Our ageing population-how will it affect future road safety action requirements?

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Abstract

Introduction:

The populations of Australia and New Zealand are ageing. Older people generally have similar safety records as middle-aged people when crash rates per time spent travelling are compared. However older people are more fragile and do have different travel and crash involvement patterns. Addressing these differences may require changes in the mix of safe system road safety strategies and measures.

Methods:

Road Safety Statistics projections have been based on current safety levels applied to official Australian and New Zealand population projections. Middle-range population age projections have been used for both countries. Separate analyses were also conducted at a regional level for both countries. Projected fatalities for both countries have been calculated using two differing bases. First, actual overall per-population fatality rates have been used in conjunction with total population projections 2011–2056 to project future 'overall' fatalities. Secondly, actual age-specific per-population fatality rates have been used in conjunction with age-specific population projections to project 'age-specific' fatalities for the same period 2011–2056.

Results:

For both countries, assuming overall and age-specific death rates do not change, there will be minimal differences between the overall and age-specific fatality projection for 2011-2056. However, considerable regional variations in older road users' contribution to the future road toll are expected, due to differences in the distribution of different age groups within the two countries.

Conclusions

The mix of measures to maintain and improve road safety will need to change in response to the ageing population. The appropriate mix for a given geographical region in either Australia or New Zealand will need to be related to the age-distribution in that area. It is anticipated that highway design measures tailored to the requirements of older people will become more important as will the design of vehicles to avoid crashes and protect a more fragile population of road users, including those who are not vehicle occupants. Older, fragile, pedestrian numbers will increase considerably and measures will be required to protect them from motor vehicle injuries and also from non-motor vehicle injuries sustained on roads and road sides.

Keywords

Ageing, population, road safety

Introduction:

The populations of Australia and New Zealand are ageing, with older groups expected to increase in both absolute numbers and as a proportion of the total populations. Older drivers generally have similar road safety records, based on time spent driving, to middle-aged drivers. However, older road users generally are more fragile and have different travel and crash involvement patterns from other age-groups. To properly address the future safety needs of larger numbers of older road users will require changes to road safety strategies and measures. . This paper seeks to address the following issues:

- The impact of the expected changes in the population age structure on overall fatalities[1] in Australia and New Zealand.
- The impact of recent improvements in fatality rates on future fatalities.
- The impact of the expected changes in the population age structure on fatalities for the different road-user age groups and in different regions of Australia and New Zealand.
- The special challenges posed by older pedestrians.
- The implications of the changes for road safety strategies and countermeasures.

Methods:

Road Safety Statistics projections have been based on current safety levels applied to official Australian and New Zealand mid-range population projections. Separate analyses were also conducted at a regional level for both countries. Firstly, actual overall per-population fatality rates for 2006–2009 (New Zealand) and 2008 (Australia) have been used in conjunction with total population projections 2011–2056 for both countries to project future fatalities. These projections are referred to as 'Fatal overall' projections, and do not account for the population age structure. Secondly, actual age-specific per-population fatality rates have been used in conjunction with age-specific population projections, to project fatalities for the period 2011–2056. These are then summed to produce future fatality projections for all age-groups. These are referred to as 'Fatal age-specific projections', and account for the population age structure. The medium range population series used to prepare the various fatality projections assume medium health status, as represented by "mortality". To illustrate the changes which might come about from better or worse health status[2], lower and higher mortality series were also used to provide fatality projections. The special case of older pedestrians was looked at in terms of time spent walking and as to whether the injury occurred as a result of a collision with a motor-vehicle.

Results

The impact of population age-structure on future fatalities

Figures 1 and 2 portray projected fatalities for New Zealand and Australia, based on overall and age specific population growth, with road safety performance remaining constant. The figures show that given constant road safety performance, over time, the ageing populations in

[1] For the sake of brevity, the projections presented in this paper pertain only to fatalities. However, similar projections have been done using injury data. These projections are comparable to those for fatalities.

