

ROAD ACCIDENT CASUALTIES AND SOCIAL DEPRIVATION

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1. INTRODUCTION

Lothian Regional Council was one of the first councils in the UK to publish a formal Road Safety Plan which was updated annually during the early 1990s to take forward a new more pro-active approach to road safety. Following Scotland's local government reform in 1996, the City of Edinburgh Council took over responsibilities for road safety in the capital city. This paper describes some of the themes that have been addressed in the city through the road safety planning process.

2. SOME HISTORY

It has been appreciated for some time that rates of involvement in road accidents as casualties are related to social deprivation. Up until the 1990s this had not been quantified in any useful way to assist the process of road safety planning.

To address this, during 1990s Lothian Regional Council as part of its road safety planning process undertook internal research to seek to quantify the relationships there are between social deprivation and involvement in road accidents.

This began very modestly in 1991 with a manual trawl of paper records to identify the number of casualties during 1990 with home address postcodes relating to a particular deprived area in Edinburgh. This research identified that people resident in that area were 1.7 times more likely to be involved as a casualty than the rest of the population of Lothian. This rose to being 2.2 times more likely for children aged 5-14.

TABLE 1: Road Accident Casualty Rates for people resident in the Pilton Area and the Rest of Lothian (1990)

Age Group	Population in Pilton	Casualty Total for Pilton residents	Casualty Rates (casualties/1,000 population)	
			Pilton Area	Rest of Lothian
0-4	1,550	4	2.6	2.1
5-14	2,730	32	11.7	5.3
15-24	2,880	42	14.6	11.1
25-64	9,130	81	8.9	4.9
over 64	2,610	21	8.0	3.9
Total	18,900	180	9.5	5.7

It was this piece of research that eventually led to Lothian Regional Council introducing in 1994 the first scheme in the UK to offer free membership to the Children's Traffic Club for all children resident in Lothian. As a result of Lothian's initiative, the Scottish Office introduced free membership to the whole of Scotland in 1995

Later, electronic address information for drivers and casualties from police records relating to all accidents in Lothian Region were postcoded from 1991 and these formed a dataset for further research. It was as a result of this research presented by CoSLA that the Department of Transport as part of its quinquennial review procedures for accident data collection decided to collect postcode information for drivers and casualties nationally. This began in 1999.

The existence of postcode information for Lothian dating back to 1991 now uniquely allows a comparison of current casualty rates with those of ten ago. This paper relates to such a comparison for Edinburgh

3. THE DATASET

The dataset comprises full STATS19 records for two four-year periods which are separated by nine years. These periods are 1991-1994 and 2000-2003.

Table 2: Number of records in database

	<i>Number/percentage</i>		
	1991-94	2000-03	%change
Accidents	8,084	6,641	-18%
Casualties	9,667	8,011	-17%
Casualties/Accident	1.20	1.21	1%

Postcode units for the home address of each casualty – where available – were attached to each casualty record. The postcode units have been assigned to a postcode sector. Examples of local postcodes are EH1 1BL and EH10 5SW. The full six or seven characters represent the postcode unit. The first four or five characters (ie EH1 1 or EH10 5) represent the postcode sector. Deprivation categories (depcats) [Carstairs and Morris (1991)] taking integer values from 1 to 7 (in ascending order of deprivation) have been assigned to each postcode sector allowing each casualty record to be given an appropriate deocat. Carstairs deocats are calculated from a combination of four indicators from census information. These indicators relate to indices of overcrowding, male unemployment, socio-economic status and car ownership

Deocat has 7 categories, where:

- 1 & 2 are affluent
- 3,4 & 5 are intermediate
- 6 & 7 are deprived

Casualty and population information has been aggregated to the postcode sector level to provide casualty rates by age group, sex and deprivation category.

The rates that are used here do not (except in Figure 7) relate to where the accident happened but to the place of residence of the casualty. The rates, therefore, relate to casualty numbers to population groups irrespective of where the accident happened. Some information about home zone casualties is set out in Section 5.3 below.

