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# Single point of truth on older drivers- Background paper for AA Research Foundation

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# 1 Introduction

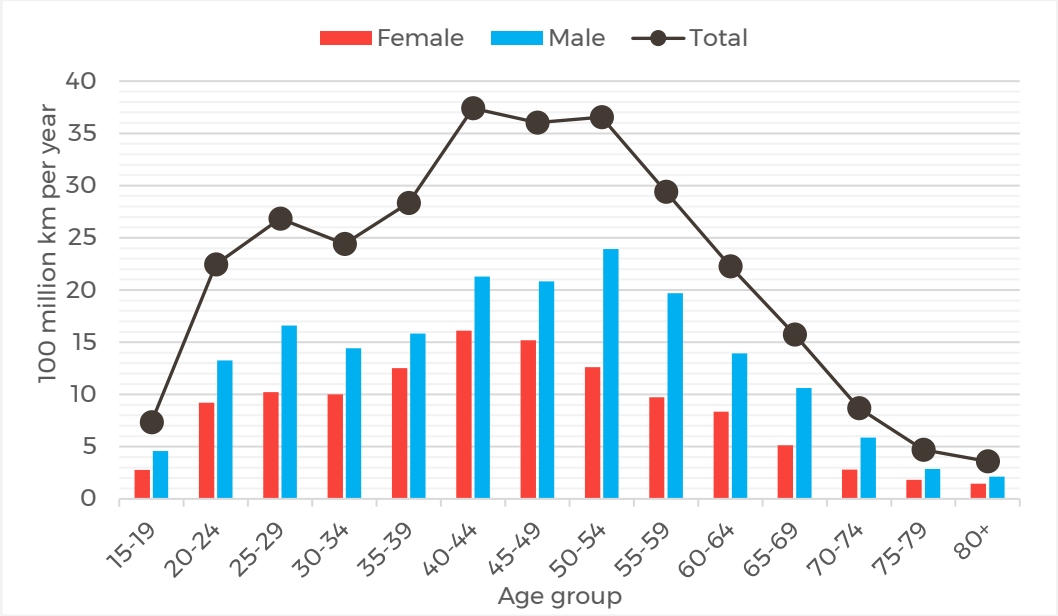
Older drivers are generally a safe group and successfully pace themselves in a variety of ways to maintain that safety. This pacing is often an unconscious response to physical and mental changes so older road users will not always feel they are "self-regulating" if asked. Thus, some studies of "self-regulation" may be subject to underestimation bias. The self-pacing of older people is best measured by their changing travel patterns as shown in travel survey information.

The total size of the crash problem for 80+ drivers is relatively small[1]. Over the 5 years July 2014–June 2019 in New Zealand, based on police reports, there were 517 fatal or serious crashes involving an 80+ driver compared with a total of 16,963 fatal or serious crashes where the age of the driver was known. This equates to just over 3% of all fatal and serious crashes where the driver's age was known. Of these 314 80+ drivers were judged culpable. This equates to 1.85% of the total.

# 2 Distance driven by age and gender

This is derived from New Zealand's National Travel Survey using data collected from July 2010 to June 2014. Figure 1 indicates that males drive more than females over all age groups and that total age group driving peaks in the 50–54 age group and then declines. Total kilometres driven by drivers over 70 being only a small percentage compared with the middle-aged peak. Female driving tends to reduce earlier than male driving, with female driving peaking in the 40–44 age group.

*Figure 1: Total annual distance driven per driver by age group and gender*




## 2.1 Infographics insight

- Males drive a lot more than females at all ages and particularly so after age 65
- Total driving drops off steeply from age 54 in males and age 44 in females
- Indicates that drivers self-pace

[1] This age group has been selected because it is usually associated with the onset of more substantial medical and driving difficulties.

Myth to bust: Older drivers do not self-pace

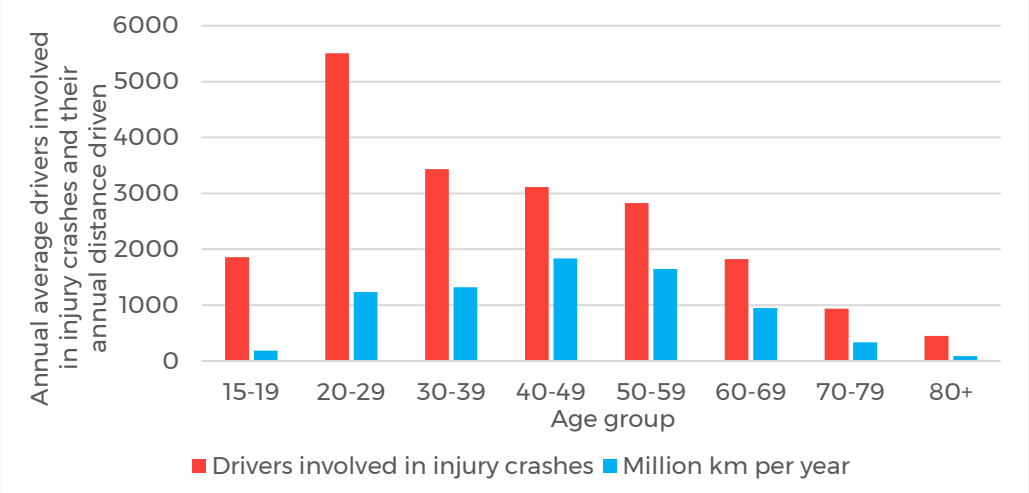
*False, they do self-pace*

# 3 Driver crash involvement

## 3.1 Driver crash involvement by age-group

Generally older drivers are among the safest age groups of drivers, in terms of both absolute crash numbers and various crash rates. Figure 2 shows the numbers of light 4-wheeled vehicle drivers in fatal and injury crashes by age and their distance driven by age. The numbers are annual averages over the years July 2010–June 2014. It shows that in absolute terms, older drivers have the lowest casualty crash involvement of all age-groups.

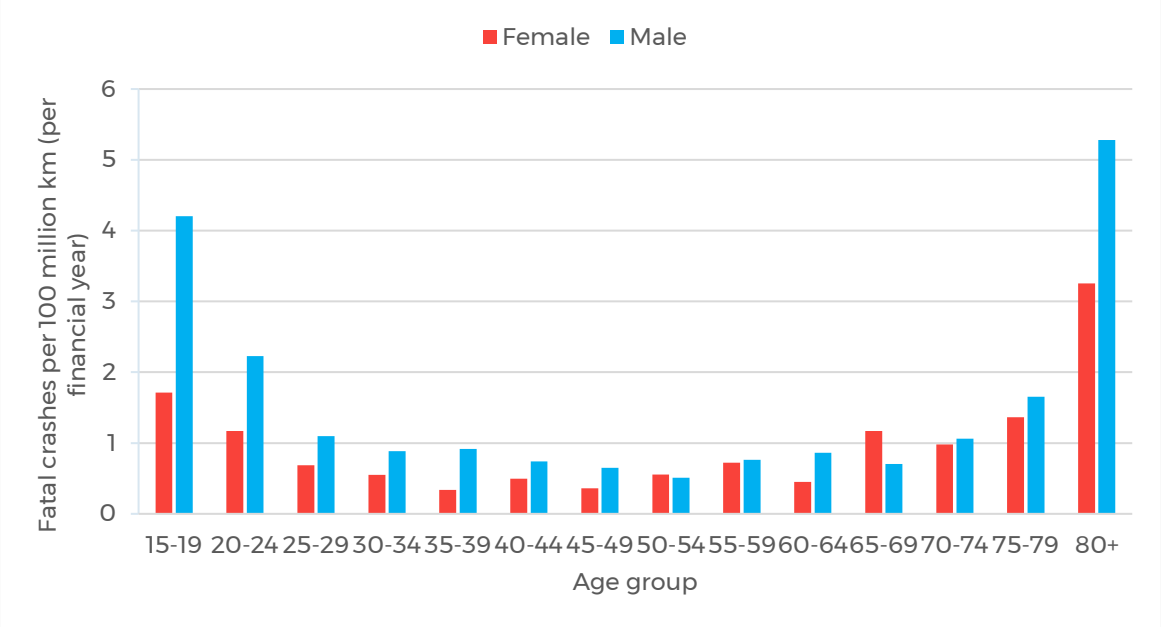
*Figure 2: Drivers of light 4-wheeled vehicles involved in fatal and injury crashes and distance driven — annual average, financial years July 2010–June 2014*




## 3.2 Driver crash involvement rates by distance driven and time driven

The reduction in driving with age shown in Figure 1 combined with an increase with age of driver fragility results in greater reported injury and fatal crash involvement per distance driven in the older age group relative to younger groups. This results in the U-shaped curve for fatal crash involvement by distance driven shown in Figure 3.

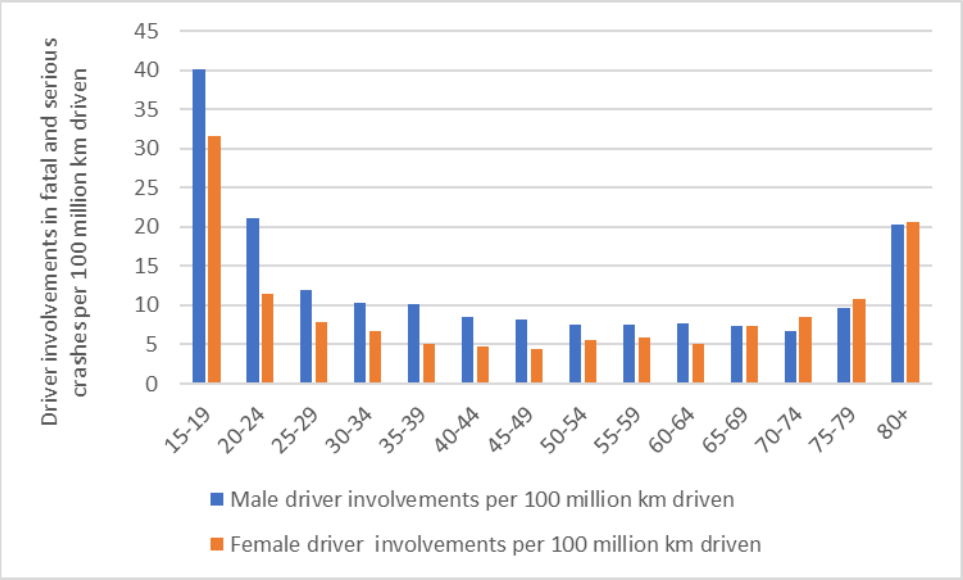
*Figure 3: Light 4-wheeled vehicle drivers involved in fatal crashes per 100 million km driven by age and gender — annual average, financial years July 2010–June 2014*




The higher rates among older drivers here do not necessarily mean they are driving dangerously: Fragility, resulting in a greater tendency to die or be injured in a crash means that their crashes are more likely to be reported than those of younger people (whose injuries tend to be slighter). This fragility will be dealt with in section 4.

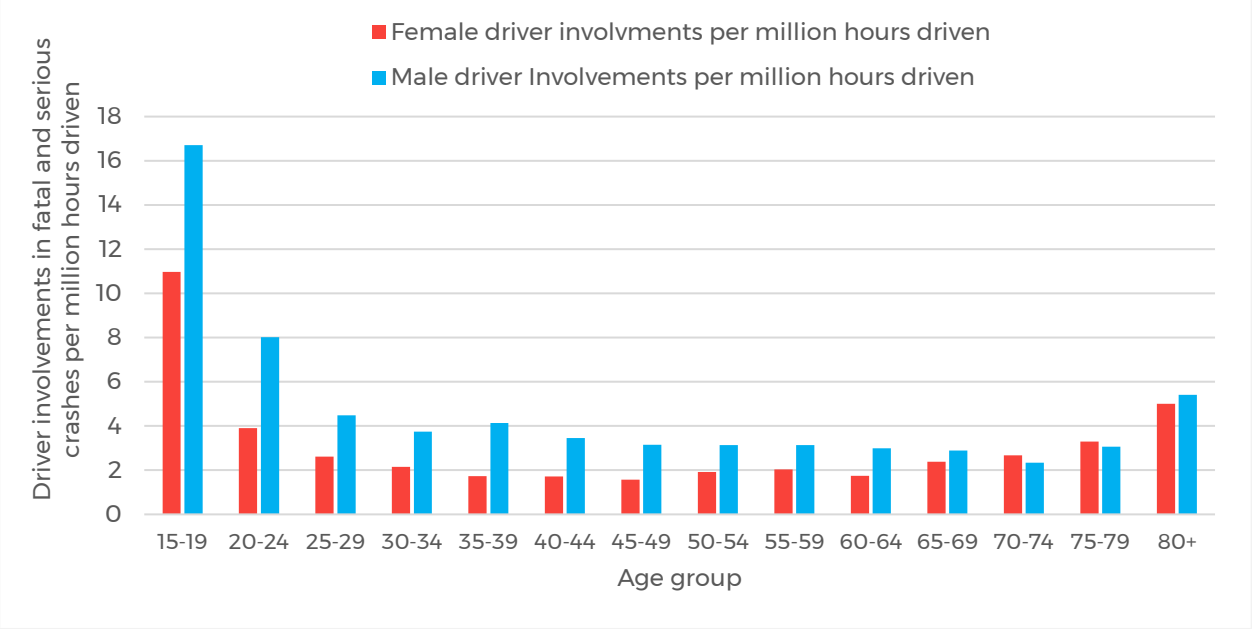
Figure 4 looks at drivers' fatal or serious crash involvements per kilometre driven.

*Figure 4: Driver involvement in fatal or serious crashes per 100 million light vehicle km driven by age and gender*




It is noticeable in this case that male drivers still dominate involvements overall, but this is less apparent in the 65+ age groups, and that the strikingly high rates for the 80+ in the fatality involvements are not present. Another rate of interest is that by time driven Figure 5.

*Figure 5: Driver involvement in fatal or serious crashes per million light vehicle hours driven by age and gender*




Again, a broadly similar pattern applies but the increase at the older end of the spectrum is more muted.

