Casualty reductions in NSW associated with the 40 km/h school zone initiative

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Abstract

The 40 km/h school zone measure was announced in 2001 and implemented for all NSW schools. The intention of the measure was to improve the safety of children around schools. The development of spatial information systems in conjunction with the RTA crash data system overcame previous limitations in the identification of defined school zones in the crash data, thus a study of the impact of the 40 km/h school zone initiative was able to be undertaken. Geo-coded information from the Regional speed management databases and follow up site visits identified a sample of 820 school zones for the crash data analysis. Crash data within these school zones were analysed for the period prior to the 40 km/h hour school zone measure and the period post the measure. The results were analysed with respect to the underlying reductions in road trauma throughout NSW over this period. The introduction of the 40 km/h school zone measure was found to be associated with a significant reduction in child pedestrian trauma in the identified school zones. The analysis found that the 40 km/h school zone measure also benefited other road users.

Keywords

Analysis, School Children, Pedestrians, Speed Limits, School Zones

Introduction

In 2001 the NSW Minister for Roads, Mr Carl Scully, announced that the Government would implement a 40 km/h speed limit which would apply on all roads with direct school / educational facility access. By the end of 2003 the policy development had been completed and 40 km/h posted speed limits were implemented at more than 3,000 schools and educational facilities across the State.

In March 2009, the Audit Office of NSW announced that it was undertaking an inquiry into the reduction of risk for school aged children associated with the introduction of the 40 km/h school zone measure. The following paper details the findings of the RTA analysis of relevant crash and casualty trends for this Audit Office inquiry (1).

Methods

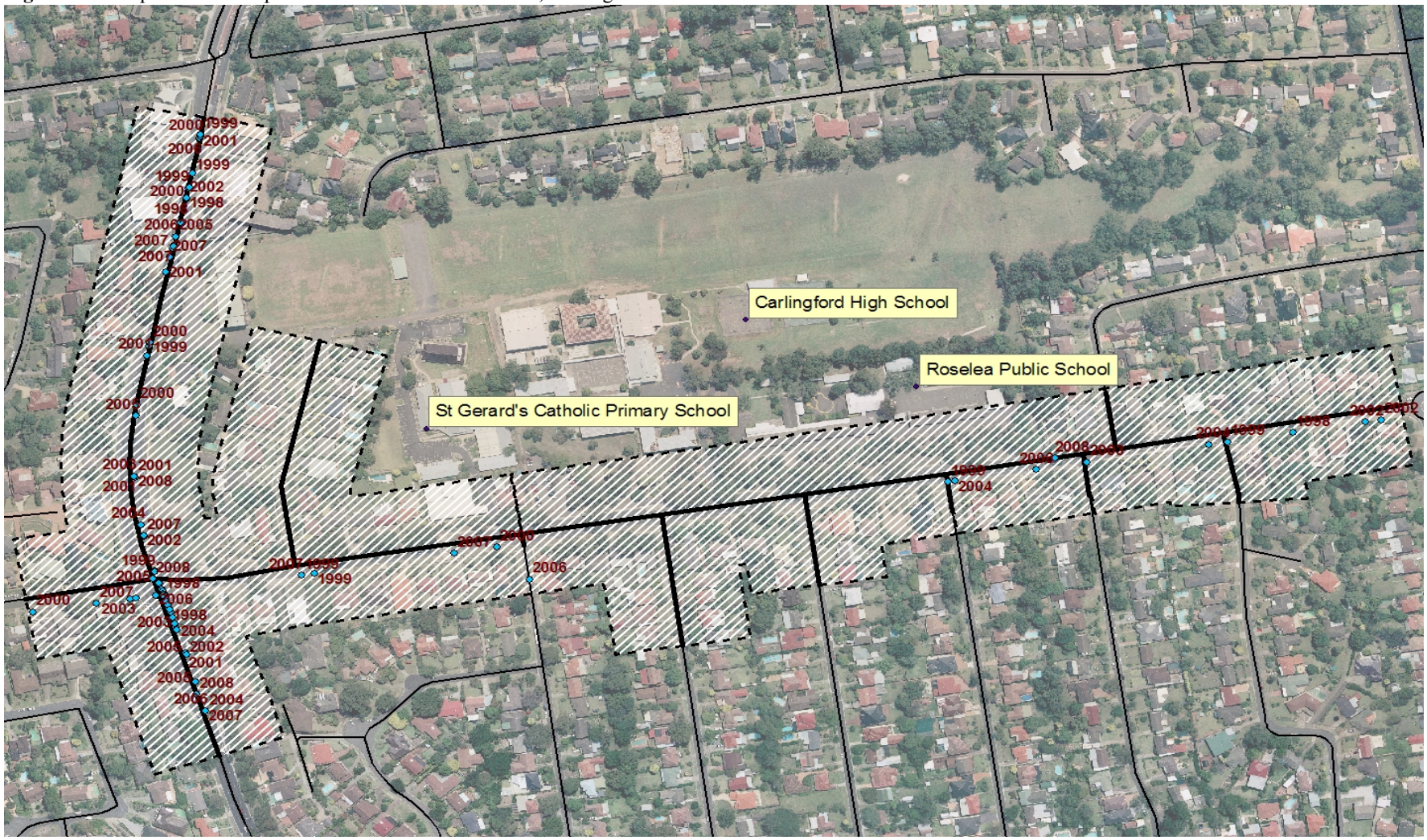
Until 2009 the collation of crash data relevant to the 40 km/h school zone measure was problematic for several reasons. Firstly, the Police reporting of the applicable speed limit for a school zone was generally too unreliable. Secondly, the RTA did not automatically flag defined school zones to match with the crash records in their geocoded crash database.