4. SUMMARY OF HEADLINE STATISTICS OF CASUALTY RATES 2000-03

Below are set out some of the headline relationships between casualty rate and deocat. All casualty rates are expressed in terms of casualties/1000 population/year.

4.1 Casualty rates by casualty class

Figure 1 sets out casualty rates by casualty class and deocat for 2000-003. It is clear that there is a highly significant relationship between casualty rate and deocat across all three casualty classes. It is very unusual in statistical analysis to identify such clear stepwise relationships.

Figure 1: Casualty rates by casualty class and deocat 2000-03

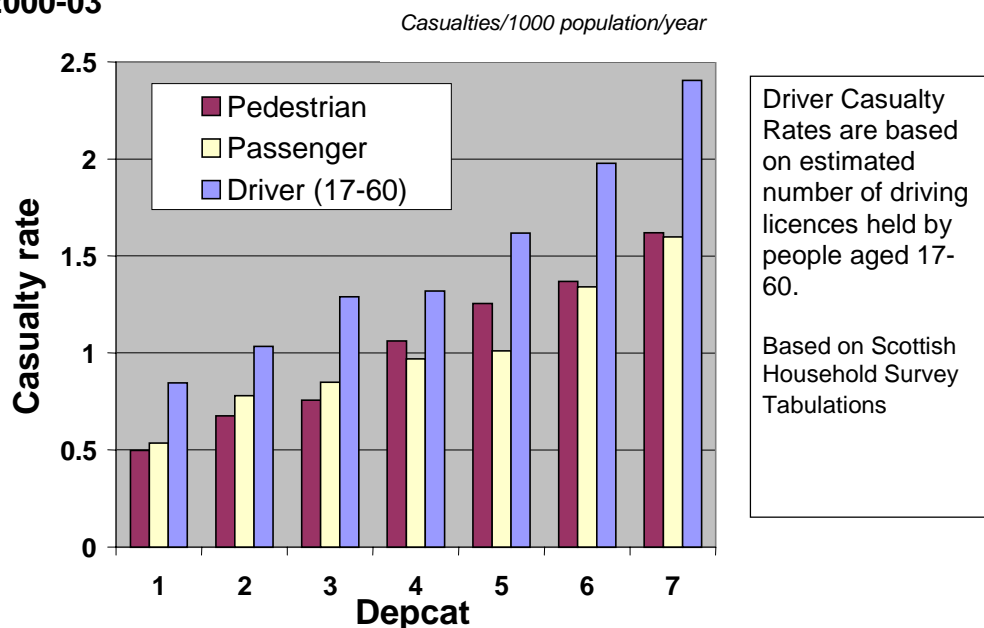


Figure 1 shows that the rates – irrespective of casualty class – for the most deprived deocat (7) are three times the rates for the most affluent deocat (1). The actual rate ratios are 3.3, 3.0 and 2.8 for pedestrians, passengers and drivers respectively.

4.2 Casualty rates by sex

This disparity in rates by deocat is also repeated by sex. Figure 2 shows these relationships in which it is evident that for females the disparity is not so marked as it is for males.