## 3.3 Driver crash involvement per licence holder

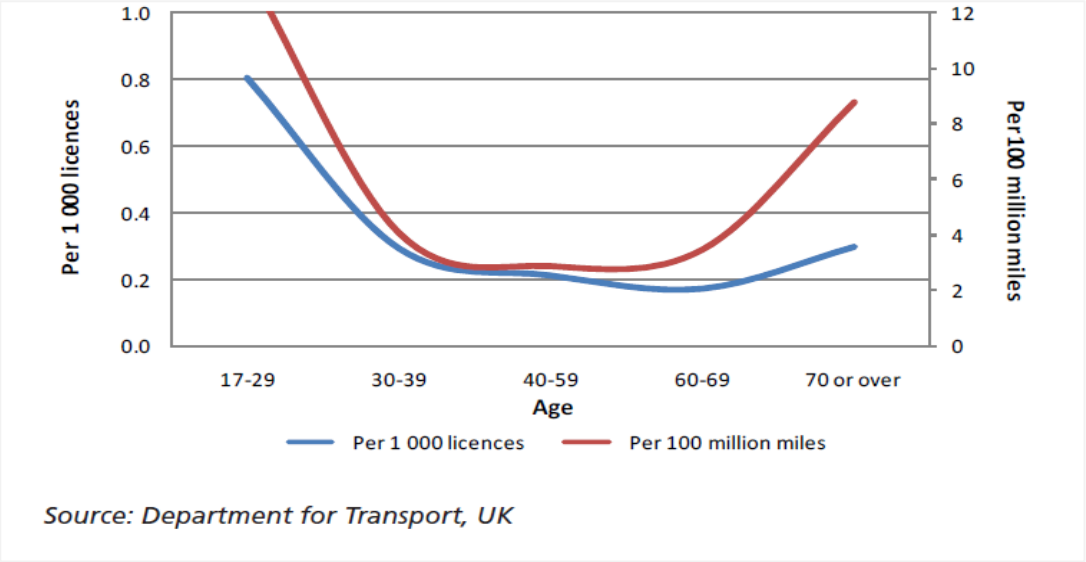
Any discussion of older driver safety also requires a consideration of older drivers' ability to pace their driving. It was because of this factor that Sullivan (2004), in a report to the Ministry of Transport, recommended against basing discussion solely on risk per distance driven. He argued the need for other information including risk per licence holder. Risk per licence holder per year looks at the risk taken over all the kilometres an individual drives in a year and is thus a better indication of the impact on community safety of a driver than a per kilometre measure. A per kilometre measure does not relate to the time-context of the kilometres driven. Risk per 1,000 licensed drivers by age disaggregated by gender is shown in Figure 6. Licence data is taken from a snapshot of the register as it was on 30 June 2019 and excludes a small number of licences of "indeterminate gender". Driver crash involvement data is from the period July 2014–June 2019 and the licence numbers are averaged over June years 2015–2019.

*Figure 6:Drivers involved in injury crashes per 1,000 licensed drivers*


Figure 6 indicates that the risk of fatal or serious driver crash involvement increases slightly after age 80 following a period of decline beginning at the 60–69 age group. However, the 80+ risk is still below the risk of middle-aged drivers. The literature contains little information on risk for more precise age groups over 80 as drivers and especially crash numbers are often too low to allow meaningful analyses. However, it would be expected that after 80 there may be a gradation in risk. Figure 6 is not corrected for fragility. As with the chart per kilometre driven, these increases would also be further mitigated if an adjustment for fragility was made.

Work done in the Netherlands indicates that for drivers under 80, increased reported crash rates are substantively due to fragility with other factors only intruding in larger measure among those over 80 (Li et al., 2003). These results are internationally robust. For example, *Figure 7* depicts a similar driver injury pattern from the United Kingdom (CEA, 2009).

*Figure 7: Drivers killed or seriously injured in the United Kingdom (2003)*




*Source: Department for Transport, UK*

## 3.4 U-shaped curves of risk with age in transport safety

It is important to note that these U-shaped curves apply not only to drivers but equally to all transport participants. *Figure 8* describes the risk of pedestrian motor vehicle crash injury per million kilometres walked while Figure 9 looks at the risk per million hours walked. Figure 10 and Figure 11 are similar charts describing the risk per hundred million vehicle kilometres ridden and per 1,000 hours ridden of being a car passenger by age. A similar pattern for drivers is apparent. The pattern also exists in hospitalisation data.

## 3.5 Pedestrians

*Figure 8: Pedestrian deaths and injuries per million km walked (July 2010–June 2014)*

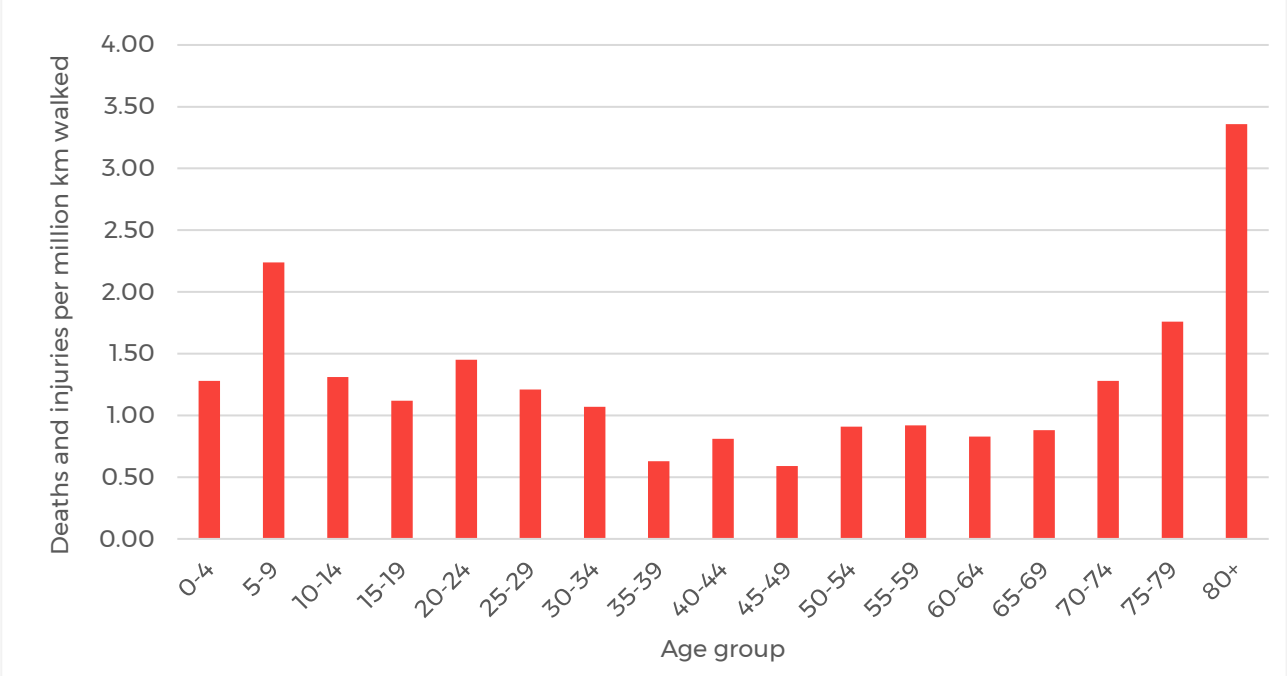
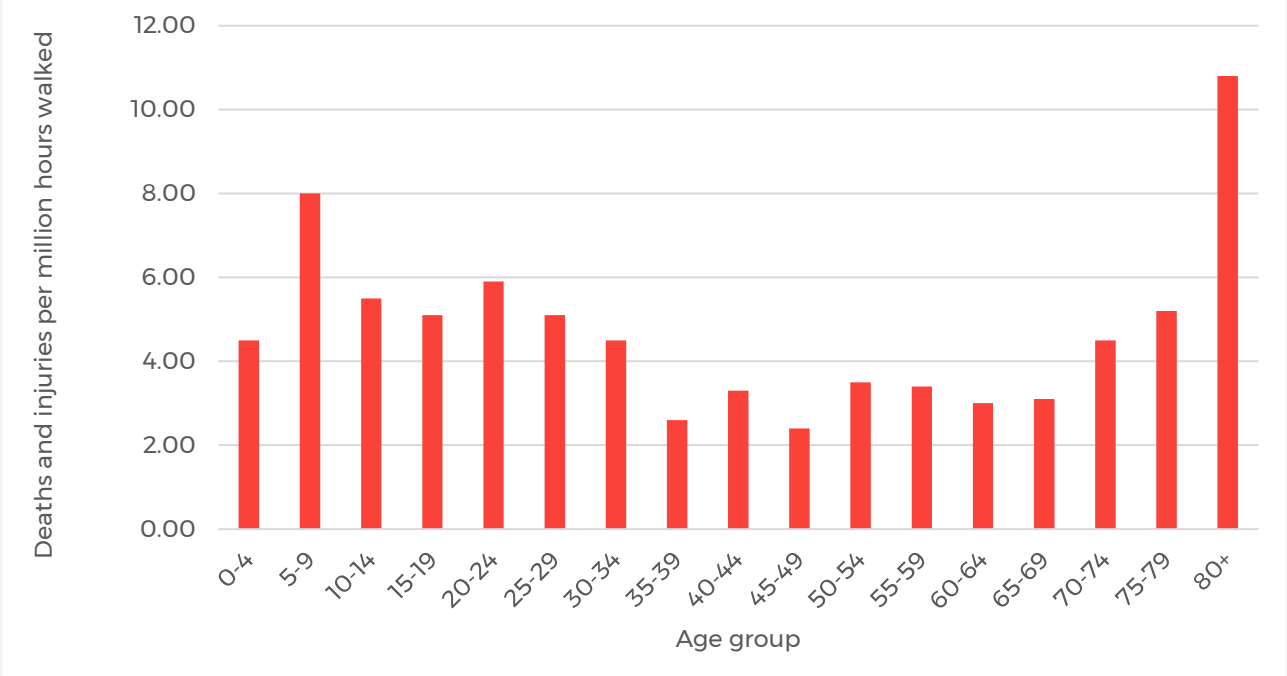



Figure 9: Pedestrian deaths and injuries per million hours walked (July 2010–June 2014)



## 3.6 Passengers

*Figure 10: Passenger deaths and injuries per 100 million km ridden*

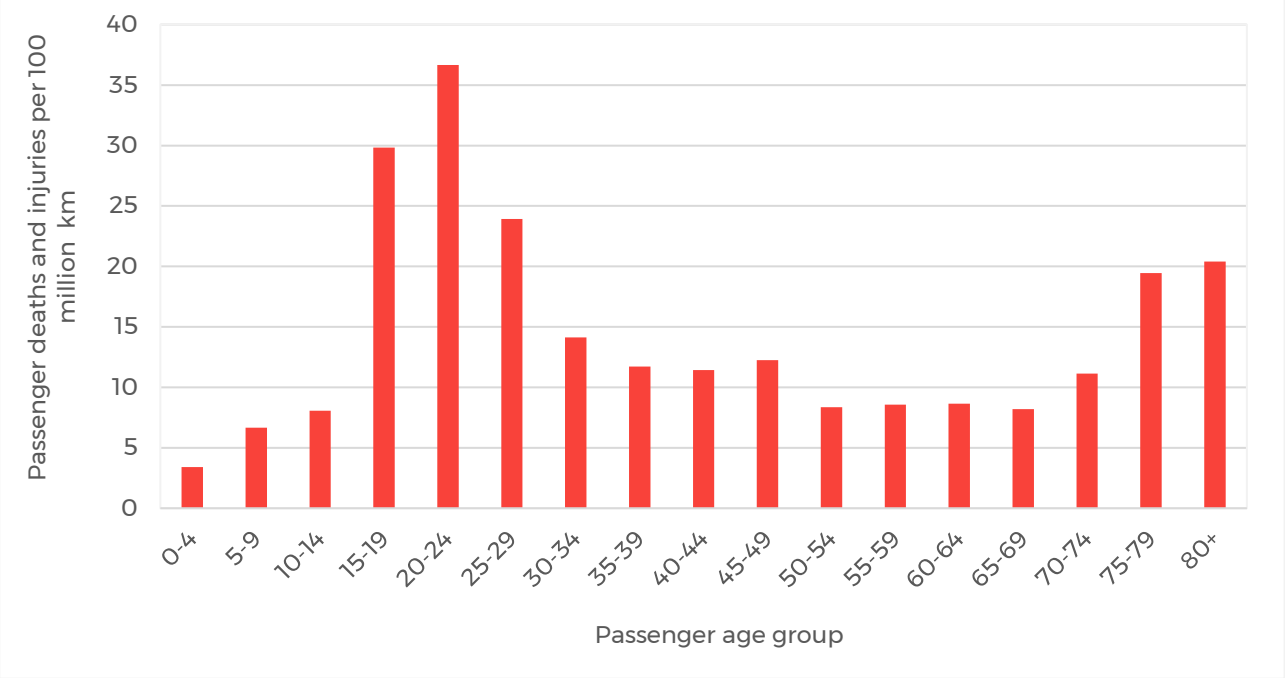
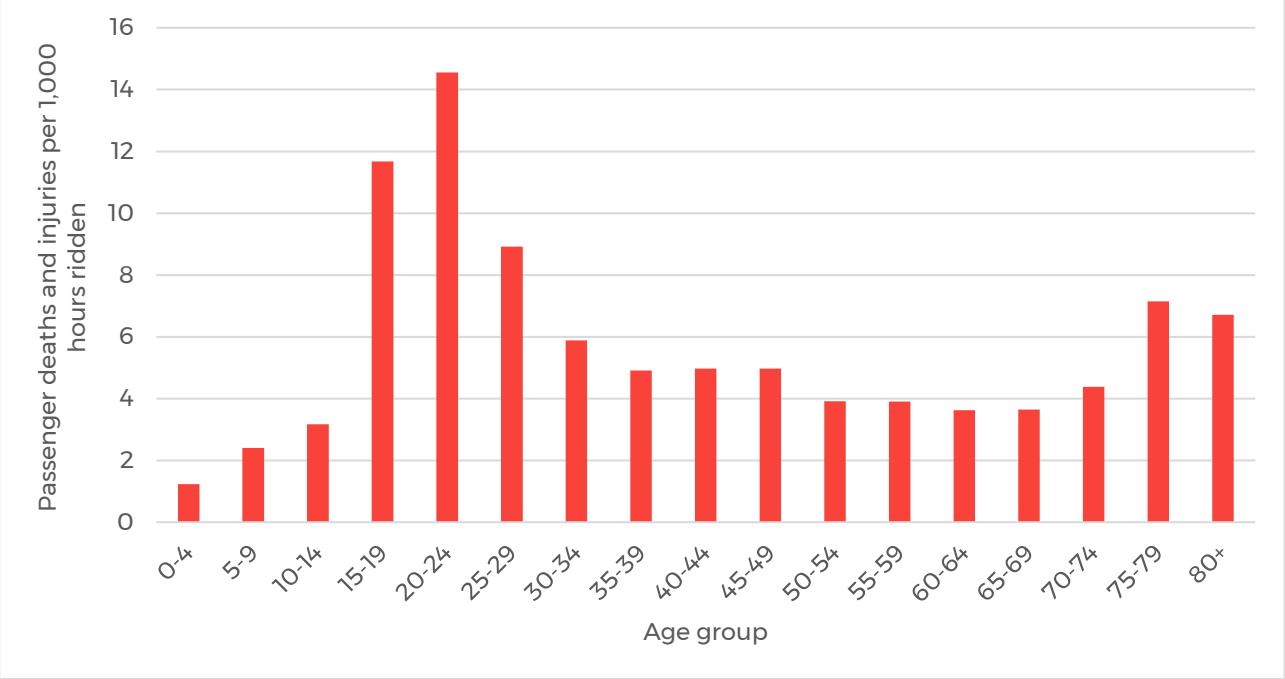



*Figure 11: Passenger deaths and injuries per 1,000 hrs ridden*




## 3.7 Vehicle occupant hospitalisations

These patterns are also apparent in hospitalisation (for one day or more) statistics for light vehicle occupants[2] by age. Figure 12 illustrates occupant hospitalisations by age group while Figure 13 is a

[2] Statistics for drivers are not available.

similar chart for hospitalisations per 100,000 population. The charts use data from 2015–2019 inclusive.

