Contributed articles

Road Safety Policy & Practice

The Age of Light Vehicles Involved in Road Fatalities

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Key Findings

- Older light vehicles were over-represented in occupant fatality crashes over the period 2012 to 2016 in both Australia and New Zealand.
- The average age of light vehicles involved in occupant fatality crashes was found to be consistently above the average age of the registered vehicle fleet in Australia and the licensed vehicle fleet in New Zealand.
- Over the period analysed, the average age of the Australian registered vehicle fleet remained relatively consistent, however the average age of vehicles involved in occupant fatality crashes increased.

Abstract

Following a period of steady decline in national road tolls, recent consecutive increases in annual road fatalities in both Australia and New Zealand have caused community concern, with policy makers and road safety organisations working to ascertain reasons for this trend reversal. The Australasian New Car Assessment Program (ANCAP) sought to build a greater understanding of road crashes and potential causes for the recent trend reversal and began monitoring the age of light vehicles involved in road crashes where an occupant was fatally injured. The study used Australian and New Zealand crash data identifying the age of vehicles involved in road fatalities and compared the age distribution amongst those vehicles with the age distribution of vehicles in the registered / licensed vehicle fleets. The results found that older vehicles were consistently over-represented in occupant fatalities over the period 2012 to 2016 and that it is possible the average age of vehicles involved in occupant fatality crashes may be increasing.

Keywords

Vehicle age, occupant fatalities, light vehicles.

Introduction

Following a period of steady decline in national road tolls, recent consecutive increases in annual road fatalities in both Australia and New Zealand have caused community concern, with policy makers and road safety organisations working to ascertain reasons for this trend reversal.

The Australasian New Car Assessment Program (ANCAP) provides consumers with transparent advice and information on the level of occupant and pedestrian protection provided by different vehicle models in the most common types of crashes, as well as their ability - through technology - to avoid a crash. The program influences the design of new vehicles, encouraging vehicle manufacturers to offer a level of safety above that required by regulation and to continue to increase safety performance as technology develops.

It is well established that newer vehicles generally offer higher levels of safety when compared to older vehicles, due to technology developments and the inclusion of specific safety features, with studies based on real-world data supporting this (Hutchinson & Anderson, 2011; Newstead, Watson & Cameron, 2011). Statistical studies of real world crashes often report on factors such as driver age, crash type and posted speed limit, however the involvement of vehicle age in fatal crashes is less understood.

In an effort to build a greater understanding of the age of vehicles involved in crashes occurring in Australia and New Zealand, ANCAP began monitoring the age of light passenger and sports utility vehicles involved in fatal crashes, with the findings used to inform road safety policies and community education and advocacy activities. This paper sets out the findings over the analysed five-year period from 2012 to 2016.

Methods

Vehicle occupants represent the largest road user group in road fatalities each year, accounting for 66% of Australian road fatalities over the period 2012-2016 and 71% in New Zealand (Bureau of Infrastructure, Transport, and Regional Economics, 2018; New Zealand Ministry of Transport, 2017). Specifically, occupants of light passenger vehicles and sports utility vehicles (SUVs) represented approximately 49% and 56% of road fatalities in Australia and New Zealand respectively, while these vehicle types represented 75% and 78 % of the respective vehicle fleets (Australian Bureau of Statistics, 2017; New Zealand Ministry of Transport, 2018).

The study focusses on road fatalities where an occupant of a passenger car or SUV was fatally injured and compares the age distribution of those vehicles involved against the age distribution of the passenger car and SUV fleet. Other road user groups and vehicle types have not been included in the study. Australia and New Zealand have been analysed separately due to fleet profile differences and to provide information specific to each country.

To perform the analyses, two key datasets are required:

1. Road fatality data identifying the fatality type, vehicle type and year of manufacture; and
2. Fleet data identifying the type and age of vehicles within the registered (AUS) / licensed (NZ) fleet.