Figure 2: Casualty rates by sex and deocat 2000-03

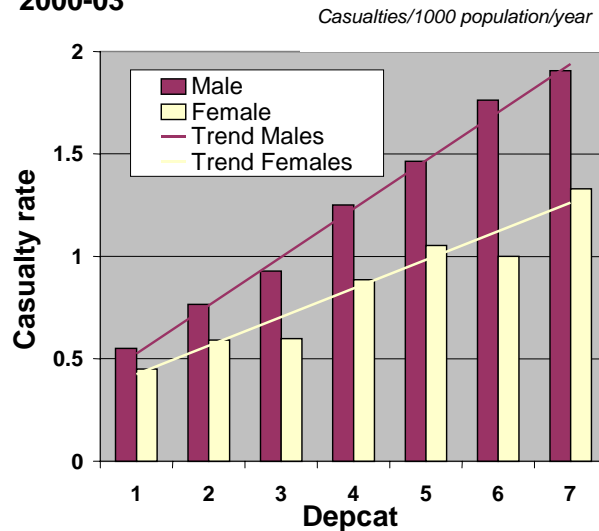
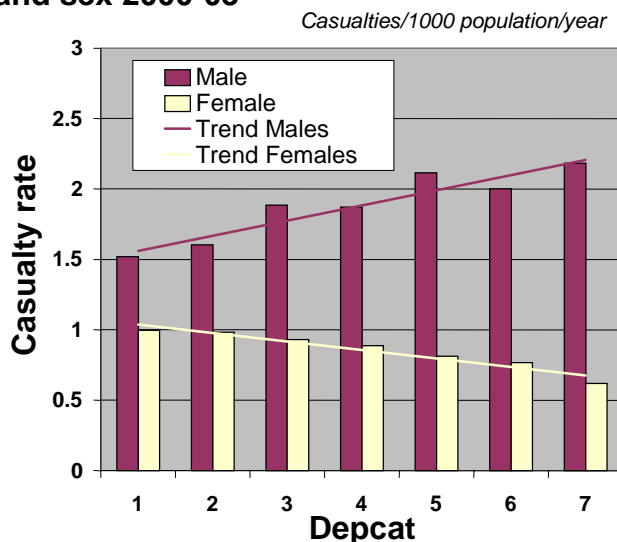


Figure 2 shows that for males the rate ratio (deocat 7 rate/deocat 1 rate) is 3.5 and for females it is 3.0.

4.3 Casualty rates for drivers by sex

This less marked disparity for females is, interestingly, explained when the rates are calculated for driver casualties by deocat and sex where a different picture emerges. Figure 3 shows these rates and it is clear that as the rates

Figure 3: Driver/rider casualty rates by deocat and sex 2000-03



rise for males with increasing deprivation they fall for females. This is

because there is also a relationship between the number of women who drive and deprivation.

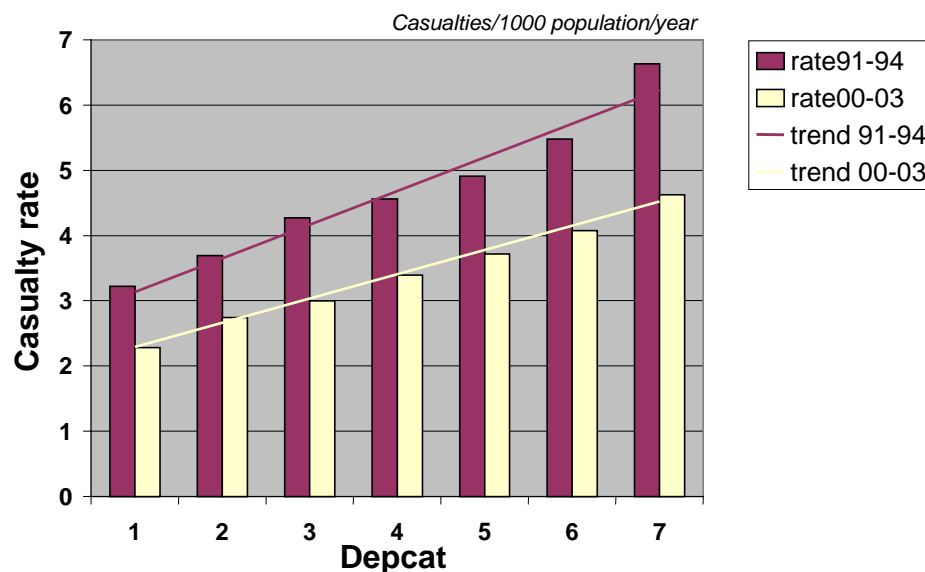
5. SUMMARY OF HEADLINE STATISTICS FOR CHANGES IN CASUALTY RATES 1991-94 and 2000-03

Below are set out some of the headline changes in casualty rate between 1991-94 and 2000-03.