*Figure 12: Light vehicle occupant hospitalisations of one day or more, by age group*[3]

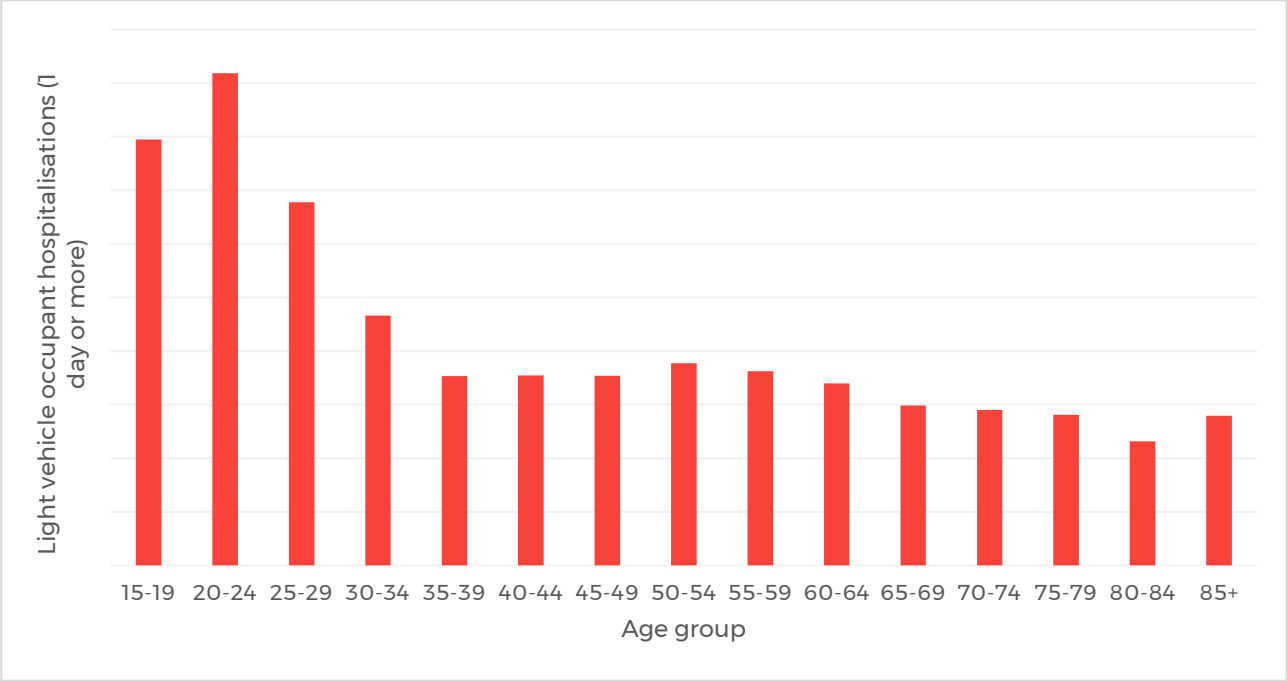
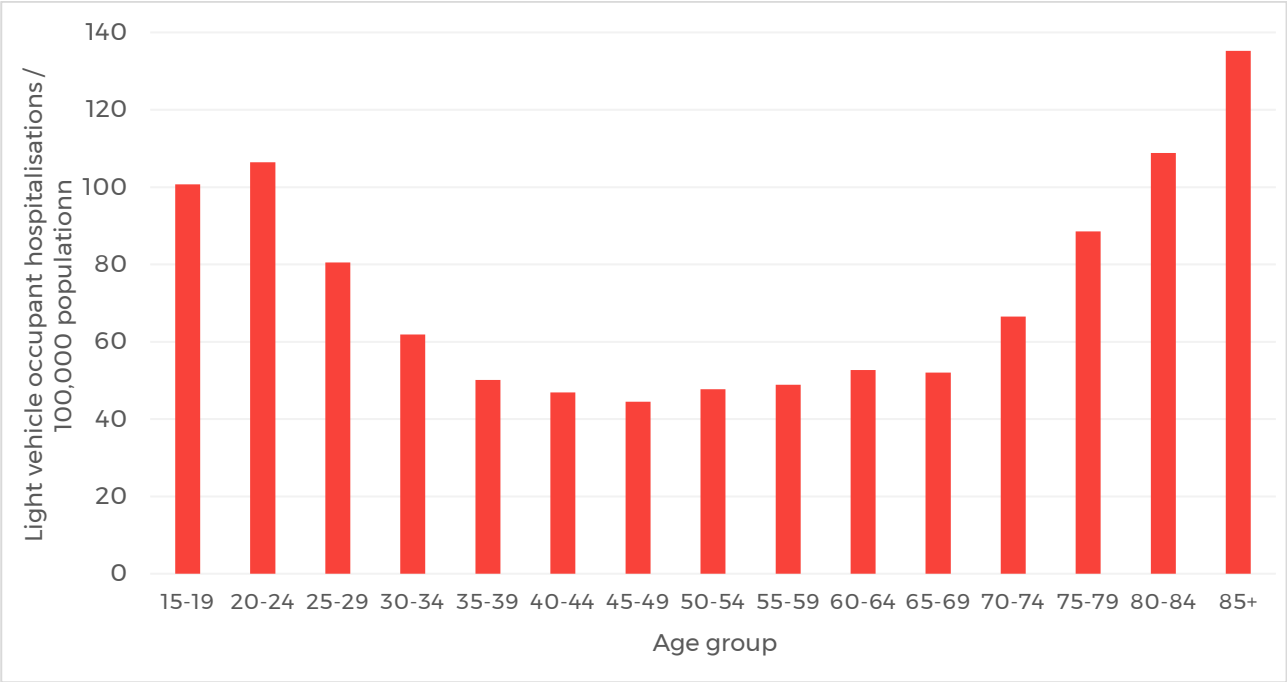



*Figure 13: Light vehicle occupant hospitalisations per 100,000 population by age group*[4]




The insight for the management of older people's transport safety is that whatever mode is used, the risk per unit of exposure increases with age and becomes relatively high over the age of 80.

[3] Source: NZ Injury Query System http://psm-dm.otago.ac.nz/niqs/index.php (accessed 10/11/2021)
[4] Source: NZ Injury Query System http://psm-dm.otago.ac.nz/niqs/index.php (accessed 10/11/2021)

This applies to all modes including being a car passenger and non-motorised modes like walking and cycling. Section 4 will show that a major factor in this situation is increased fragility, with risk being a more minor player.

## 3.8 Infographics insights-all modes

- Whatever mode is used, the risk per unit of exposure increases with age and becomes relatively high over the age of 80
- This applies to all modes including being a car passenger and non-motorised modes like walking and cycling and a major factor is increased fragility.
- When looking at the average fatal and serious crashes drivers have in a year, the 70-79 , and 80+ age groups are the lowest. with women drivers predominating in the 80+ age group. This could relate to there being more women than men in that age-group.

Myth to bust: Older drivers are a high crash risk group.

False: Drivers 80 years and older are involved in only 14.5% as many injury crashes as 40-49-year-old drivers

# 4 The role of fragility in determining crash outcomes

In interpreting older relatively drivers' high reported crash involvement per distance driven as illustrated in Figure 3 and Figure 4, it is necessary to consider the fragility of the driver. A crash cannot enter the Waka Kotahi crash analysis system (CAS) database of injury crashes unless it results in an injury to somebody. As people age, they are more likely to become injured in any particular crash, due to their increased fragility and hence vulnerability to injury. Thus, a younger person may have a crash and it will not be recorded if they remain uninjured. An older person may have an equivalent crash and emerge injured, with the crash entering the database. This results in the right hand ends of Figure 3 and Figure 4 appearing to be steep. When we correct for fragility as in Figure 14. and Figure 15 (which are disaggregated by gender) a very different picture emerges. These charts are truncated at age 20 because the fragility factors apply to ages greater than 20 and normalise other ages to the fragility of a 20-year-old. These factors have only been calculated for fatal crashes, so the charts relate to drivers involved in fatal crashes.

*Figure 14: Killed female drivers per billion km driven with and without a fragility correction from Evans (2004)*

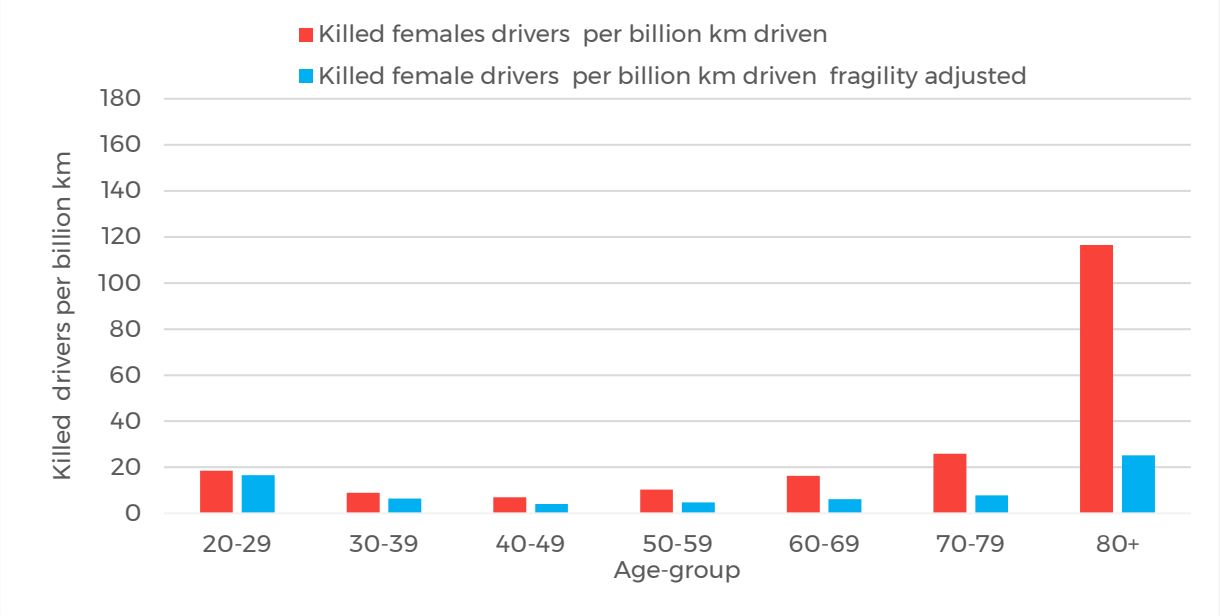
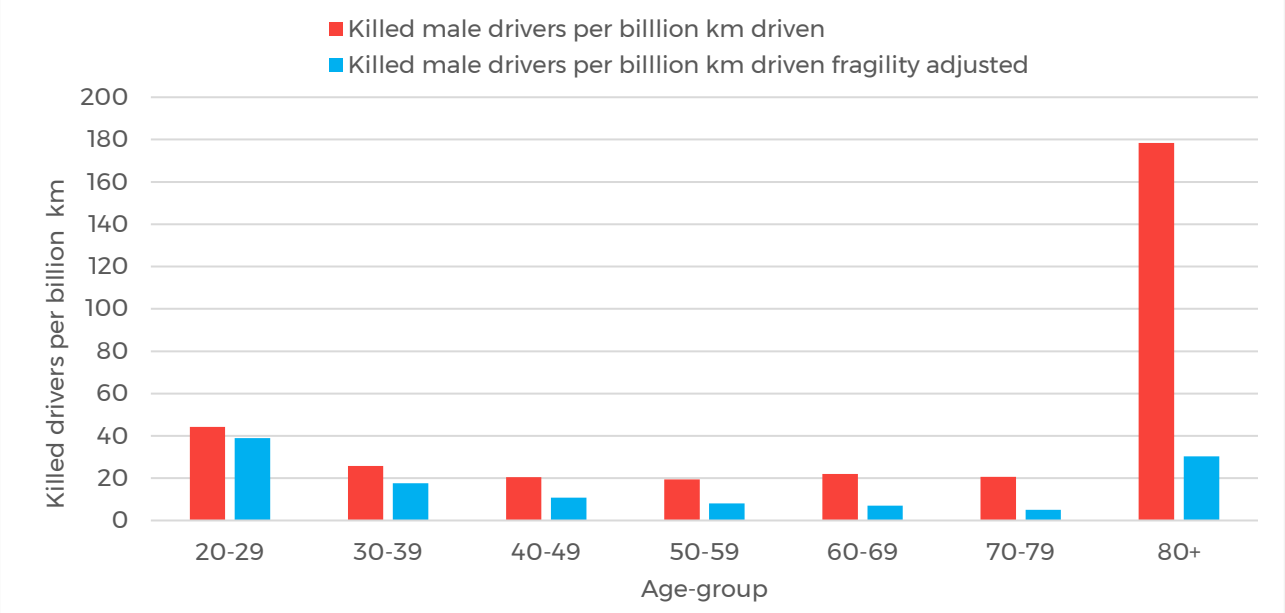



*Figure 15: Killed male drivers per billion km with and without a fragility correction from Evans (2004)*




The Ministry of Transport points out that:

> *"While the fragility correction makes a relatively small difference up to age 60, after that point, the corrected risk is much lower per 100 million km travelled" (Ministry of Transport, 2008, page 4).*

The above charts also indicate that female drivers of all age groups are less susceptible to crash injury than male drivers. This may relate to styles and patterns of driving.

## 4.1 Infographics insights

- After allowing for fragility, male driver fatalities per billion kms driven bottoms out in the 70-79 age -group and rises in the 80+ age group to around 2/3 of the 20-29 level
- For females the pattern is similar but at a slightly higher level of risk with the post 80 rise going to a little higher than the 20-29 level .

Myth to bust : New technology in vehicles means that it doesn't matter what age you are, you are equally protected.

False: Senior drivers are much more fragile than younger drivers even with the existing vehicle fleet (for example, greater prevalence of side airbags during intersection crashes).