Focussing on occupant fatalities occurring in light passenger vehicles and SUVs resulted in datasets ranging from 500 to 700 fatalities each year in Australia and 120 to180 fatalities in New Zealand. Organising this data by vehicle year of manufacture into groups matching the information

reported by the fleet statistical data allowed age comparisons to be made between vehicles involved in occupant fatalities and vehicles within the respective fleets.

The period between 2012 and 2016 represented the most recent five-year period for which detailed crash data was available for both Australia and New Zealand. This period formed the basis for the study.

Data Sources

Australian fleet information was sourced from the *Motor Vehicle Census, Australia* reports published by the Australian Bureau of Statistics (ABS), while New Zealand fleet information was sourced from the *New Zealand Vehicle Fleet Status* reports published by the New Zealand Ministry of Transport.

For Australia, Motor Vehicle Census reports are based on the fleet at 31 January of the report year. For the purpose of this study, fleet information at 31 January is considered a good representation of the fleet at the end of the previous year.

Vehicle age amongst the Australian passenger car and SUV fleet is reported in four groups based on year of manufacture. Three of these groups span five years each while the remaining group includes vehicles that are fifteen years or older. These groups roll over based on the year in which the motor vehicle census is conducted.

For New Zealand, the fleet status data are reported at 31 December of the report year. Vehicle year of manufacture is generally reported in six groups, each spanning 10 years, however these groups do not rollover and remain consistent each year. As a result, the newest group identifying vehicles built between '2010-current' continues to grow significantly with each status report as more new vehicles are added to the fleet.

Australian road fatality data identifying the fatality type, vehicle type and year of manufacture was sourced from the Bureau of Infrastructure, Transport and Regional Economics (BITRE) National Crash Database. Corresponding New Zealand data has been provided by the New Zealand Ministry of Transport and the New Zealand Transport Agency.

Results

Tables 1 and 2 show the age distribution amongst passenger vehicles and SUVs involved in occupant fatalities over the period 2012 to 2016. Vehicle age shown is based on the vehicle age in the year in which the crash occurred. Occupant fatalities where the vehicle year of manufacture is unknown represent 11% of the Australian dataset and less than 1% of the New Zealand dataset.

Vehicles aged 24 years or less were involved in the majority of occupant fatalities, with older vehicles, particularly those aged 30 years or older, involved in relatively few occupant fatalities. The average age of light passenger vehicles involved in occupant fatalities during the five-year period was found to be 12.7 years in Australia and 16.1 years in New Zealand.

The results comparing the age of vehicles involved in occupant fatalities and the age of vehicles within the fleet are shown separately for each year in Australia and New Zealand in Figures 1 and 2 below.

The results found that in Australia during 2016, vehicles built in 2012 or later represented the largest portion of registered vehicles at 31%, and were involved in the fewest occupant fatalities at 12%. Vehicles built between 2007 and 2011 represented 27% of registered vehicles and were involved in 13% of occupant fatalities. Vehicles built between 2002 and 2006 represented 22% of registered vehicles and were involved in 21% of occupant fatalities. The oldest group, those built in 2001 or earlier, represented the smallest portion of registered vehicles at 20% and held the largest share of occupant fatalities at 36%.

On average over the five-year period analysed, the newest vehicles aged up to four years in the year in which the crash occurred represented 31% of registered vehicles in Australia and were involved in 12% of occupant fatalities. The oldest age group, those vehicles aged 15 years or older, represented 20% of registered vehicles on average and were involved in 34% of occupant fatalities.