5.1 Changes in all casualty rates

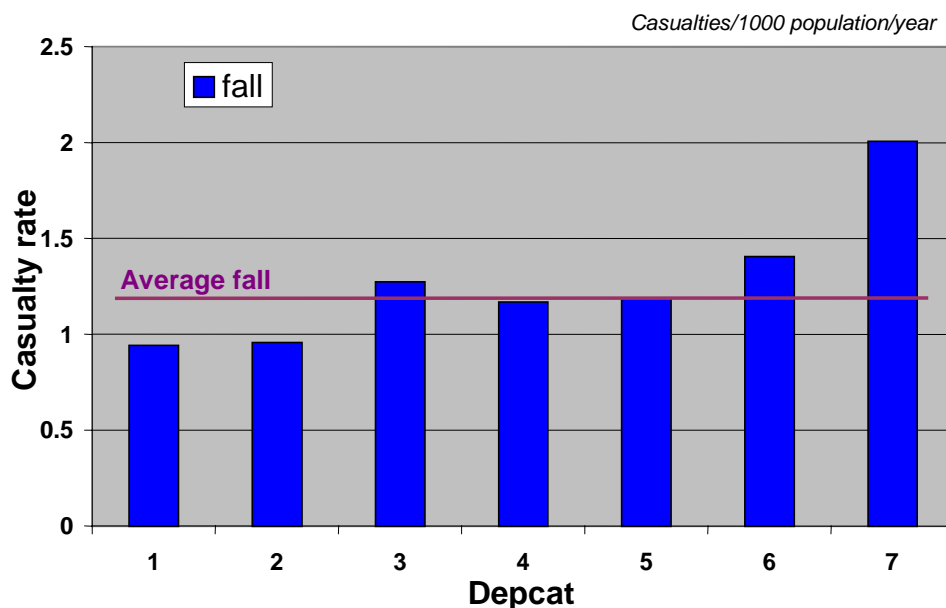
Figure 4 shows the casualty rates for all casualty classes by depcat for the two time periods. They show that the rates in 2000-03 are lower for all depcats than they were in 1991-94. It is interesting to note here that although the rates have fallen the disparity defined by the rate ratio remains almost identical for both periods at 2.1 and 2.0 for 1991-94 and 2000-03 respectively. This is exemplified by the depcat trend lines which are shown in the figure to be approximately parallel (or have similar slopes).

Figure 4: All casualty rates by depcat for 1991-94 and 2000-03



This raises an interesting point in that whilst the rates in terms of casualties per head of population have fallen by a greater absolute amount in the more deprived depcats the overall rate ratio remains the same across all casualties. Figure 5 shows the differences in rates between the two periods. It is evident that the rate has fallen by just under 1 casualty/1000 population/ year for depcat 1 and by just over 2 casualties/1000 population/year

Figure 5: Differences in all casualty rates 1991-94 and 2000-03



5.2 Changes in casualty rates for child pedestrians

If we look at pedestrian casualties for children in the 5-14 year age group the situation is slightly different. Here in Figure 6 it is evident that the slope of the 2000-03 deocat trend line is flatter than the equivalent line for 1991-94. This indicates that the disparity in rates is reducing for this class of casualty. The rate ratios for 1991-94 and 2000-03 are 4.6 and 4.0 respectively.

Figure 6: Pedestrian casualty rates by deocat for age group 5-14 1991-94 and 2000-03