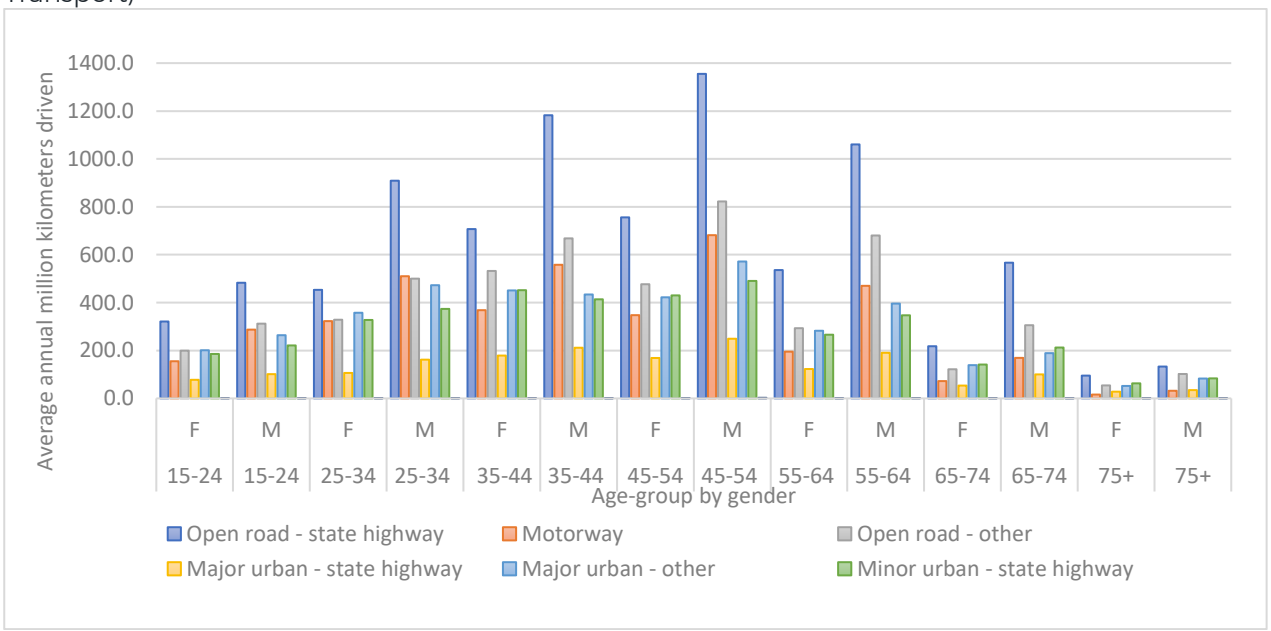
# 5 Where and when do older drivers drive and crash?

## 5.1 Where and when they drive

The risk of reported injury crash involvement per kilometre driven begins to increase with driver age from about age 80. However, the resulting injury burden posed by older drivers is substantially mitigated by their reduced amount of driving. For older drivers, as for all drivers, driving on urban roads produces higher reported injury crash involvement rates per kilometre driven than driving on rural roads.[5] Within these categories, minor urban roads pose less risk than major urban roads and, conversely, major rural roads pose less risk than minor ones, with motorways the least risky. Similar driving patterns are seen overseas (ERSO, 2007).

Figure 16 shows that at all ages women drive less than men and that when the mid-70s are reached urban distance driven exceeds 50% of all distance driven. This means that time spent driving in urban areas would be greater than 50% owing to slower urban speeds,

Figure 16: Average distance driven per year by driver age group and gender(source: Ministry of Transport)




Motorways, which are our safest roads for all ages, represent only 6.1 % of distance driven in the 75+ age group. Unsurprisingly, Keall and Frith (2004) found that after accounting for other variables motorways are the lowest risk roads for older drivers as they are for other age-groups. This may be related to the lower complexity of these roads combined with the separation of conflicting traffic

[5] Rural roads tend to have crashes of higher severity due to the higher speeds involved.

streams outweighing the severity risk of a higher speed environment. It may therefore be beneficial to more comprehensively explore the effects of road type to ascertain what is helpful to older drivers (as opposed to what is unhelpful to their driving performance and confidence).

Preusser et al.(1998) suggest that all the relevant information required to traverse an intersection should be made clearly available by looking straight ahead at signals, which would be beneficial for younger and older drivers alike.

Dividing these road categories more simply into urban vs open road plus motorway yields Figure 17.

*Figure 17: Percentage of travel by urban vs open road and motorway (source Ministry of Transport)*

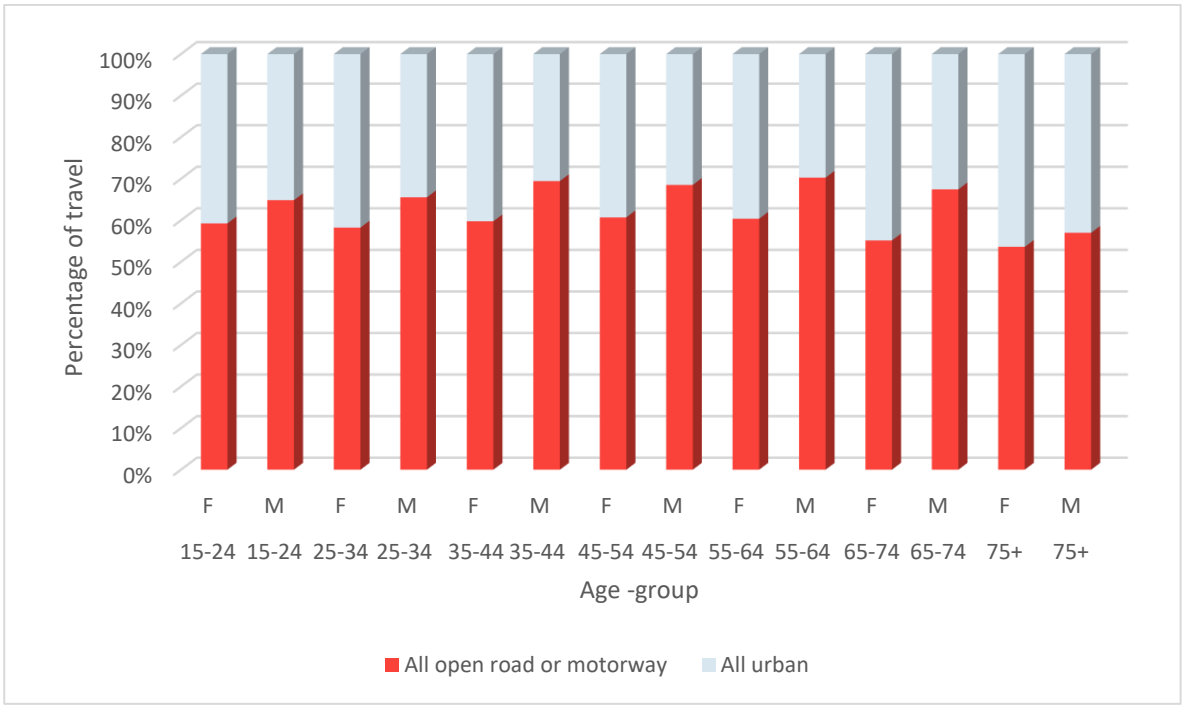
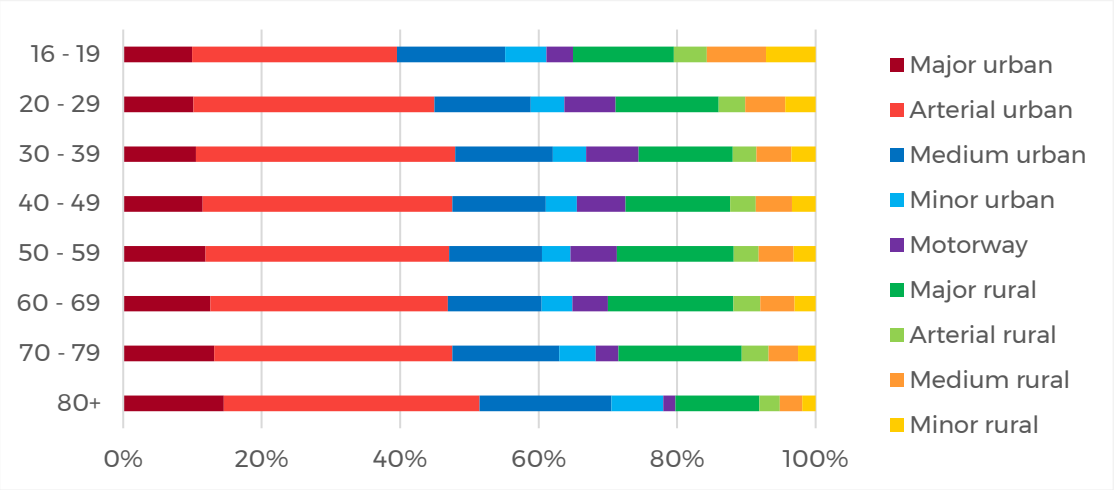



Figure 17 indicates that driving gradually becomes more urban with age with females reaching 50% urban in the 75+ age-group and males in that age-group coming close. This will be an underestimate of driving in urban areas as a significant proportion of motorway driving occurs on urban motorways.

## 5.2 Where they crash

The driving pattern discussed in section 5.1 is accompanied by the fatal and serious crash involvement pattern shown in Figure 18. This indicates that once the 60s are reached the percentage of fatal and serious driver crash involvements on urban roads increases with age with commensurate reductions in rural and motorway crashes.

*Figure 18: Percent of fatal and serious crash involvement by road type and driver age (July 2014–June 2019).*




It has also been shown that older drivers generally choose a relatively safe driving pattern for themselves in terms of location of driving. Keall and Frith (2004) have shown that had older drivers adopted the driving patterns of younger groups, their crashes would have increased substantially.

## 5.3 When they drive

Figure 19, derived from Keall and Frith (2004), uses travel data from the 1997/98 New Zealand Travel Survey to look at how drivers of various ages use the road network disaggregated by time of day.

*Figure 19: Percentage of distance driven by driver age group by day/night and road type.*

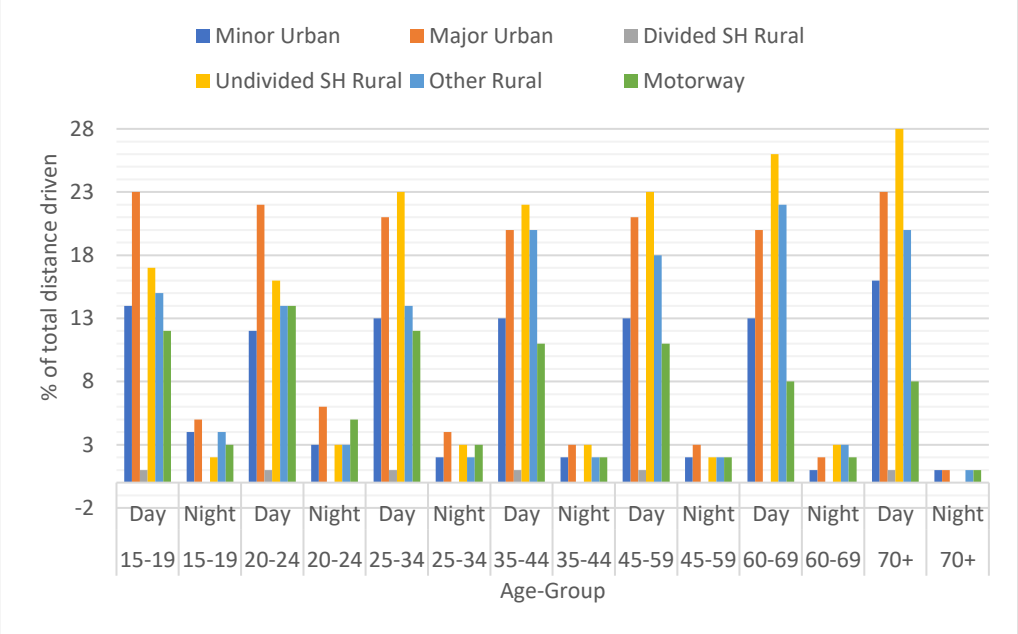
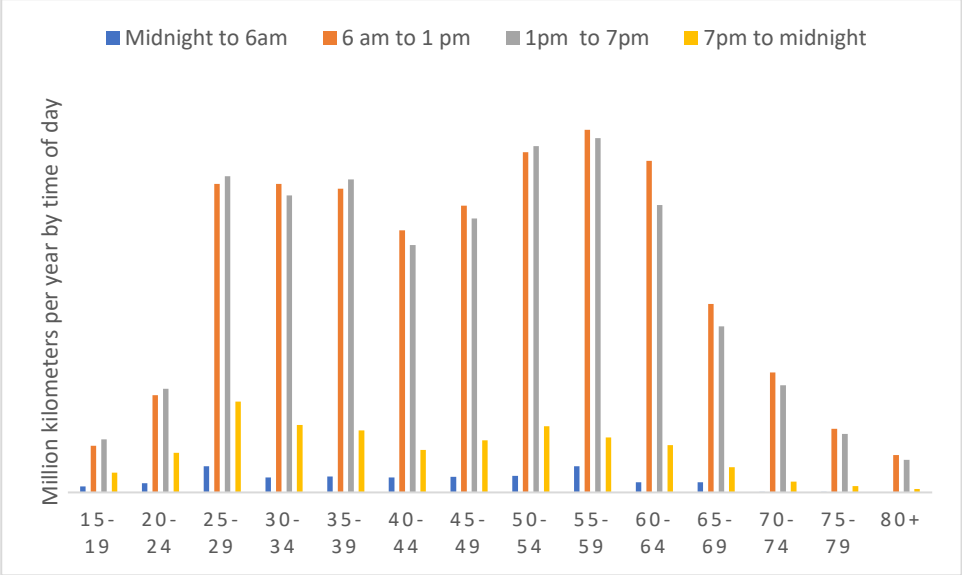



*Figure 20* depicts average annual travel for light 4-wheel vehicle drivers aged 15+ years old, by time of day and age-group but not disaggregated by road type (*July 2014–June 2019).*

*Figure 20: Average annual travel by light 4-wheeled vehicles by time of day and age-group*

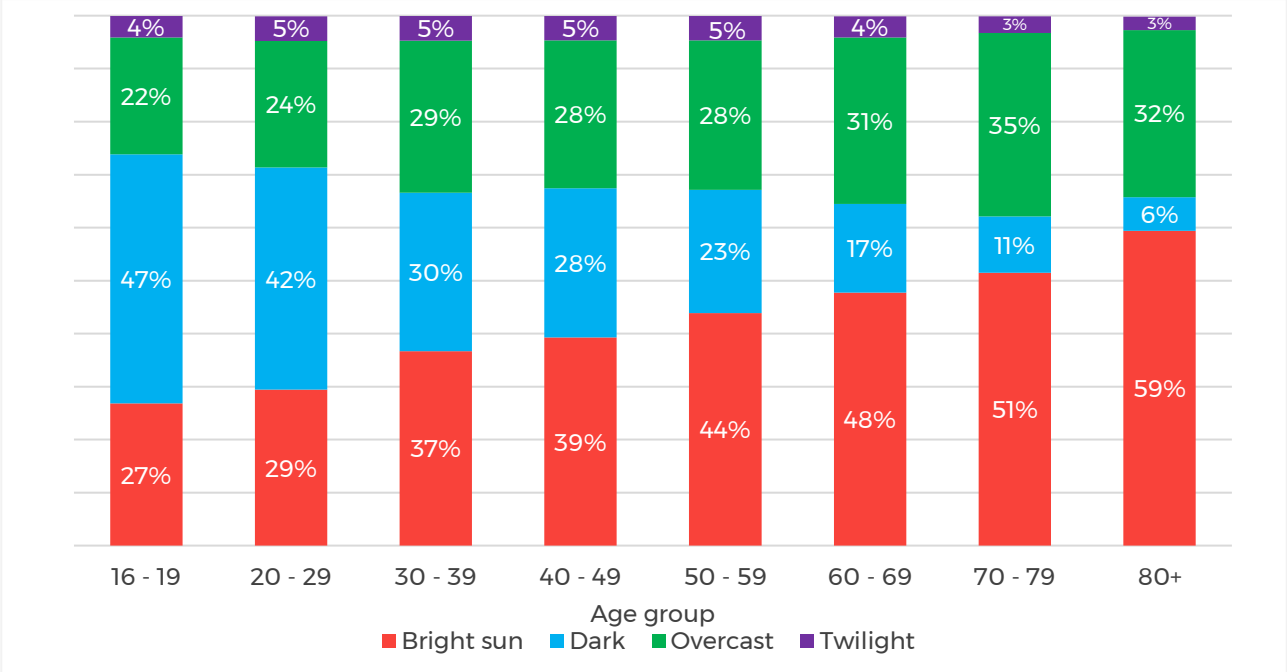



As with Figure 19, it is apparent that most older people drive predominantly during the day with little of their driving occurring between 7pm and midnight and no driving between midnight and 6am being recorded for drivers over 69.