[2] There is no published set of series where only mortality is varied. Thus this factor is not able to be totally isolated.

both Australia and New Zealand are expected to produce relatively small increases in fatalities compared with equivalent population growth and no change in age-distribution. By 2031, the overall increase in fatalities is expected to be around 143% for Australia and 125% for New Zealand regardless of the underlying age structures.

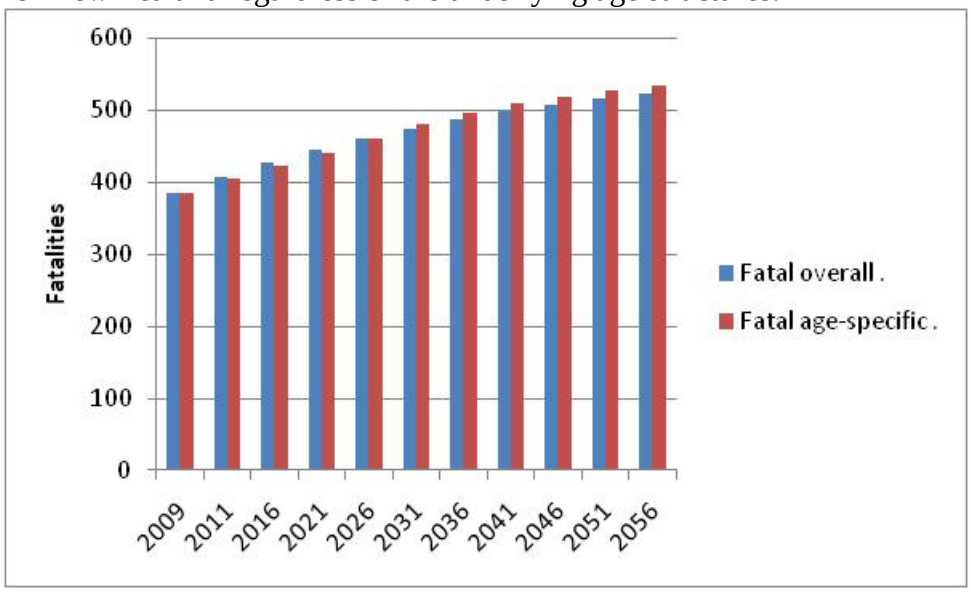

Figure 1: Projections of fatalities with overall population growth and age-specific population growth for New Zealand-Medium population growth assumptions

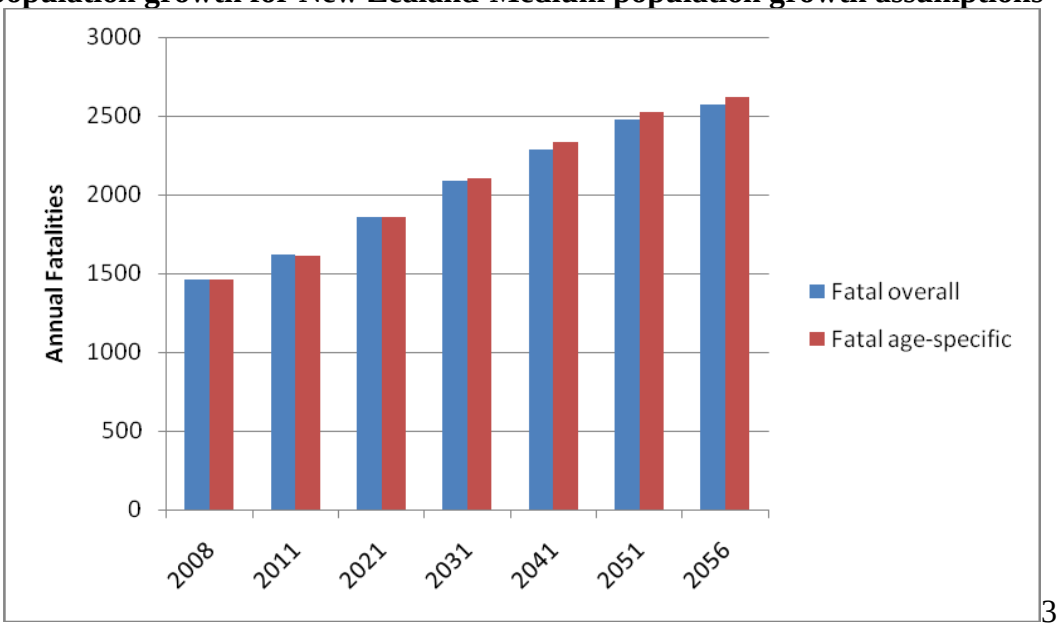

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Figure.2: Projections of fatalities with overall population growth and age-specific population growth for Australia-Medium growth population projections

