk of high severity accidents. In keeping with the theme of urban safety management, the Traffic and Road Safety Plan also states that, 'As a matter of course, all proposed schemes should be submitted for safety audit, and all completed schemes should be monitored to determine their effect on traffic patterns'.

In work with the Main Drainage Division, 'A high priority should be given to safety when designing or checking new housing estate road layouts, with special regard to vulnerable road-user groups'.

6.2.3 Targets for 1990/91

Targets for 1990/91 related to the present study include the identification and remedial work at 25 sites (only some of which will have had accidents to young pedestrians), with the aim of reducing accident totals by at least one per year at each site, and to continue research into accident trends and causes.

It is the Council's aim to reduce accident severity by installing speed humps at 3 sites as a trial and to establish a policy for the introduction of speed humps at other sites in the City.

Accidents to vulnerable road users are to be treated at a further 5 sites with the aim of reducing accidents to these vulnerable groups by at least one accident per year at each site.

A child pedestrian campaign is to be promoted within inner city Birmingham to cater for children at risk.

A programme of research is to be established addressing the needs of the teenage road-user.

A Traffic Education Scheme within hospital schools in the City is to be continued and work will be undertaken towards the establishment of a Children's Traffic Club.

Although not specifically mentioned in the Traffic and Road Safety Plan, discussions are now being held within the Traffic Management Division to formulate plans for an area-wide traffic safety scheme.

In keeping with some of the comments expressed in this report, steps are to be taken to evaluate road safety education, training and publicity and long term accident trends both at treated sites, and in the City as a whole, will continue to be monitored.

6.3 Recommendations for action

Recommendations for action are divided into 5 main areas, relating to:

i the way in which data are or may be collected, or presented,

ii the analysis and use of data,

iii education, training and publicity,

iv engineering approaches,

v future research needs.

6.3.1 Data collection and presentation

In the course of this work, many definitions of child pedestrians have been encountered and, for purposes of comparison, it would be helpful if some uniformity could be agreed. Most studies and sources of national and international data in this field define children as those aged 0-14 years.

An increase in the detail of the classification of road or street on the Stats 19 form would greatly assist research, especially at a level of examining demographic and hierarchic patterns of accidents. At present, coders employed by the Police or local authority usually add a coding of 'M', 'A', 'B' and 'C' roads, the remainder being unclassified (Non-network). Using the present system, but by making necessary additions to the reference maps used, local authority coders could also classify according to distributor roads (primary, district and local), access roads and pedestrian streets.

This study has demonstrated the high quality of data available from the records of HM Coroner. Gloyns and Rattenbury (1989) have demonstrated the use to which large, structured data sets may be put and it is recommended that a sampling system be extended to other parts of the country to take advantage of this data source.

6.3.2 Analysis and use of data

The computer system used to identify and analyse road accidents in the West Midlands metropolitan districts is one of the more sophisticated currently available in the UK. It is important that accidents, such as those to young pedestrians, which are common on **minor** roads, can be quickly identified, accessed and analysed on a locational basis using the computer. Some systems being used in the UK do not allow this to be done satisfactorily and it is recommended that they are improved accordingly.

6.3.3 Developments in education, training and publicity

It would seem important that more education, training and publicity is aimed specifically at the characteristics of those identified in this study. Many of those at risk are the disadvantaged in society, who attach little priority to traffic safety before an accident occurs, and are least able to make use of a sophisticated road safety message.

There is a need for evaluation of all measures to be built into education, training and publicity – there is almost no evidence of the worth of large amounts of money invested in this area and, although this does not negate the need for it to be spent, it gives little information about where priorities for spending should lie.

One concern identified in the study of the records of HM Coroner is that of young children returning to their home with a parent and, once opposite their house, suddenly dashing towards a place that they recognise, with apparently nothing on their mind other than reaching home. It is recommended that a campaign be organised to draw attention to this and that an alternative and less risky place to cross may be at some distance from the home, the last part of any journey being made on the same side of the road as the place where the young person lives.

A campaign should be aimed at drivers, especially those who use streets in residential areas, to increase their awareness of the likelihood of poor pedestrian behaviour.

Similarly, there is evidence of resistance to the types of changes to road layout which could potentially reduce accidents to young pedestrians. It is recommended that a programme of education be launched to advise both residents and drivers of the advantages of such changes.

Other education, training and publicity which would benefit young pedestrians includes the promotion of accompaniment, and measures designed to improve how young people cross roads. Some of these efforts will need to be directed through parents. Related to such practice, it is recommended that young people, rather than being told **not** to cross near parked vehicles, are told of the dangers of doing so

but shown how to do so as safely as possible. Many of those for whom this is a risk live in areas where it is all but impossible to cross anywhere other than by parked vehicles.