## 5.4 When they crash

Figure 21 depicts percent driver involvement in fatal and serious crashes by age group and lighting conditions. It is apparent that as they age, drivers become more involved in daytime crashes and less involved in night-time crashes. This is related to a tendency to drive less at night and more during the day as indicated in Figure 19.

Figure 21: Percent driver fatal or serious crash involvement by light conditions (as a surrogate for night/day) and age group



## 5.5 Infographic Insights

- Driving becomes more urban focussed with age reaching around 50% urban (excluding urban motorways) by age 75+.
- Most older people drive predominantly during the day with little of their driving occurring between 7pm and midnight and no driving between midnight and 6am being recorded for drivers over 69.
- Motorways, which are our safest roads for all ages represent only 6.1 % of distance driven in the 75+ age-group.
- For all age-groups more than sixty percent of driver involvements in serious and fatal crashes occur in urban areas with the percentage approaching 80% in the 75+ age-group.
- As they age, drivers become more involved in daytime (bright sun and overcast conditions) crashes and less involved in night-time crashes. This is related to a tendency to drive less at night and more during the day.

Myth to bust: Older drivers are safe, as long as they stay in low-speed urban roads

False: Intersection crashes on urban roads have much higher rates of serious injury and fatality for senior drivers (between 1.5 – 2.5 times higher) compared with younger age-groups ( *Figure 22*). This is related to fragility. Locations like higher speed motorways/expressways are actually safer by comparison.

# 6 Crash patterns of older drivers

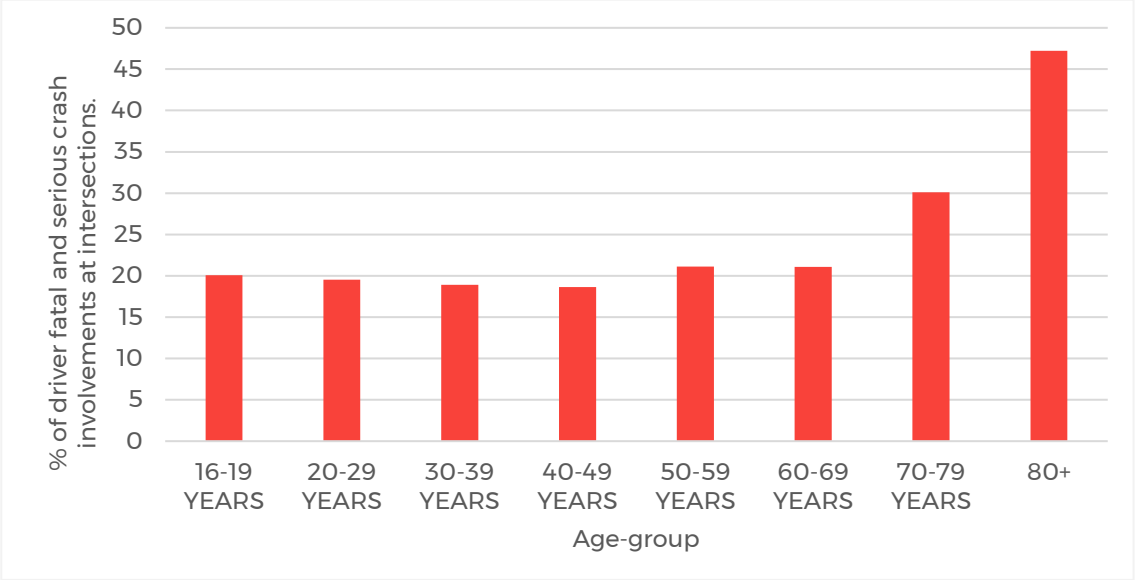
Older drivers' crash patterns vary little between countries. An OECD report (OECD, 2001 pp. 47–48) summarises the situation well:

> *"A larger share of older driver accidents involves collisions with another vehicle. They have a smaller share of single vehicle and speed related accidents. Older drivers tend to be legally at fault in their collisions*[6]*. A greater proportion of older drivers' crashes occur at intersections, where typically the older driver is turning against oncoming traffic with right-of-way on the main road. For those aged 80 years and over, the percentage of angle collisions, typically involving intersection situations, is more than double that of the youngest group. The high percentage of angle collisions where the older driver is hit from the side by an oncoming vehicle is another factor that explains why older drivers tend to be the ones injured in their accidents.*

This is illustrated locally in *Figure 22* showing the percentage of driver crash involvements at intersections by age of driver.

[6] A personal discussion with Dr Jim Langford, a leading member of the OECD working party behind the OECD report indicates that they had a percentage of more than 50% in mind when writing this sentence , and that it was based on an analysis of Police Reports.

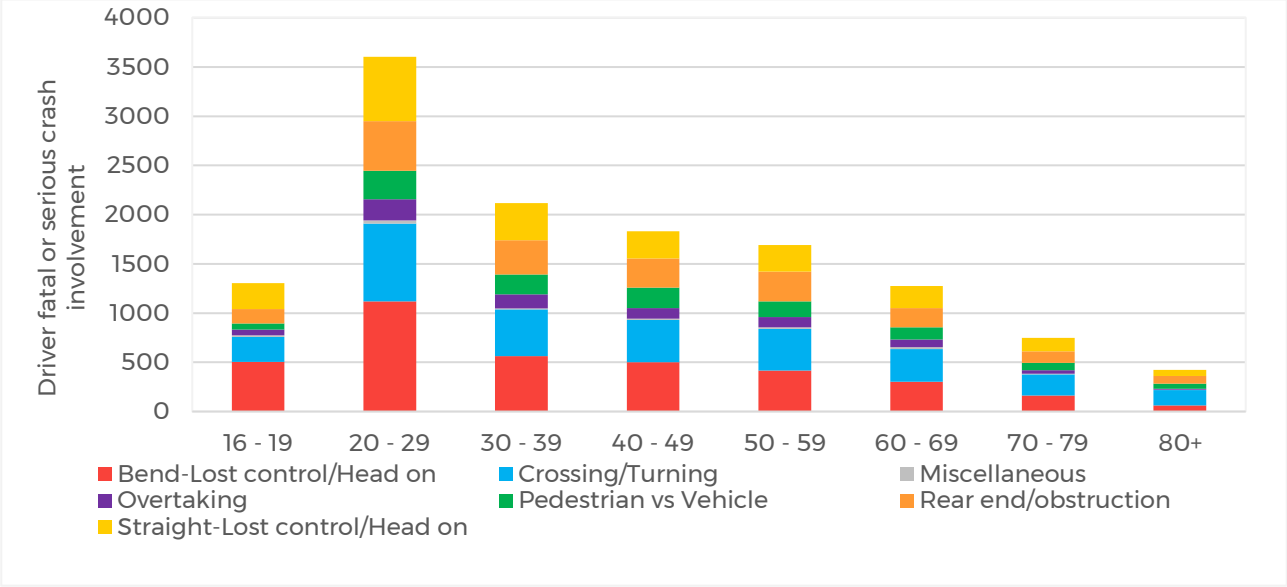
*Figure 22: The percentage of driver crash involvements at intersections by age of driver (July 2014–June 2019 inclusive)*




The proportion of driver intersection crash involvements increases with age once drivers reach their 70s. This is due first to older drivers' increased proportion of urban driving and therefore greater exposure to intersections. Secondly, older people are particularly vulnerable to chest injuries (Kent et al., 2005) which are often associated with intersection crashes. None of the other categories of crashes (head-on/overtaking and lane change, lost control, manoeuvring/miscellaneous, pedestrian involved, rear end/collision) show a clear increase, in percentage, with age.

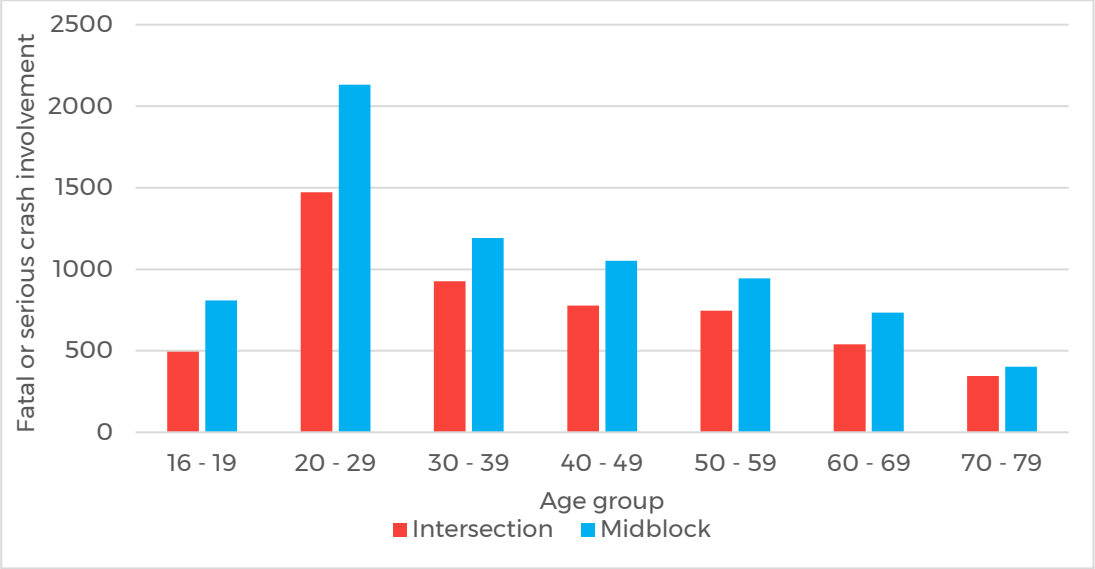
However, looking at proportions does not tell the whole story. *Figure 23* depicts light vehicle driver involvement in fatal or serious crashes by vehicle crash movement and age group. The movement group best corresponding to intersection crashes is "Crossing/Turning".

*Figure 23: Light vehicle driver involvement in fatal or serious crashes by vehicle crash movement and age group (July 2014–June 2019)*



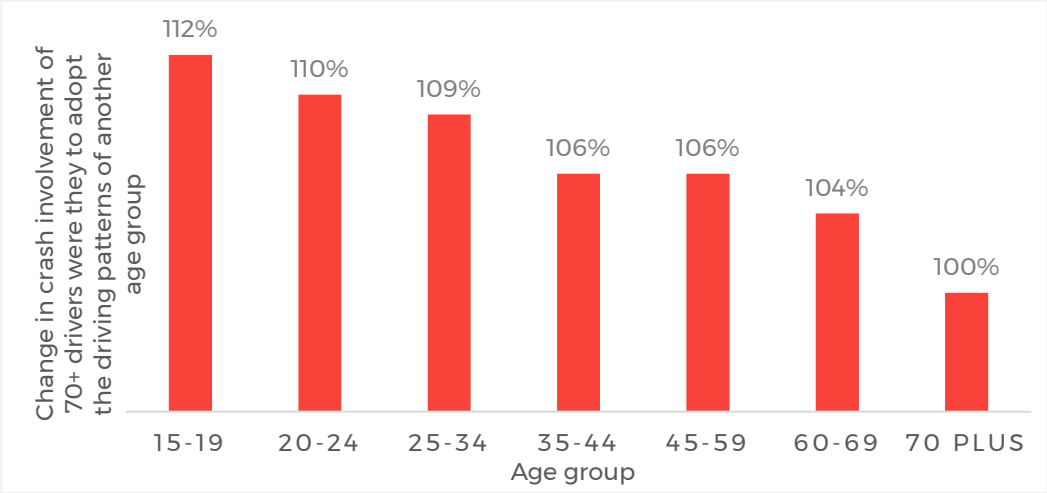

The percentage may increase with age, but the absolute numbers do not. There is a similar story when intersection crashes are looked at vis-à-vis mid-block crashes (Figure 24).

*Figure 24: Light vehicle driver involvement in fatal and serious Intersection and midblock crashes by age of driver (July 2014–June 2019 inclusive)*




These crash patterns are influenced by older drivers' particular patterns of driving which are safer than those of younger age groups. Kell and Frith (2004) looked at the change in injury crash involvement that would be expected if drivers in the 70+ age-group adopted the driving patterns of other age-groups while driving the same total distance and retaining the same risk per driving situation. Their results are depicted in Figure 25.

*Figure 25: Change in crash involvement of 70+ drivers were they to adopt the driving patterns of younger groups*




It is apparent that the 70+ group has evolved a pattern of driving which, in terms, of safety serves them better than the patterns of all younger age-groups.

## 6.1 Infographics insights

- Most older driver crashes involve collisions with another vehicle
- Older drivers have a greater proportion of their injury crashes at intersections than younger drivers
- Crossing/turning crashes feature prominently
- They are especially vulnerable to side crashes due to fragility.

- Overall, they adopt safer driving patterns than younger age-groups but these can still be improved (e.g. by using multi-lane divided carriageway roads more).

# 7 Lower mileage older drivers

Arguably, driving is like any other activity — if you do not feel well, you tend to do less of it. Older drivers are no exception. Langford et al. (2006) found that lower-mileage older drivers tended both to be less healthy and to have greater crash rates per unit of distance driven than their healthier peers. This is not surprising as when you do less driving it naturally tends to occur close to home, which mostly means urban areas. With their higher traffic flows, urban areas present drivers with greater opportunity to collide with other vehicles than non-urban areas., which naturally increases their crash rate per distance driven. However, when the authors looked at the percentage of drivers in crashes in the past 2 years, their findings were as presented in Table 7.1.