Table 1. Occupant fatalities by vehicle age at the time of crash (2012 to 2016)

Vehicle age (years)	Occupant fatalities in Australia	Percentage	Occupant fatalities in New Zealand	Percentage
0-4	361	12%	42	6%
5-9	554	18%	79	10%
10-14	745	25%	162	22%
15-19	638	21%	259	34%
20-24	297	10%	155	21%
25-29	62	2%	44	6%
30-34	25	1%	3	0%
35-39	4	0%	3	0%
40-44	3	0%	0	0%
45-49	5	0%	2	0%
50-54	1	0%	0	0%
55-59	1	0%	0	0%
60-64	2	0%	0	0%
65-69	0	0%	0	0%
70-74	0	0%	0	0%
75-79	0	0%	2	0%
80-84	1	0%	1	0%
Unknown	334	11%	1	0%
Total	3033	100%	753	100%

Table 2. Occupant fatality data key statistics (2012 to 2016)

	Average age (years)	Mode	Minimum age (years)	Maximum age (years)
Australia	12.7	14	0	83
New Zealand	16.1	18	0	83

For New Zealand in 2016, the results found that the newest vehicles built in 2010 or later represented 22% of licensed vehicles and were involved in 6% of occupant fatalities. Vehicles built between 2000 and 2009 represented 50% of licensed vehicles and were involved in 44% of occupant fatalities. Vehicles built from 1990 to 1999 represented 25% of licensed vehicles and were involved 45% of fatalities. Vehicles built prior to 1990 collectively represented 3% of licensed vehicles and were involved in 5% of occupant fatalities.

The New Zealand analysis shows relative consistency over the five-year period for vehicles built between 1990 and 2009. On average over the period, vehicles built between 1990 and 1999 represented 35% of licensed vehicles and were involved in 56% of occupant fatalities, while vehicles built between 2000 and 2009 represented 47% of licensed vehicles and were involved in 33% of occupant fatalities.

The differing age groupings reported by Australia and New Zealand, due to the reporting methods of the respective fleet statistics, make comparisons between the two datasets difficult. However, limited statistical datasets of the New Zealand fleet were available (New Zealand Ministry of Transport, 2018) allowing for some comparison to be made between the results. Figure 3 shows the age of vehicles involved in occupant fatalities in New Zealand during 2016 grouped into common age groups with the corresponding Australian results.

Figure 3 shows that in New Zealand during 2016, the oldest vehicles, built in 2001 or earlier, represented 40% of licensed vehicles and were involved in 60% of occupant fatalities. In constrast, the newest vehicles built in 2012 or later represented 15% of licensed vehicles and were involved in 5% of occupant fatalities.