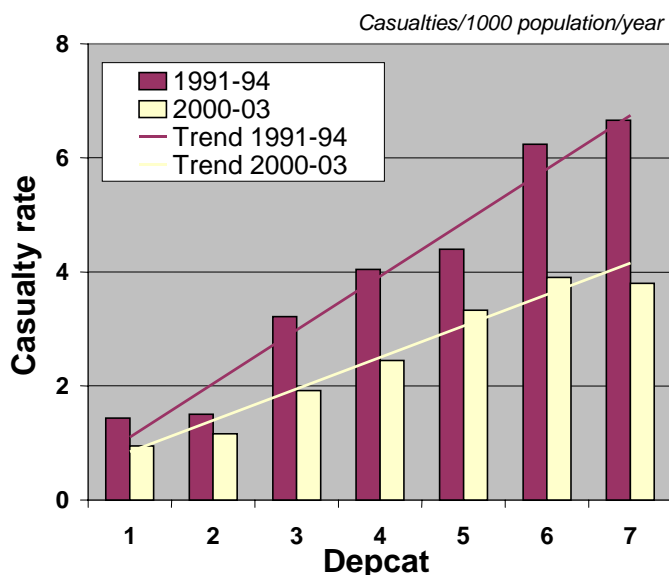
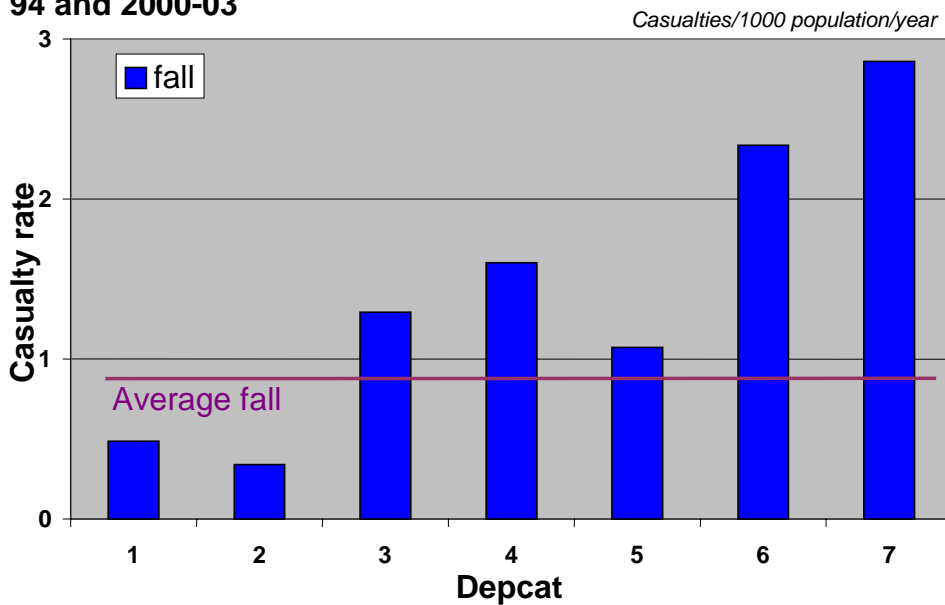


Figure 7 shows the differences in rates where it is evident that the absolute reduction in rates for the more deprived deocats are very much larger than for the more affluent deocats.