*Table 7.1: Drivers crashing in the last two years by kilometres driven per week*

| Km driven per week | Percentage of drivers in crashes in the past 2 years |
|---|---|
| Low Mileage (≤ 50 km) | 10.7 |
| Medium Mileage (51–100 km) | 12.0 |
| High Mileage (> 100 km) | 13.4 |

Table 7.1 indicates that a lower percentage of the more infirm, lower-mileage group in the preceding two years than the higher-mileage, healthier groups. This indicates that their self-pacing was successful in reducing crashes per year, arguably the goal of all safety jurisdictions. Their sample comprised New Zealand older drivers and the crash involvements were self-reported.

## 7.1 Infographics Insights

*Lower mileage drivers:*

- Tend to be less heathy than their higher mileage counterparts
- Have higher crash rates per distance driven
- Have lower crash rates per year.
- This means they contribute less to the annual road toll than healthier older drivers

Myth to bust: Less healthy older drivers are as a group higher risk than healthier older drivers

False: They are at lower risk.

# 8 International comparisons

Figure 26 depicts car occupant deaths per 100,000 population by age-group for a selection of developed countries including New Zealand. Similar information is not available for driver deaths. All countries show a similar pattern of middle-aged rates being the lowest with the rates for younger people being higher than those for older people. The difference between the 65+ rates and the middle-aged rates will be largely due to fragility. New Zealand stands out as having the worst rates of all the nations listed, which indicates plentiful room for improvement

*Figure 26: Car occupant deaths per 100,000 population by age group (source: IRTAD)*

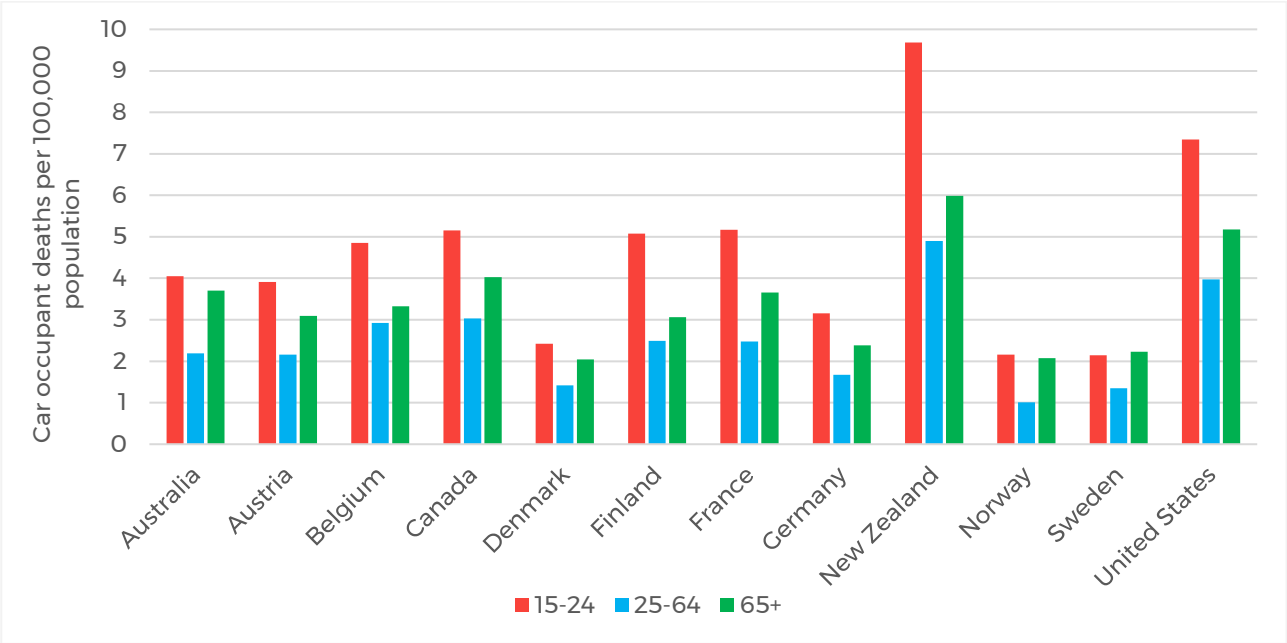
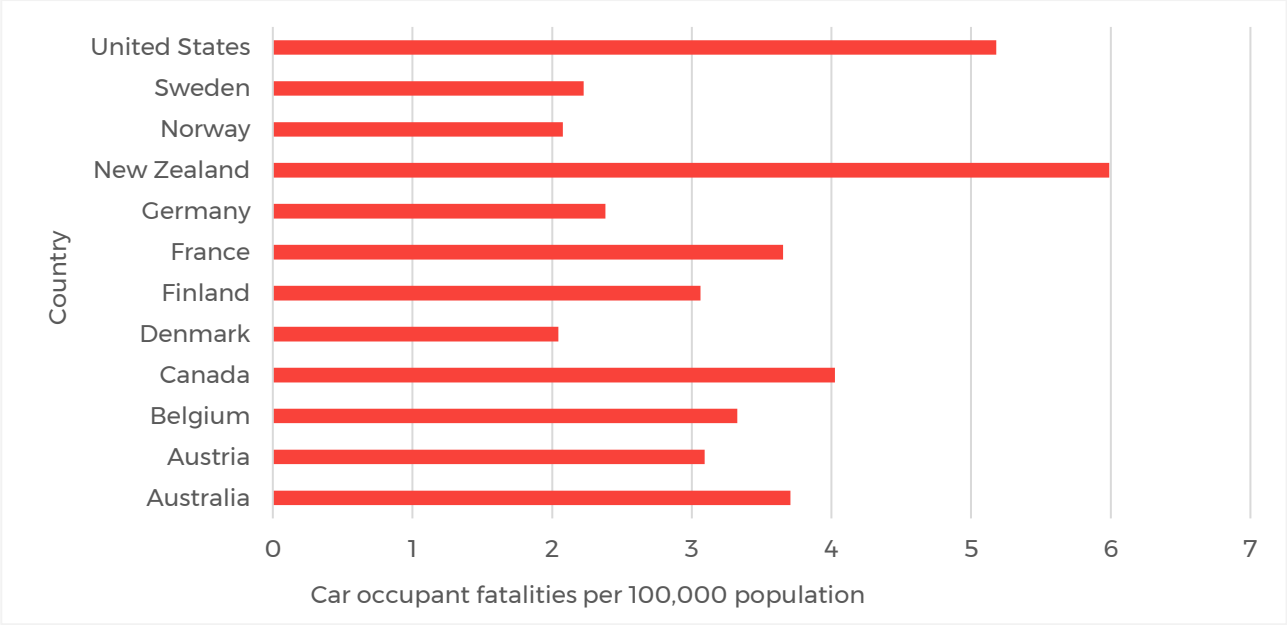


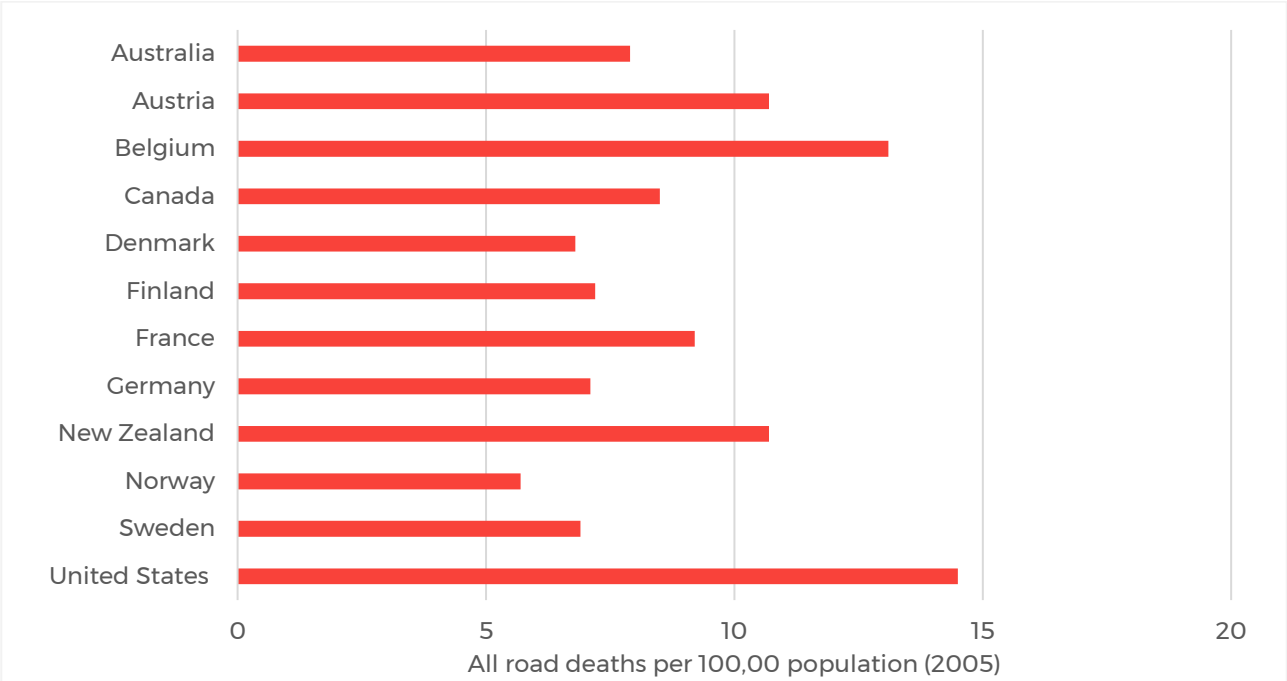

Figure 27 focusses entirely on the 65+ age-group.

*Figure 27: Age 65+ car occupant fatalities per 100,000 population by country*




Based on Figure 27 New Zealand's 65+ rate is substantially worse than all the others, several of which are demographically older than New Zealand. This indicates that an aged demography does not necessarily lead to safety problems. Our overall car occupant fatality rates are also at the top end of the cited countries, and we compare less favourably now than we did in 2005 (Figure 28).

*Figure 28: All road deaths per 100,00 population (2005)*




## 8.1 Infographic insights

- *New Zealand has one of the worst car occupant death rates in the OECD over all age-groups*
- *This is also true for the 65+ age-group.*
- *We trail several countries which are demographically older than New Zealand*
- *Some of the best performers have substantially older populations than New Zealand.*
- *This indicates an aged population does not necessarily lead to safety problems*
- *Our relative position has got worse since 2005*

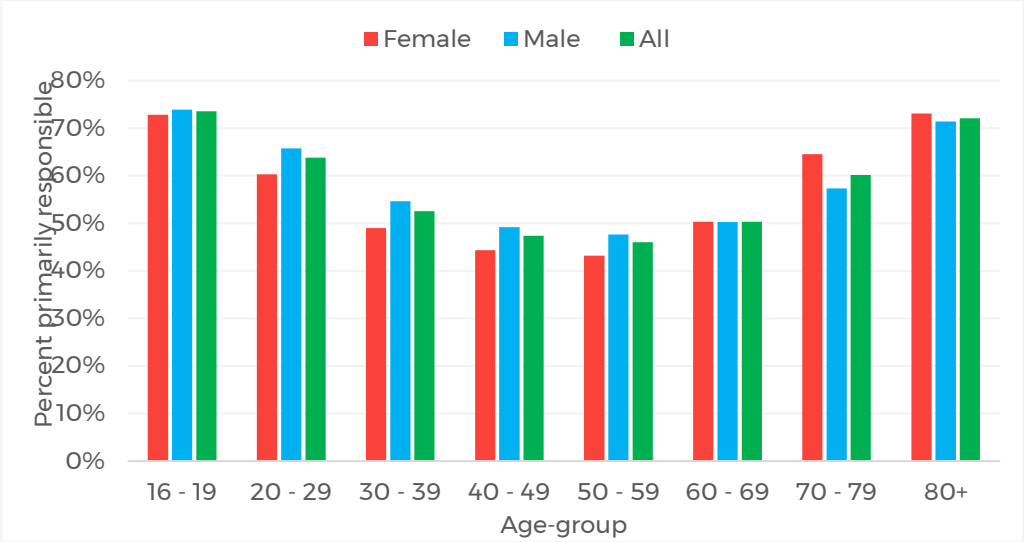
*Myth to bust: An ageing population leads to safety problems on the road*

*False: older drivers are the safest group (in terms of annual crashes.*

# 9 Crash responsibility

Figure 29 illustrates the percentage of drivers listed as culpable in CAS by age and gender in fatal and serious crashes. The chart for all crashes is very similar. Males are more culpable than females over all age groups and the curve has the familiar bathtub shape with higher culpability percentages in the younger and older age groups.. The higher percentage of females primarily responsible in the 70+ age-groups may relate to the females having a higher life expectancy than males.

*Figure 29: Percentage of involved drivers listed as primarily responsible in CAS by gender and age group (fatal and serious crashes, July 2014–June 2019)*




The related issues of crash responsibility and causation are complex. Most, if not all, crashes have several causes — that is, there is a chain of events or circumstances leading to the crash and its outcomes, the absence of any one of which might have either prevented the crash or reduced its severity. Further, the process of attributing crash responsibility may be faulty. For example, older drivers have fewer possibilities of defending their pre-crash actions due to greater mortality and authorities' assessments may be biased against very young and very old drivers in attributing blame (Hakamies-Blomqvist, 1993; Elliott et al., 1995).

## 9.1 Infographics insights

- The percentage of involved drivers listed as primarily responsible for fatal and serious crashes increases with age after the age of 60.
- Crashes are multifactorial and assessing primary responsibility is a fraught business.
- Assessments may be subject to unconscious bias towards the very young and very old.

# 10 Older driver safety in the recent past

## 10.1 Fatal or serious crash involvement

Figure 30 portrays light vehicle drivers involved in fatal or serious crashes over time by age-group. It is apparent that overall, there has been an easing of numbers since a peak in 2016/17. Apart from 80+ the age-groups used are five years' duration, and it is apparent that general crash numbers for older age-groups are lower than those for younger age-groups.