However, in 2009 the RTA undertook a resource intensive project to spatially identify school zones using available databases, in particular using information derived from separate speed zone spatial information databases. School zones were identified using these regional speed management databases of speed limits, together with information from GIPSICAM for zones located on RTA classified roads. GIPSICAM is a video software program that displays captured images taken every 10 metres on roads in the RTA classified network. Where they were identified, deficiencies in the speed limit database were corrected with site visits.

The spatial information for 40 km/h speed zones were compiled for those RTA regions (South West and Sydney RTA Regions) that were well advanced with the project.

Figure 1 below shows an example of a defined school zone (covering three neighbouring schools) derived from the process, together with plotted crashes recorded in the school zones during 1998 to 2008.

Figure 1: Example of crashes plotted in a defined school zone, Carlingford NSW



However, as this was the first attempt at identifying school zones there were some problems with the initial set of school zone sites. Quality control checking of the data revealed that some school zones included the "school zone 40 k ahead" signs as the start of the zone and not the actual "40 k school zone" sign whilst there were a small number of 40 km/h roadwork zones included. These problems were identified and resolved using software such as GIPSICAM and Google Earth.

At the completion of the process a total of 820 unique school zones were identified in the Sydney and South West RTA regions. This represented approximately 100% coverage of the South West region and the majority of school zones in the Sydney region – approximately one-quarter of all school zones in NSW.

Using these spatially defined school zones the relevant crash data were extracted from the RTA Crashlink database, tabulated and analysed.

Most of the focus of the crash analysis was on child pedestrian casualties aged 5 to 16 years, in school zones during school zone times (SZT). The crash data covers the period 1998 to 2008, with the pre period (1998 to 2000), transition period (2001 to 2003) and the post period (2004 to 2008). Comparisons were made for pedestrian trauma for these periods, particularly for the 5 to 16 year old age group.