6.3.4 Developments in engineering

In terms of locational analysis, it would appear from this study that the greatest benefits in reduction of young pedestrian casualties from engineering measures will involve methods of urban safety management using many of the techniques proposed in the guidelines produced by the Institution of Highways and Transportation (1990). It is recommended therefore that highway authorities look closely at the number of accidents occurring on their minor roads, and small areas which include a number of these roads, and consider what changes may be appropriate.

The descriptions provided in this research show that there are issues involving accidents to young pedestrians that require particular attention. Parked vehicles are a major contributory factor in accidents to young pedestrians and it is recommended that, in using techniques of urban safety management, emphasis is given to finding solutions to parking-related problems.

6.3.5 Future research needs

It is recommended that there should be more studies conducted with accident location or **type** of location as the basic unit of analysis. For example, there is a scarcity of published information about the characteristics of accidents to young pedestrians at or near schools.

Given that almost all of the work in this report is of simple frequency counts and not related to exposure, some of the particular issues examined in this research should be subjected to exposure studies.

This study has been one of the first to focus on accidents to those pedestrians aged 15-19 years. It is recommended that other studies are made to examine how these accidents compare with those to pedestrians aged 20 years and older in order that their characteristics be taken into account in any countermeasures designed.

Accidents to young pedestrians occurring on minor roads are amenable to treatment by techniques of urban safety management. It is therefore recommended that authorities make analyses of the accidents occurring in such areas, extending the type of analysis shown in Section 5 of this report. This will involve looking in detail at the accidents and use of these roads, the traffic activity thereon, and matching this information with knowledge of available countermeasures.

This study has examined some of the characteristics of drivers involved in these accidents and their behaviour immediately prior to the accident. It is recommended that this be extended to include research, such as that described above, which would consider driver behaviour, especially in residential and inner city areas.

It would help quantify accident issues if the historical record of the number and location of different types of accidents were loaded onto

traffic and transportation models. It is recommended that this be done as part of initiatives involving the reduction of traffic congestion in cities.

There is a need for more information about the nature of the behaviour, as pedestrians, of the young Asian ethnic minorities. This study has shown that accidents to those aged 0-9 are twice as common for this part of the community compared with others, but has not provided reasons for this, other than those which may be associated with the areas in which Asians live.

This study has considered only behaviours and events which led to accidents. A case-controlled study is now required in order to find out more about both the behaviour of pedestrians at times when accidents do **not** occur, and about the areas where casualties are common. This could draw upon standard research techniques used in other studies and take the form of:

i gathering data in a similar way to that gained from the HO/RT7 in the present study and taking particular note of the location of all accidents involving young pedestrians,

ii researchers returning to the scene of these accidents (often either a matter of a few weeks after each accident or exactly a year afterwards),

iii measuring and making observations of features of the accident scene which have been shown by this study and others to contribute to road accidents,

iv taking especial note of the behaviour, exposure and ethnic origin of pedestrians at the scene,

v analysing differences in the behaviour and exposure of pedestrians of different ethnic origin.

In addition to the above, it is recommended that, when data from the UK 1991 census come through, these be linked to studies of those involved in accidents, with particular reference to any information available on ethnic minorities.

According to the 1981 Census there were 17 metropolitan districts or London boroughs with a percentage of the ethnic minority population as high or higher than that of Birmingham. Some of these authorities, like Birmingham, will be receiving funds from HM Government under the provisions of Section 11 of the Local Government Act 1966 to make special provision for the traffic safety requirements of ethnic minorities. It is recommended that these, and other authorities with a large percentage of ethnic minorities, take steps similar to those outlined in this research to establish the level and nature of risk to all sections of their community.

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The views expressed are those of the author and not necessarily those of Birmingham City Council, the City Engineer's Department or the Automobile Association Foundation for Road Safety Research.

9 A note on the sponsor – The AA Foundation for Road Safety Research

The AA Foundation for Road Safety Research was formed by The Automobile Association in December 1986 as part of its continuing efforts in the road safety field and as a major contribution to European Road Safety Year.

Registered as a charity, the objectives of the Foundation are :

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>
> To promote and encourage the safe use of public roads by all classes of road users through the circulation of advice, information and knowledge gained from research; and
>
> To conceive, develop and implement programmes and courses of action designed to improve road safety, these to include the carrying out of any projects or programmes intended to educate young children or others in the safe use of public roads.

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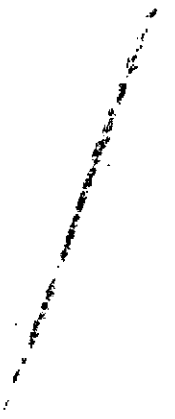

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