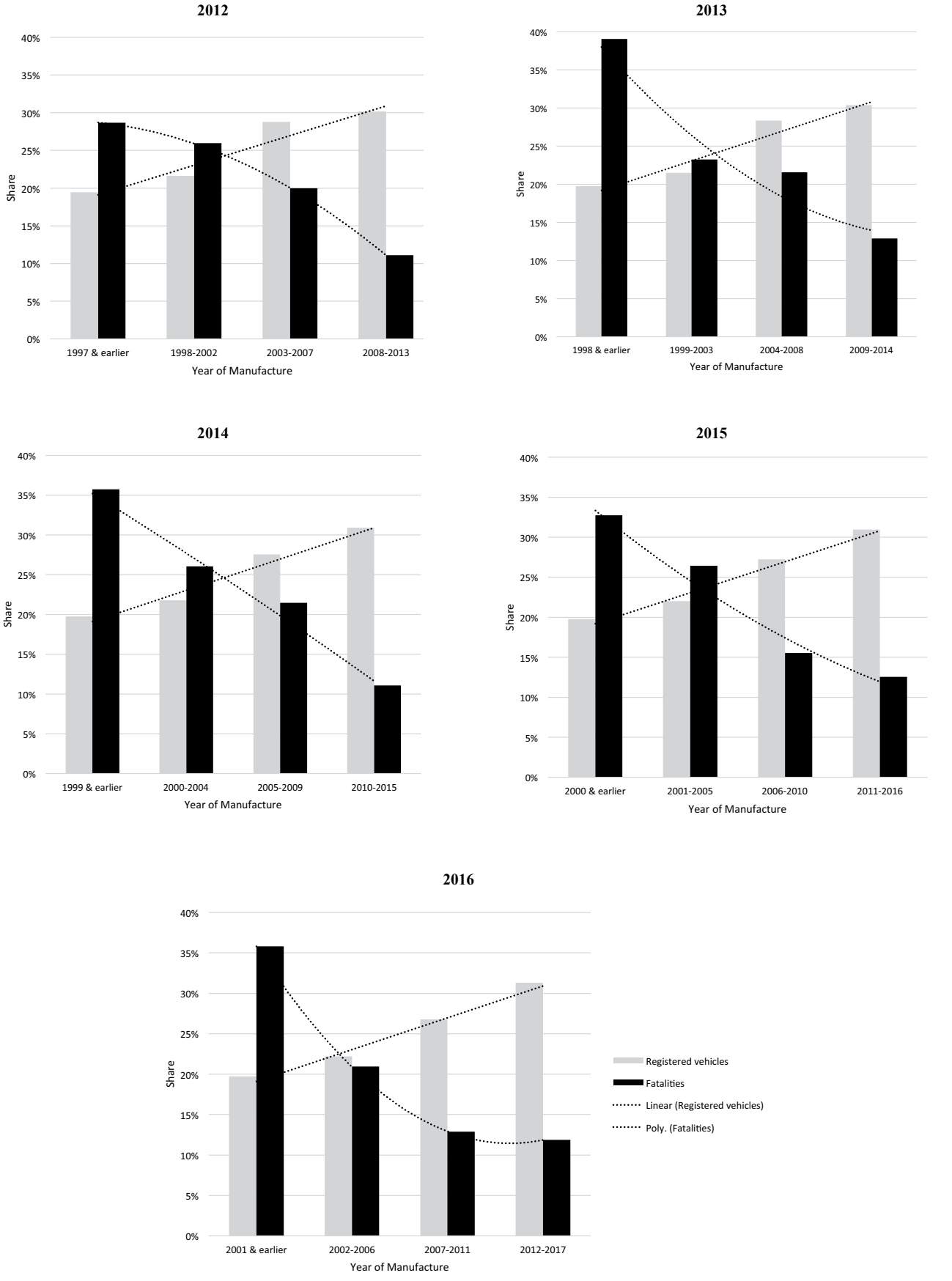

Figure 1. Age of vehicles involved in occupant fatalities vs age of registered vehicles (light passenger vehicles and SUVs) in Australia.