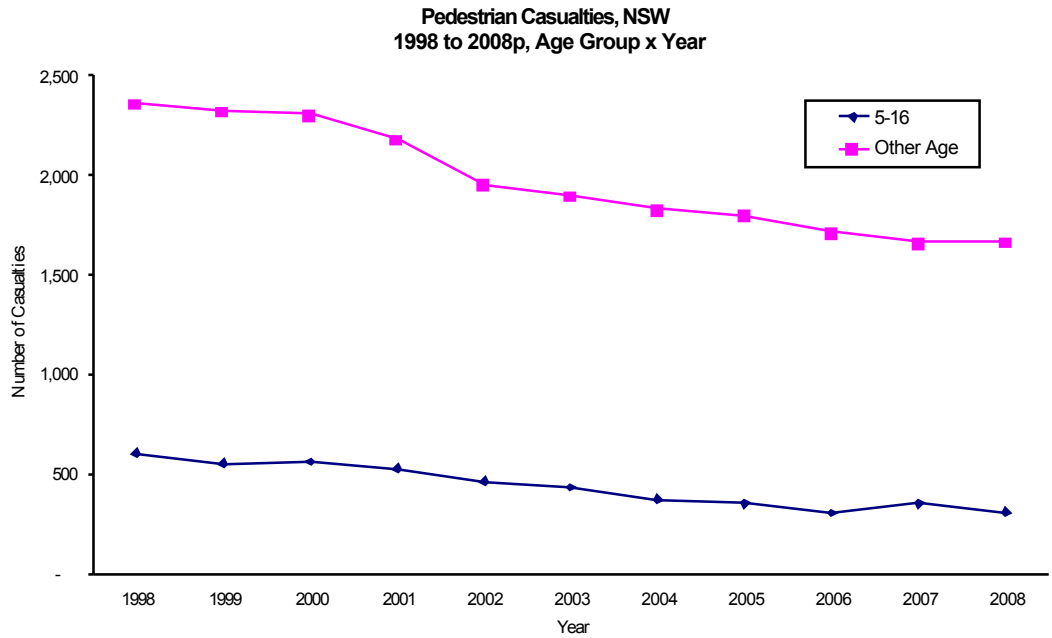
The incidence of speed involvement in crashes in school zones was also investigated, as well as the types of crash occurring in school zones during SZT.

Results

Since reaching a peak of 1,384 fatalities in 1978, NSW has significantly reduced its road toll over the past three decades. In 2008 there were 374 persons killed on NSW roads, the lowest annual total since 1944. This was also the sixth consecutive reduction in the annual road toll, a feat not previously achieved since fatality statistics were first compiled in 1908. Injury reductions have also been impressive – just over 24,000 persons were injured in 2008, the lowest annual total recorded since 1962.

Pedestrians have been one of the major road user classes contributing to the reductions in road trauma in NSW since 1998. Comparing the change from the pre period (1998 to 2000) to the post period (2004 to 2008), total pedestrian casualties in NSW decreased by 29% whilst pedestrian casualties age 5 to 16 years decreased by 41%.

Figure 2:



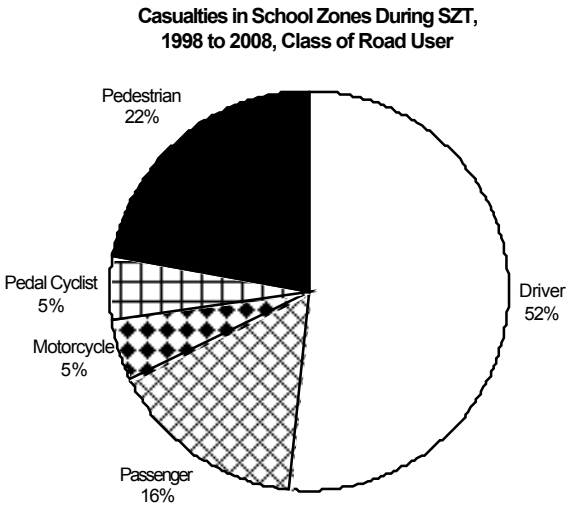
Children aged 5 to 16 years accounted for 17% of all pedestrian casualties over the study period, this percentage being similar to their proportion of the overall NSW population.

The Statewide trends for pedestrian casualties were also experienced in the Sydney and South West RTA Regions – i.e. the RTA Regions from which the sample of school zones were selected. Total pedestrian casualties in these two RTA Regions decreased by 29%, whilst casualties aged 5 to 16 years decreased by 40%.

1) Casualties in Selected School Zones During SZT

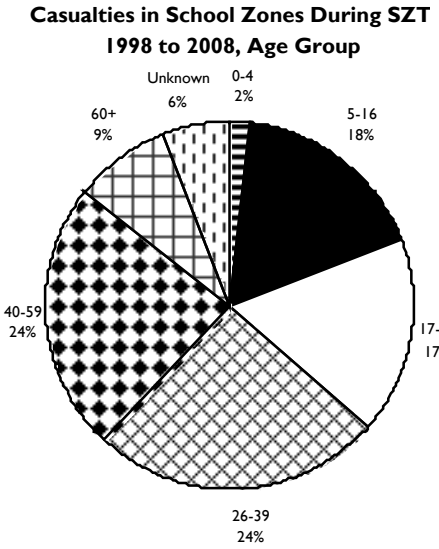
Within the 820 selected school zones, there were a total of 1,594 casualties during SZT over the study period – of which the majority (52%) were drivers. Pedestrians (22%) were the next largest class of road user followed by passengers (16%).