Figure 7: Differences in child (aged 5-14) pedestrian rates 1991-94 and 2000-03

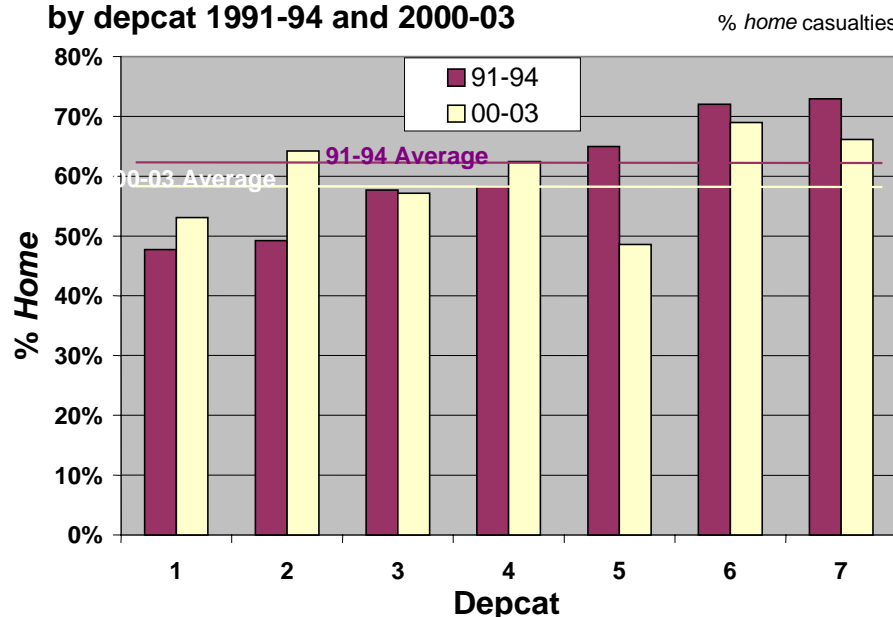


5.3 "Home" and "Away" casualties

With a knowledge of where the accident happened combined with the postcode of the place of residence of the casualty we are able to assign *home* and *away* labels to each casualty. A *home* casualty is a person injured in an accident at a location in the same postcode sector as that person's home address. Conversely, an *away* casualty is a person injured in an accident located outside the postcode sector of the home postcode of that person. In fact, for all casualties, for the 1991-94 period 73% of casualties were injured in accidents outside their *home* zone with an equivalent figure of 76% for the 2000-03 period.

Figure 8 shows the percentage of *home* casualties by depcat for children

Figure 8: Percentage of *home* child casualties (aged 5-14) by depcat 1991-94 and 2000-03



aged 5-14. It is clear that children in the more deprived areas are more likely to be injured in accidents in their *home* zone than children in the more affluent areas. For the 1991-94 data fewer than 50% of the children resident in the most affluent areas were injured in their home zone whereas the equivalent figure for children resident in the most deprived areas exceeded 70%.

5.4 Some conclusions

The preceding analysis at just some of the accident data analysis into Edinburgh's road accident history offers a glimpse into some of the changes in road accident numbers and distribution that are taking place in Edinburgh.

It is clear that casualty rates are very much related to deprivation and that the disparity in absolute terms is large and significant. These disparities differ by a number of factors especially sex and age.

There is a clear overall reduction in casualty numbers and also a reduction in the rates across all deprivation groups. In aggregate, the highest falls in the absolute values of casualty rates are observed for people resident in the most deprived areas. However, the proportionate falls in these rates are seen to be reasonably constant across all areas. There is, however, evidence that for some road user groups – child pedestrians – the rates are falling more steeply for children resident in the deprived areas than they are for those resident in the more affluent areas.

Most casualties are injured outside their *home* zone. However, mixed in with this, the proportion of casualties injured in their *home* zone increases with deprivation. This latter point is also true for *home* zone casualty rates.

Has all this happened by chance? Casualty rates and their distribution by geographical location of the accident and by socio-economic factors relating to the casualty are systematic. Certain people are more exposed to risk and certain locations on the road network are more risky for road users. The who when and where of road accidents are of course governed by a random process based on these and other risks (weather conditions, for example). All these risks can be managed to some extent by interventions and it is these interventions that the road safety community works with on a day-to-day basis.

The next part of this paper reviews some of the work undertaken by the City of Edinburgh Council and demonstrates that the changes in casualty rates and their distribution can be seen to in tune with the council's work.

6. ROAD SAFETY PLANNING IN EDINBURGH

The fall in children accidents and casualties is not only desirable; it is a national objective. Resources whether time or money as always are restricted even for road safety. The City of Edinburgh Council, are its predecessor Lothian Region, has however placed a high priority on road safety improvements and specifically for children. Through this targeted approach

Edinburgh has achieved a downward trend in accidents for children and at an even higher rate in locations where children have traditionally been more at risk. So how has Edinburgh been able to achieve the high levels of reduction in children casualties?

The key to Edinburgh's approach has been to firstly target its focus on people who can make the difference our road safety stakeholders. Secondly to be informed about our casualty and accident statistics, including the use of geographical information systems (GIS). Thirdly integrating this approach through into our Road Safety Plan over a sustained period of time- particularly over the last 10 years has not achieved a quick win but more importantly a sustained win for children and the community.