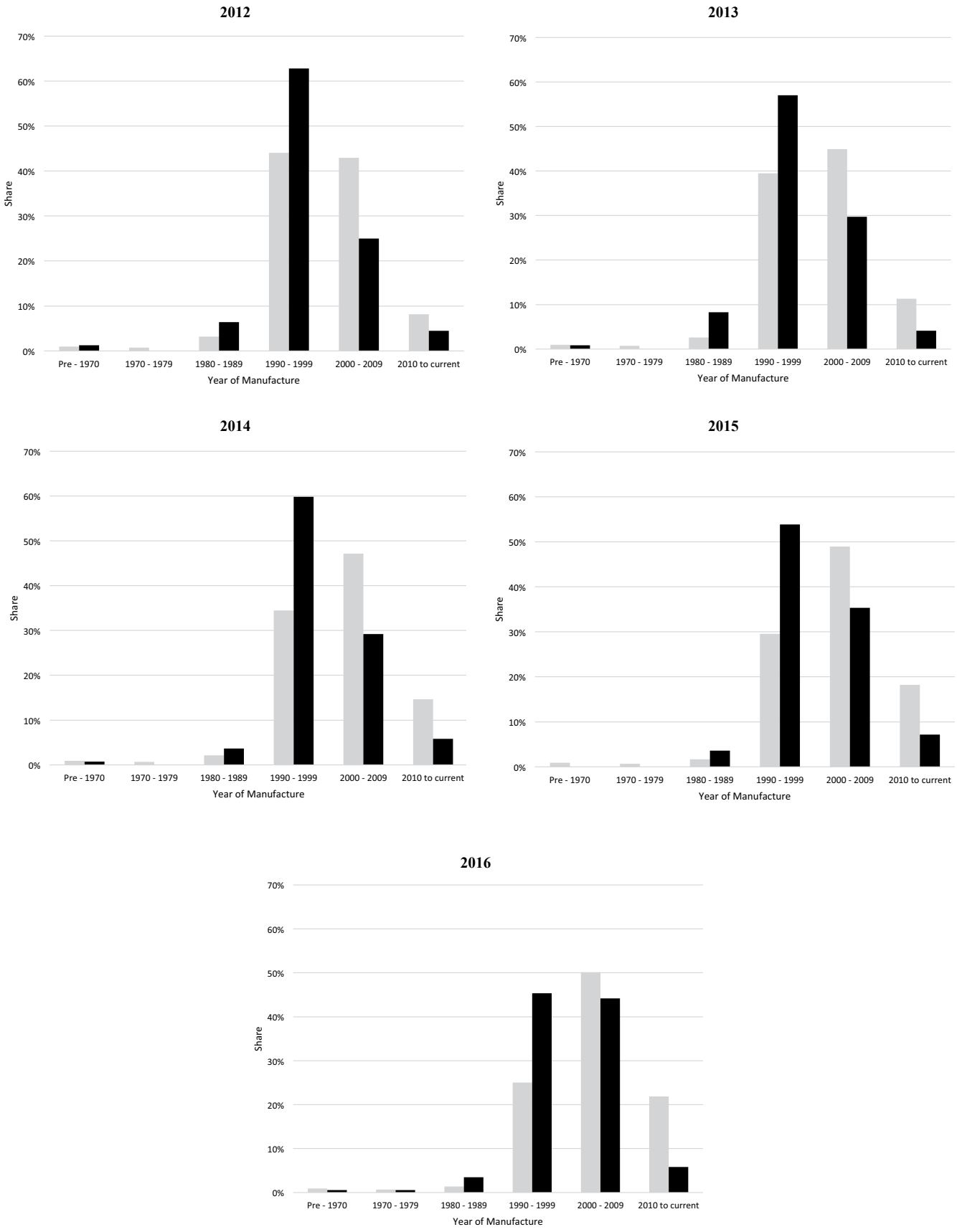

Figure 2. Age of vehicles involved in occupant fatalities vs age of licensed vehicles (light passenger vehicles and SUVs) in New Zealand.

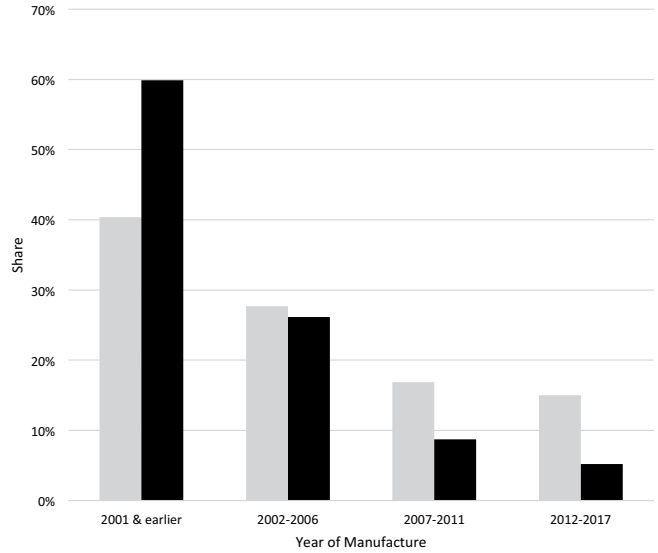

Figure 3. Age of vehicles involved in occupant fatalities vs age of licensed vehicles (passenger vehicles and SUVs) in New Zealand (2016).

Discussion

The results of the analysis show that older vehicles are consistently over-represented in occupant fatalities in both Australia and New Zealand over the period 2012 to 2016. Australian Motor Vehicle Census data consistently shows a relatively linear relationship between vehicle age and the share of the registered vehicle fleet over the five-year period, with fleet share decreasing with vehicle age. In contrast, the results suggest the relationship between vehicle age and involvement in occupant fatalities was the reverse, with crash involvement increasing with vehicle age. This relationship however is limited, as shown in Table 1, where vehicles aged 25 years and older were involved in few occupant fatality crashes.