Figure 3:



Of the 1,594 casualties, the 5 to 16 years age group was one of the largest age groups (with 279 casualties, 18% of all casualties), surpassed only by the 26 to 39 years age group (25% of all casualties) and the 40 to 59 years age group (24% of all casualties).

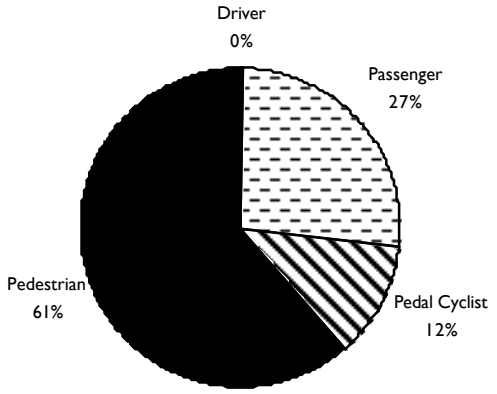
Figure 4:



Of the 279 casualties aged 5 to 16 years occurring in the selected school zones during SZT, pedestrians comprised the majority (171 casualties and 61% of all casualties aged 5 to 16 years) followed by passengers (27%) and pedal cyclists (12%).

Figure 5:

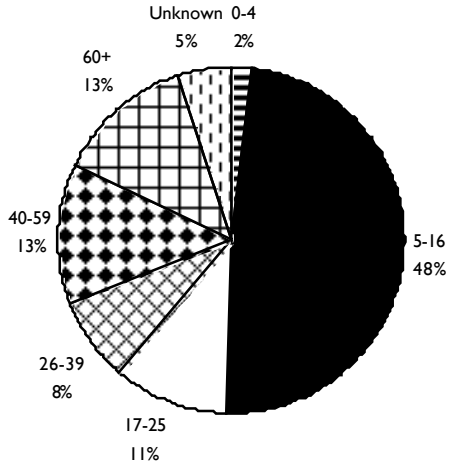
Casualties Aged 5 to 16 Years in School Zones During SZ 1998 to 2008, Class of Road User



Of all pedestrian casualties occurring in selected school zones during SZT (353 casualties), just under half (48%, 171 casualties) were aged 5 to 16 years.

Figure 6:

Pedestrian Casualties in School Zones During SZT, 1998 to 2008, Age Group



Whilst the incidence of pedestrian crashes involving children in school zones during SZT is significant, the actual incidence for an individual school zone is relatively low – less than one in five school zones in

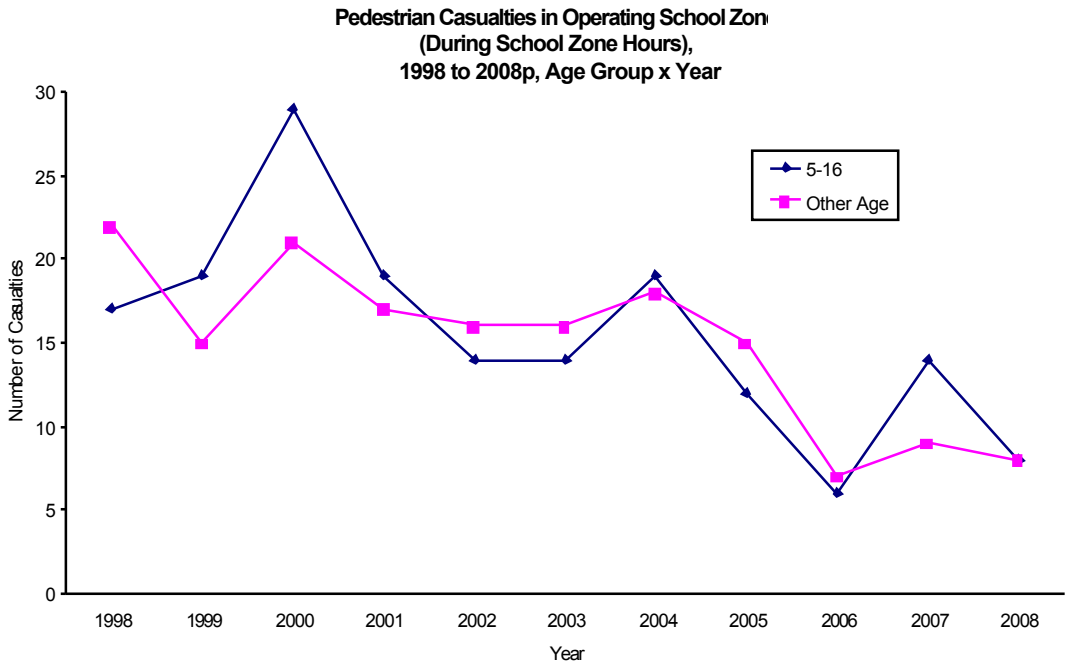
the analysis recorded any pedestrian casualties aged 5 to 16 years during SZT over the entire 11 year study period.