*Figure 30: Driver involvement in fatal or serious crashes by age group and financial year*

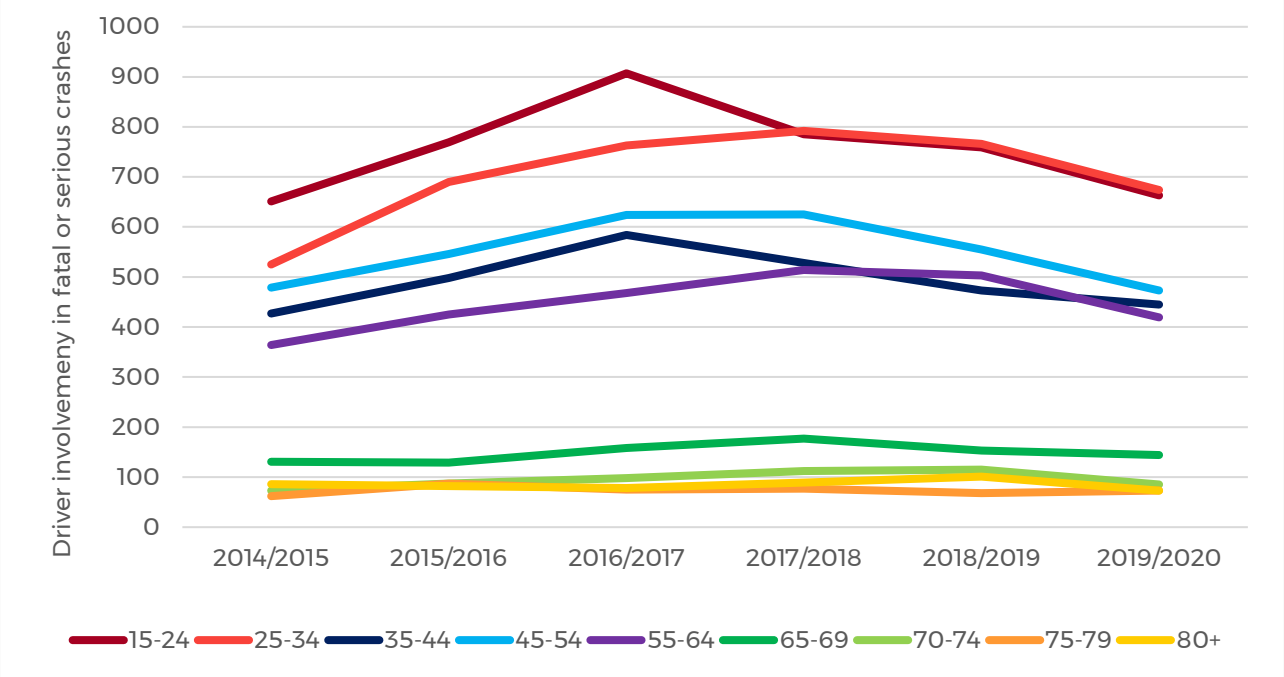
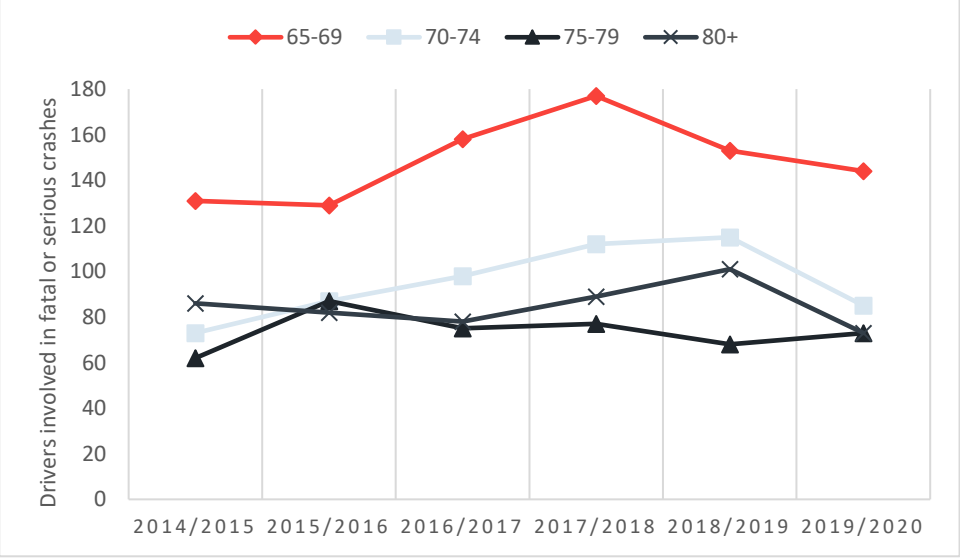



Figure 31 looks separately at the 65+ age-groups in Figure 30. Generally, crashes drop off with age. At 80+ however, this age-group has more crash involvement than the 75–79 group. This may relate to it covering a wider span of ages as well as fragility factors.

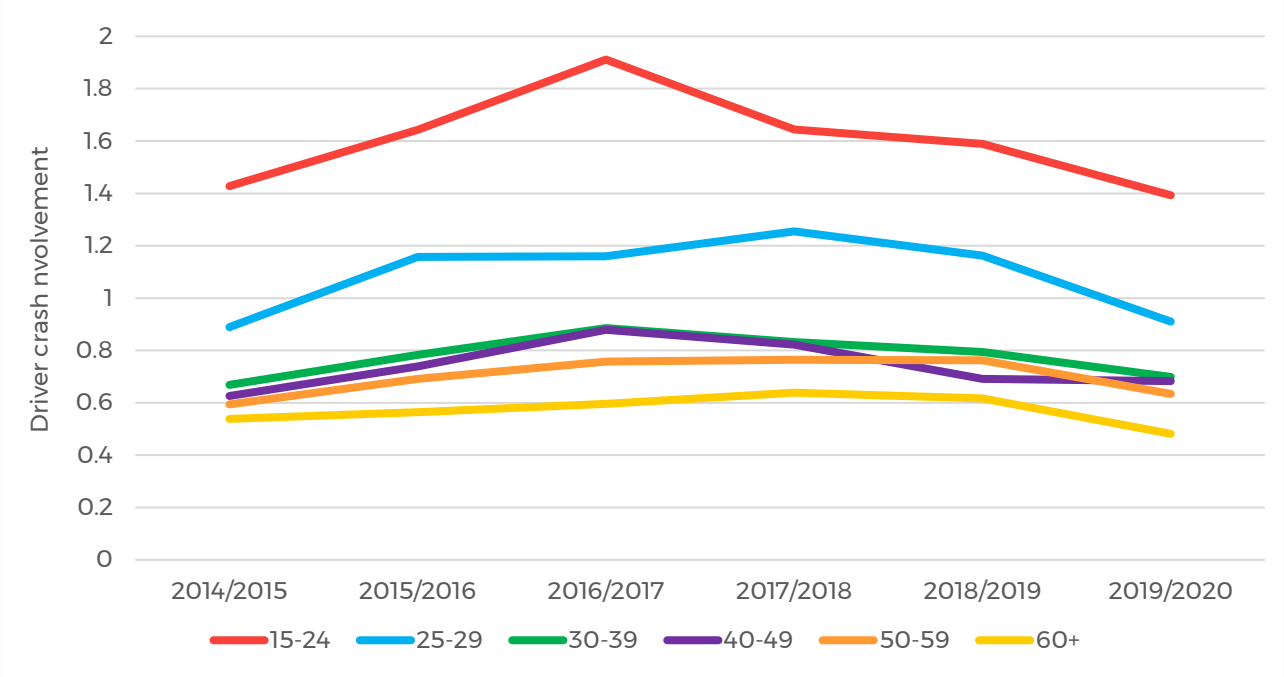
*Figure 31: Drivers involved in fatal or serious crashes by age group and financial year — drivers 65+ only*



## 10.2 Fatal or serious crash involvement per 1,000 drivers

Figure 32 portrays drivers involved in fatal or serious crashes per 1,000 drivers by year. The oldest age-group used here is 60+ as older demographics have not been released by Waka Kotahi in this data set. A chart of crash involvements per 1,000 drivers by age, for all drivers in the fleet is available in Figure 32 This normalises the accident involvement so that the average involvement per driver in each age-group can be viewed. As can be expected, the younger age-groups had the highest rates with 60+ having the lowest rate.

*Figure 32: Drivers involved in fatal or serious crashes per 1,000 drivers by age group*

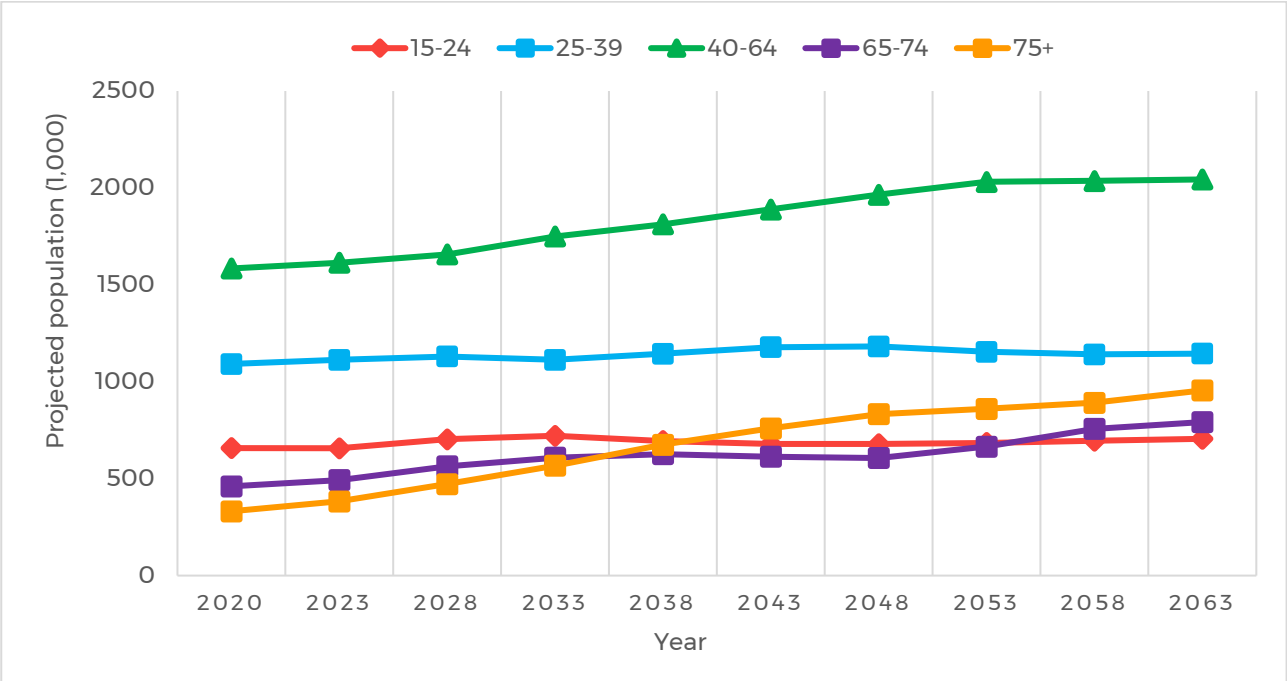



# 11 New Zealand older driver safety in the future

## 11.1 Population growth

Given a base year of 2020, the number of people in New Zealand aged 65 and over is projected to increase by around 75% by 2043 and by 220% by 2063. The 2063 projection for numbers of people 80 years old and over is an increase of 288% (Figure 33). These come about through differing changes in the various age-groups. Figure 33 depicts median statistics for New Zealand age-specific population projections, base year 2020 up to 2063. These projections assume a 30 June 2020 population of 5.094 million, a long-term median period total fertility rate (TFR) of 1.65 births per woman, and age-specific death rates (which continue to decrease with life expectancy at birth for males and females) increasing from 80.8 and 84.4 years in 2021 to 86.1 and 89.0 years in 2060. The long-term median annual net migration gain is assumed to be 25,000.

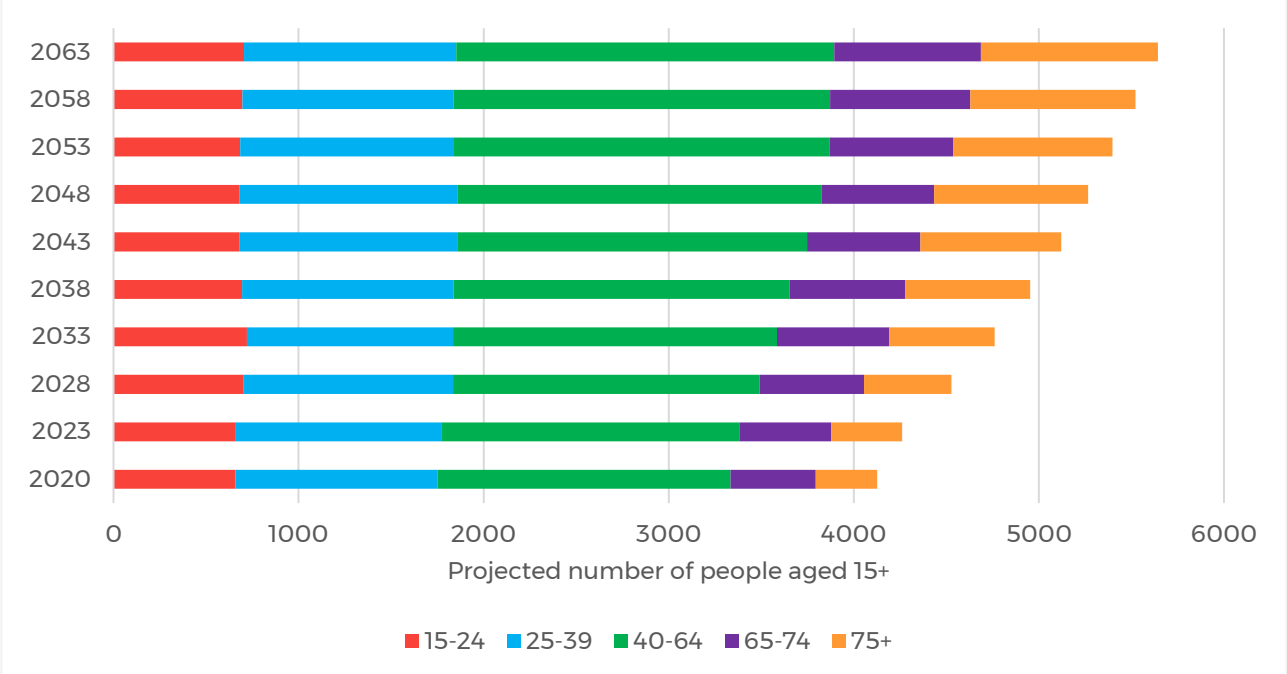
*Figure 33: Age specific population projections from base year 2020*




The bar chart in

Figure 34 highlights the differences in the population changes for the various age-groups. It is apparent that a change occurs after the age-group 25–39 and the differences over time increase with age. For the 15–24 and 25–39 age-groups, there is very little population change over time while the population increases for the older age-groups.