Over the five-year period, the Australian results consistently showed that the oldest group of vehicles reported in the Motor Vehicle Census data represented the smallest portion of registered vehicles, yet were involved in the most occupant fatalities. Contrast to this, the newest vehicles represented the largest portion of registered vehicles and were involved in the smallest portion of occupant fatalities.

The New Zealand results comparing the age distribution of vehicles involved in occupant fatalities and that of licensed vehicles presents differently due to the vehicle age groups provided in the New Zealand Fleet Statistics Reports. Vehicles built between 1990 and 1999 were consistently over-represented in occupant fatalities while vehicles built between 2000 and 2009 were consistently shown to be involved in less fatalities yet represented more of the licensed fleet. The portion of registered vehicles built in 2010 or later increased over time as expected, however the involvement in occupant fatalities for those vehicles remained relatively constant.

In comparing the vehicle age distribution between the Australian and New Zealand results, Figure 3 suggests a differing relationship between vehicle age and the distribution of licensed vehicles, with newer vehicles representing less of the fleet than older vehicles. However, the relationship between vehicle age and involvement in occupant fatalities does appear similar, increasing with age.

The observed difference between the Australian and New Zealand distribution of vehicle age amongst the fleet reflects the significant differences in the New Zealand fleet makeup, with used imports representing roughly 50% of the passenger vehicle and SUV fleet (New Zealand Ministry of Transport, 2017).

The average age of vehicles involved in occupant fatalities was shown to be consistently older than the average age of vehicles in the passenger vehicle and SUV fleet for both Australia and New Zealand, supporting the notion that older vehicles are over-represented in occupant fatality crashes.

In reviewing the average age results for each year over the five-year period, the results suggest a potential trend where the average age of vehicles involved in occupant fatalities is increasing. It is plausible that as newer vehicles become safer and therefore involved in fewer serious crashes, the share of serious crashes in which older vehicles are involved may increase. This does, however, imply that overall road fatality numbers will reduce. Further work is needed to establish whether a trend indeed exists or is emerging.

Table 3. Average age of vehicles involved in occupant fatalities.

	2012	2013	2014	2015	2016	2012-2016
Australia						
Fatalities	12.2 years	12.8 years	12.5 years	12.9 years	13.1 years	12.7 years
Registered vehicles	9.8 years	9.8 years	9.8 years	9.8 years	9.8 years	9.8 years
New Zealand						
Fatalities	15.7 years	16.4 years	15.6 years	15.9 years	16.8 years	16.1 years
Licensed vehicles	14.0 years	14.2 years	14.2 years	14.3 years	14.4 years	14.2 years

Limitations

A key limitation to the findings is that the study does not investigate crash causation and factors contributing to the involvement of vehicles of various ages in fatal crashes. Driver demographics are considered a significant factor contributing to older vehicle involvement in serious crashes with many older vehicles involved in crashes being driven by more at-risk drivers, such as the young and inexperienced, and the elderly and frail (Transport for New South Wales, 2017).

The size of the dataset and statistical significance of the results, particularly New Zealand, also presents a limitation.

Conclusions

Investigating the involvement of vehicle age in fatal crashes and comparing the age distribution to that of the registered / licensed fleet, found that older vehicles aged between 15 and 25 years old

were consistently over-represented in road fatalities in which the occupant of a passenger vehicle or SUV was fatally injured over the period 2012 to 2016. Significantly older vehicles aged 30 years or more were not found to be significantly involved in occupant fatality crashes.

The average age of vehicles involved in occupant fatality crashes each year over the five-year period suggests a potential trend towards an increasing over-representation of older vehicles involved in occupant fatalities, which may be influenced by a reduced rate of fatality crashes involving newer vehicles.

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