2) Pedestrian Casualties in Selected School Zones

a) During SZT

The data analysis showed that there were impressive reductions in pedestrian casualties, including pedestrians aged 5 to 16 years, since the implementation of school zones.

Figure 7:



Compared with the pre period (1998 to 2000), the average annual pedestrian casualties in the selected school zones decreased by 45% during post period (2004 to 2008). For pedestrians aged 5 to 16 years there was a 46% decrease over the same period. This result suggests that the benefits of school zones (and the lowering of speeds) applied to <u>all</u> pedestrians and not just school aged children.

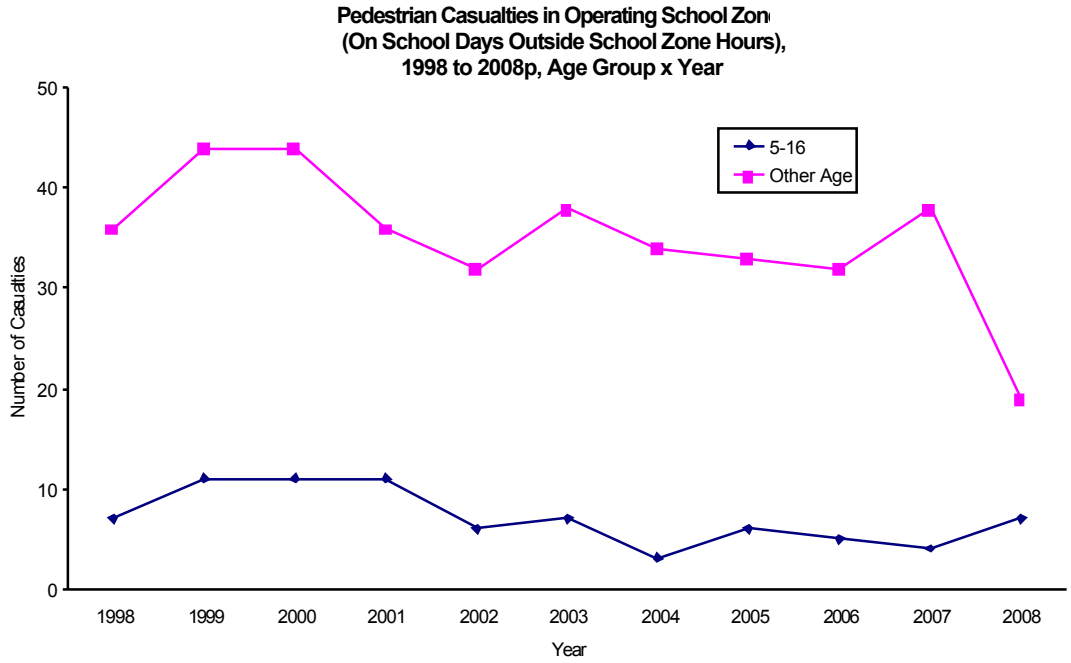
The study also found that this 46% reduction in pedestrian casualties aged 5 to 16 years in school zones during SZT was larger than the reduction in pedestrian casualties aged 5 to 16 years outside the sample school zones during SZT (only 35% reduction).

b) On School Days Outside SZT

As a contrast to the above, data were analysed for pedestrian casualties in the selected zones on school days outside SZT.