*Figure 34: Bar chart of projected population of people 15+ highlighting differences in growth between age-groups*

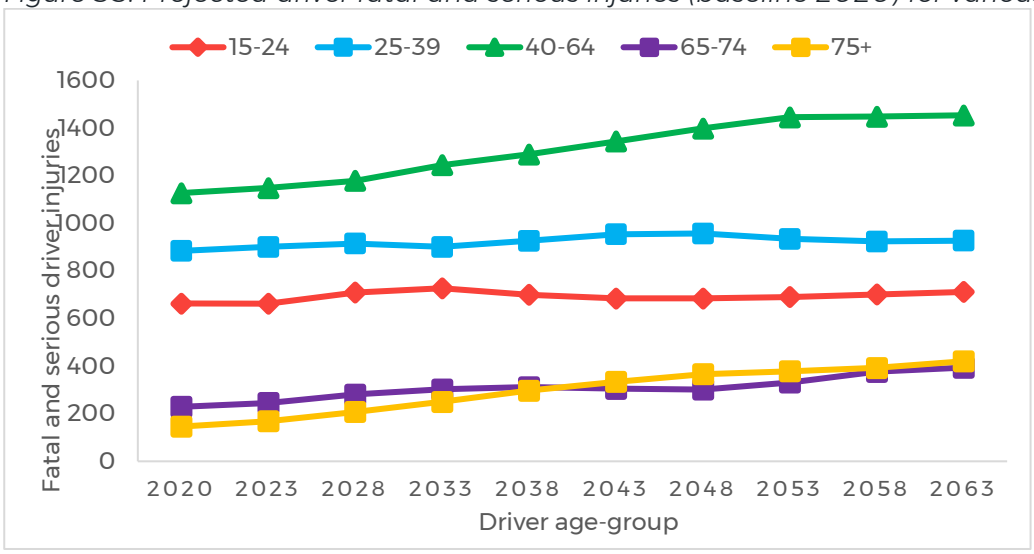



## 11.2 Projected changes in light vehicle driver fatal and serious injuries by age group over time

The projections illustrated in Figure 33 and

Figure 34, when combined with average 12-month light vehicle driver fatal and serious injuries over the period July 2015–June 2020, result in the chart of fatal and serious driver injuries over time depicted in *Figure 35*. It must be emphasised that these charts assume driver involvement rates stay constant.

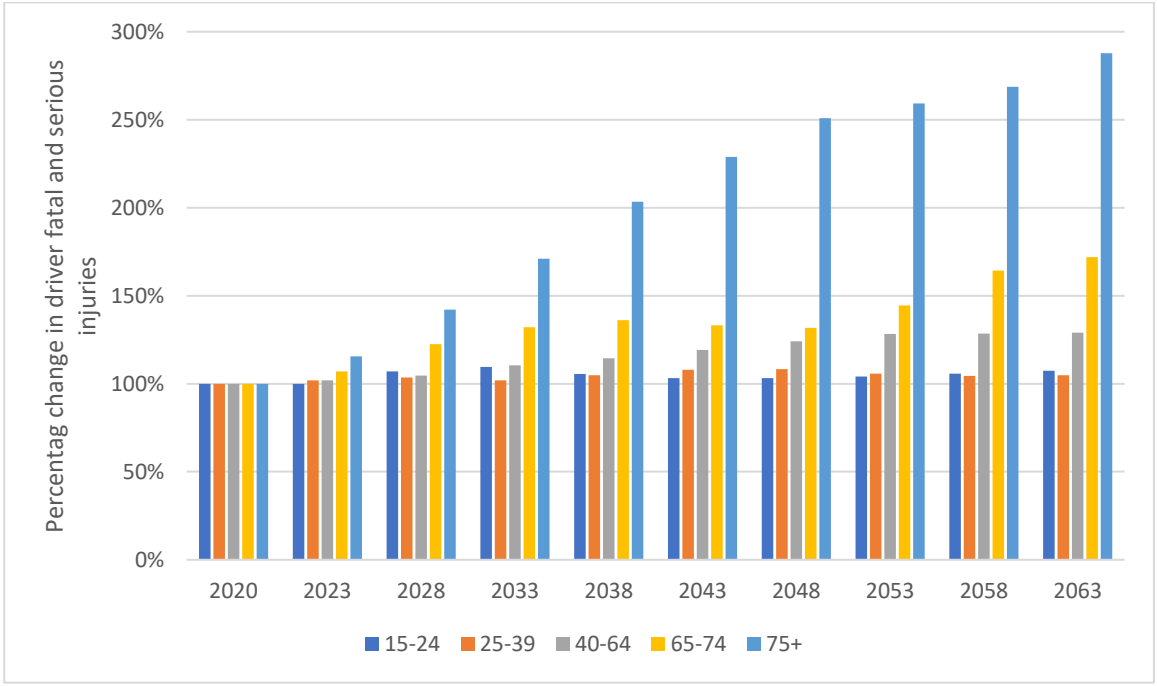
*Figure 35: Projected driver fatal and serious injuries (baseline 2020) for various age-groups*




This indicates relatively flat changes for the under-40s with population driven increases in driver fatal and serious injuries in the middle-aged and older groups, especially so for the 75+ group.

This is best highlighted by looking at the projected percentage changes for the various age-groups as depicted in *Figure 36*.

*Figure 36: Percentage change in driver fatal and serious injuries (baseline 2020) over time for various age-groups*

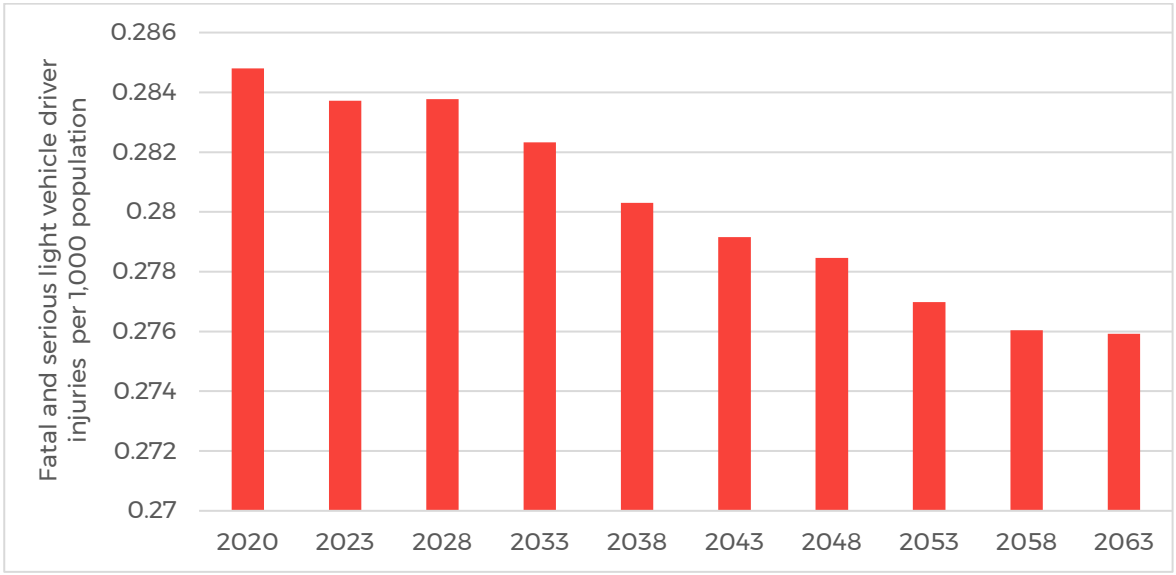



This chart highlights the large increases in driver fatal and serious injuries relative to 2020 levels projected for older age-groups over time, compared to younger age-groups.

## 11.3 Impact on total driver injuries over time

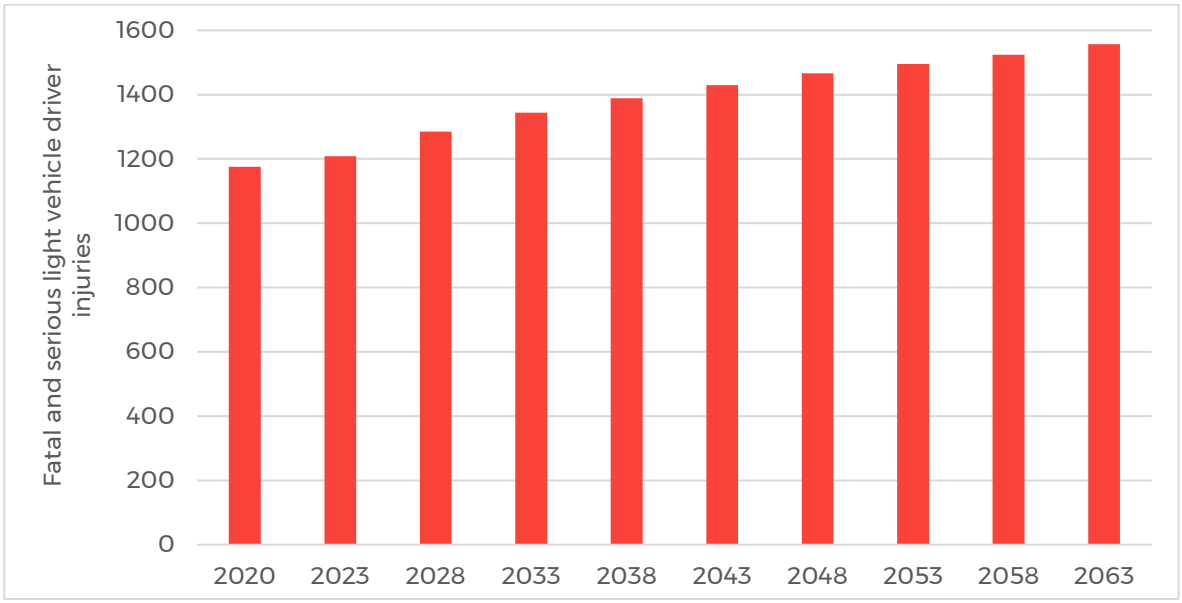
*Figure 37* depicts projected fatal and serious injuries, per 1,000 population to light vehicle drivers over a 12-month period, by year. It again is derived by combining age-specific population projections with crash injury figures. This rate drops off slowly over time with the 2063 figure being 3% lower than the figure for 2020. Given the assumptions used and their uncertainties, this result can be taken as indicating no change in the total injuries per 1,000 population over time.

*Figure 37: Projected driver involvement in fatal and serious injuries per 1,000 population to light vehicle drivers over a 12-month period, by year*




The growing population combined with the slightly reducing crash rate per 1,000 population results in the projected increase in light vehicle driver fatal and serious injuries depicted in *Figure 38*.

Figure 38: Projected fatal and serious light vehicle driver involvements by year




This section of the report is based on projections of the status quo. It does not take into account any future changes in vehicle technology, road infrastructure design, road safety policies, etc. Road and vehicle infrastructure are looked at in the older drivers-Infrastructure and vehicle issues part of the project.

### 11.4 Infographics insights

- The population is aging
- This will tend to improve safety as older drivers are safer in terms crashes per driver than younger drivers
- However, this will be outstripped by population growth
- This is projected to result in a 70% increase in fatal and serious driver injuries between 2020 and 2063 if preventative measures are not taken

Myth to bust: An aging population will tend to decrease road safety

False: It will tend to increase road safety

# 12 Summary of infographics insights

### 12.1 Distance driven by age and gender

- Males drive a lot more than females at all ages and particularly so after age 65
- Total driving drops off steeply from age 54 in males and age 44 in females
- Indicates that drivers self-pace

Myth to bust: Older drivers do not self-pace

False: They in fact do self-pace

### 12.2 Crash involvement -all modes

- Whatever mode is used, the risk per unit of exposure increases with age and becomes relatively high over the age of 80
- This applies to all modes including being a car passenger and non-motorised modes like walking and cycling and a major factor is increased fragility.
- When looking at the average fatal and crashes drivers have in a year the 70-79, and 80+ age-groups are the lowest, with women drivers predominating in the 80+. This could relate to there being more women than men in that age-group.

Myth to bust: Older drivers are a high crash risk group.

False: Drivers 80 years and older are involved in only 14.5% as many injury crashes as 40–49-year-old drivers

### 12.3 The role of fragility in determining crash outcomes

- After allowing for fragility killed male drivers/ billion kms driven bottoms out in the 70-79 age-group and rises in the 80+ age-group to around 2/3 of the 20-29 level
- For females the pattern is similar but at a slightly higher level of risk with the post-80 rise going to a little higher than the 20-29 level .

Myth to bust: New technology in vehicles means that it doesn't matter what age you are, you are equally protected.

False: Senior drivers are much more fragile than younger drivers even with the existing vehicle fleet (for example, greater prevalence of side airbags during intersection crashes).

## 12.4 Where and when do older drivers drive and crash?

- Driving becomes more urban focussed with age reaching around 50% urban (excluding urban motorways) by age 75+.
- Most older people drive predominantly during the day with little of their driving occurring between 7pm and midnight, and no driving between midnight and 6am being recorded for drivers over 69.

- Motorways, which are our safest roads for all ages, represent only 6.1 % of distance driven in the 75+ age-group.

- For all age-groups more than sixty percent of driver involvements in serious and fatal crashes occur in urban areas with the percentage approaching 80% in the 75+ age-group.
- As they age, drivers become more involved in daytime crashes (bright sun and overcast conditions) and less involved in night-time crashes. This is related to a tendency to drive less at night and more during the day.

Myth to bust: Older drivers are safe, as long as they stay in low-speed urban roads

False: Intersection crashes on urban roads have much higher rates of serious injury and fatality for older drivers (between 1.5 – 2.5 times higher) compared with younger age-groups (*Figure 22*). Locations like higher speed motorways/expressways are safer by comparison.

## 12.5 Crash patterns of older drivers

- Most older driver crashes involve collisions with another vehicle
- Older drivers have a greater proportion of their injury crashes at intersections than younger drivers
- Crossing/turning crashes feature prominently
- They are especially vulnerable to side crashes due to fragility.
- They adopt safer driving patterns than younger age-groups.

## 12.6 Lower mileage older drivers

Lower mileage drivers:

- Tend to be less healthy than their higher mileage counterparts
- Have higher crash rates per distance driven
- Have lower crash rates per year.
- This means they contribute less to the annual road toll than healthier older drivers

Myth to bust: Less healthy older drivers are as a group higher risk than healthier older drivers

False: They are lower risk as a group than healthier older drivers

## 12.7 International comparisons

- New Zealand has one of the worst car occupant death rates in the OECD over all age groups
- This is also true for the 65+ age-group.

- We trail several countries which are demographically older than New Zealand
- Some of  the best performers have substantially older populations than New Zealand.
- This indicates an aged population does not necessarily lead to safety problems
- Our relative position has worsened since 2005

Myth to bust: An aging population leads to safety problems on the road

False: older drivers are the safest group in terms of annual crashes.

## 12.8 Crash responsibility

- The percentage of involved drivers listed as primarily responsible for fatal and serious crashes increases with age after 60.
- Crashes are multifactorial and assessing primary responsibility is a fraught business.
- Assessments may be subject to unconscious bias towards the very young and very old.

## 12.9 New Zealand older driver safety in the future

- The population is aging
- This will tend to improve safety as older drivers are safer (i.e., crashes per driver) than younger drivers
- However, this will be outstripped by population growth
- This is projected to result in a 70% increase in fatal and serious driver injuries between 2020 and 2063 if preventative measures are not taken

Myth to bust: An ageing population will tend to decrease road safety

False: older drivers are the safest group in terms of annual crashes.

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