Casualty trends for all people seriously injured or killed over the past 10 years show a downward trend and one, which is below that of the national targets - this is good news. However when we look at the similar graph for children we observe that this is also sustaining this downward trend, to this more vulnerable group. How has this been achieved?

The earlier part of this paper has shown there is a direct correlation of increasing children casualties with higher levels when compared with an increased value of the deprivation index. Significantly this applies to all categories of casualty from passenger, driver and pedestrian. The Edinburgh road safety team has approached this from a casualty risk analysis perspective and then targeting resources towards this vulnerable group. Importantly the City of Edinburgh Council's road safety team appreciated that there is no one simple solution in targeting children casualty reduction, but rather a broad approach including engineering, enforcement and education the well known 3 E's.

Engineering outcomes include provision of pedestrian crossing, AIP schemes and most recently large expenditure on 20 mph zones in both residential areas and at schools (£5m over the past 3 years). Common to our approach however in establishing priorities has been the inclusion of a parameter for child pedestrian accidents. One good example of this geographically is the prioritisation of 20mph in residential areas which includes areas of high deprivation because it used children casualties as one of the primary factors for assessment. This is a reasonable and justified approach not least because children are three times at greater risk than adults of being involved in an accident in a residential area.

Enforcement also has an important role to play and the setting up of a Lothian and Borders Camera Partnership has played a significant role in the past 3 years. Research in the city of Edinburgh shows that, two years after the introduction of the camera partnership, that drivers are more speed aware. Also that at control site, with no safety cameras, drivers are 50% more likely to drive at or below the speed limit than before the introduction of camera enforcement. A key element of the partnership has been on promoting public relations. Notwithstanding some misinformation circulation in the media the

next effect of better enforcement has resulted in a downward trend in speeds and casualties and arguably not by chance!

Education has been a most recent focus with regard to road safety and one, which I believe is longer-term yet sustainable. This is because it informs and engages children when they are receptive (and parents) about road safety risks. It is the second highest cause of accident to children but above all many of these accidents are avoidable with some training using the risk aware and hence risk adverse approach. One good example of this has been the children traffic club, started by Lothian Region and then adopted nationally by the Scottish Executive because of its effectiveness in getting the message through to young and receptive children and parents.

To create the greatest impact the City of Edinburgh Council started by engaging with our stakeholders in the Council along with our partners in the NHS and the Police. In people terms this include the front line such as crossing guides, junior road safety officers, social workers and the cycle training team. Specifically road safety service delivery to schools by providing assistance to teachers through the new provision of an Education Road Safety officer and over the past 3 years *Kerbcraft*.

The Education RSO provides resources for teacher thus enabling and empowering busy teachers to provide road safety learning, one of the key elements in the 5-14 curriculum. *Kerbcraft's* approach is different as it empowers trained parents to pass on their road safety knowledge to their and other children in the neighbourhood. The limited resources for this programme resulted in it being focused around a group of schools with the historically highest children accident rate, in the north of the city. This correlated directly with the analysis shown use earlier. The impact and commitment of these school-based programmes has been overwhelming. Indeed Granton Primary School received the top *Kerbcraft* award in the UK for their commitment and contribution to *Kerbcraft* and getting the road safety message over to children.

In conclusion, children accident reduction is no accident but one of good analysis, planning and implementation. There is no simple solution to road safety, but more of a wide ranging approach within a well co-ordinated and focused road safety team. The outcome is a more informed and risk aware children and hopefully parents. One of the welcomed out-comes for Edinburgh has been no children fatal accidents over the past three years. This is good news for communities and for stakeholders, such as the NHS who can use their care and healing resources on those involved in unavoidable accidents! Targeting road safety resources engaging a wide team of stakeholders and above all the community is the route to sustainable success. Vision zero, no severe or injury accidents, is our goal and one which will require a long-term effort. The City of Edinburgh has made a good start to this objective over the past 10 years and will in the future continue a sustained and innovative approach to the road safety challenge, particularly for children - our future adults.