Up to 2007, there was a decreasing trend for pedestrian casualties aged 5 to 16 years, whilst pedestrian casualties in other age groups were relatively flat. However, in 2008 pedestrian casualties in the other age group decreased by half (from 38 to 19) whilst pedestrian casualties in the 5 to 16 year age group increased (from 4 to 7). Caution must be exercised with interpreting this result because the single year pedestrian casualty figures are small and subject to large variability.

Figure 8:



Aggregated data for the pre and post school zone periods are somewhat more robust though. These data show that all pedestrian casualties decreased between the pre and post periods by 30% in the selected school zones outside SZT – similar to underlying levels of decrease in all pedestrian casualties in all locations at all times (29%). However, the average annual number of pedestrian casualties aged 5 to 16 years in the selected school zones outside SZT decreased by 48% - slightly above the decrease in pedestrian casualties aged 5 to 16 years in all locations at all times (41%).

3) Trends for Recorded Crashes in Selected School Zones

Like casualties, analysis of the crash data showed that recorded crashes in school zones during SZT decreased by 35%, from the pre period to the post period. Of particular interest were the trends for speed related crashes and "congestion/sudden slowing down" type crashes associated with the 40 km/h school zones.

a) Speed Related Crashes

During the study period (1998 to 2008) speed[(2)] was involved in around 17% of all crashes in NSW, and around 12% in the combined Sydney and South West RTA Regions. In School Zones during SZT speed related crashes are quite rare, involved in around 5% of all crashes, and only 1% of crashes involving a 5 to 16 year old pedestrian (only 2 out of 166 crashes). The number of speed related crashes in school zones during SZT decreased by 20% between the pre and post periods.

b) Congestion / Sudden Slowing Down type crashes

Total crashes decreased by 35% between the pre and post period, with pedestrian (-45%) and vehicle opposing (-47%) crashes improving by the largest degree. Congestion type crashes included crashes involving parking road user movement codes, whilst "sudden slowing down" crashes included rear end type crashes. The analysis of the crash data showed that these types of crashes improved at about the average rate – parking (-37%) and rear end (-35%) crashes.

Discussion

The data suggests that pedestrian casualties amongst the 5 to 16 year old age group have decreased in school zones at a greater rate than at other locations. This would appear to hold true during both SZT and

non SZT. However, during SZT they make up nearly half of all pedestrian casualties. Interestingly, other age groups have experienced large casualty decreases in the school zones during SZT, but not so much outside SZT.

Compared with the whole of the State, speed related crashes in school zones during SZT were relatively uncommon, but improved over the study period. Contrary to popular misconceptions, crashes associated with sudden slowing of vehicles and congestion did not increase but actually decreased from the pre to the post periods.

However, there are a couple of confounding factors with this study of the introduction of the 40 km/h school zones. In recent years, fixed digital speed cameras have been extended and have now been installed in a handful of school zones involved in the study (commencing late 2002). Furthermore, there has been a progressive rollout of flashing lights installed next to the 40 km/h school zone signage (from late 2006). These extra measures may have influenced casualty outcomes for the sample school zones in the later years of the study.

In conclusion, pedestrian casualties, including those aged 5 to 16 years, have been the major beneficiaries as a result of the introduction of school zones with the 40 km/h speed limit applying to school zone times. School aged pedestrian casualties also demonstrated significant reductions in school zones outside SZT, suggesting that the signage of school zones also contributed to a safer road environment at all times of the school day for this vulnerable road user group. Though relatively uncommon in school zones, speed related crashes also decreased during the post implementation period. Finally, the hypothesised increase in congestion / slowing down type crashes associated with the school zone arrangements did not eventuate – crashes of this type actually decreased in line with the reductions for all crash types.

It is hoped that further work on the project to identify all 40 km/h school zones across NSW will allow a more complete analysis of the trends in pedestrian casualties and other crashes associated with the 40 km/h school zone measure.

References

1) AUDITOR-GENERAL'S REPORT PERFORMANCE AUDIT
   Improving Road Safety: School Zones
   www.audit.nsw.gov.au/publications/reports/performance/2010/school_zones/school_zones.pdf
2) ROAD TRAFFIC CRASHES IN NEW SOUTH WALES
   Statistical Statement for the year ended 31 December 2008
   Criteria for determining speed involvement, p14
   www.rta.nsw.gov.au/roadsafety/downloads/accidentstats2008.pdf