The assumption of constant road safety performance is conservative, as in both countries, road safety has continued to improve over time (see Figures 3 and 4). Figures 3 and 4 relate to drivers from specified age-groups and illustrate that in both countries, the death rates of the middle-aged and the 65+ age-group have declined similarly. These declines represent a general phenomenon applying to all road users collectively, as illustrated in Figure 5 using Australian data. The declines are not unique to Australasia. In the US increases in trauma related to all age groups but particularly to older people predicted by Hu et al., 2000. .have not eventuated (Cheung et al., 2008). Inspection of FARS data, (figure 6) shows this lowering trend has continued into later years.

Thus, all other factors being equal, if road safety performance in Australia and New Zealand continues to improve, the projections shown in Figures 1 and 2 are likely to prove overly pessimistic.

Figure 3: New Zealand driver deaths per 10 0000 population, by age indexed so that 1999=1

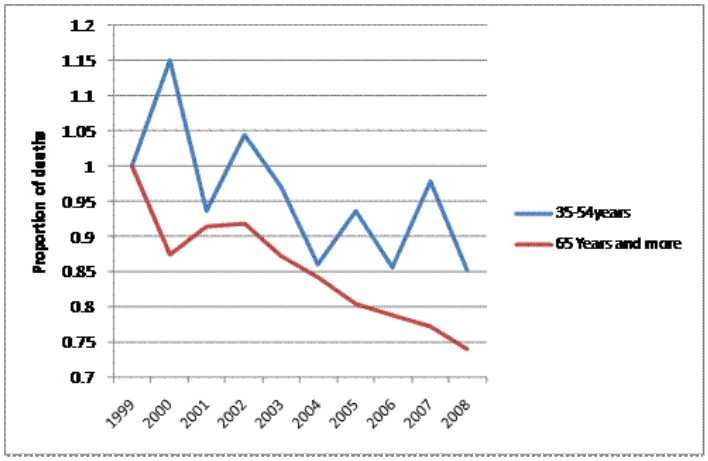

Figure 4: Australian driver deaths per 10 000 population, by age indexed so that 1999=1 DOTARS data

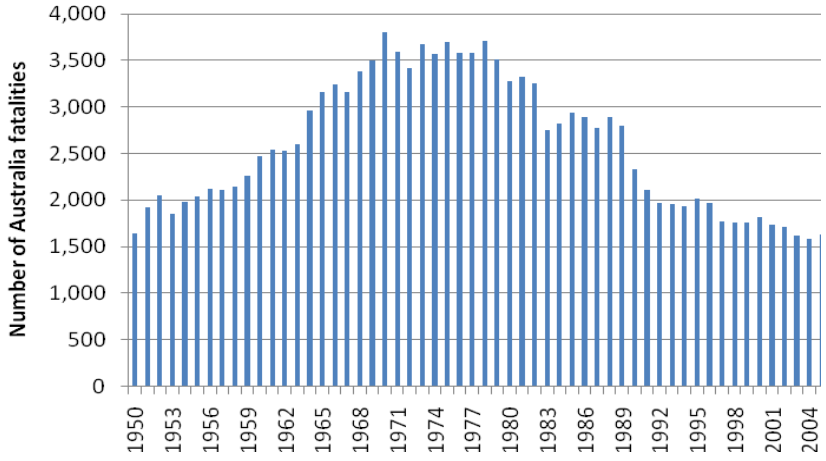

Figure 5: Road fatalities in Australia, 1950 to 2008

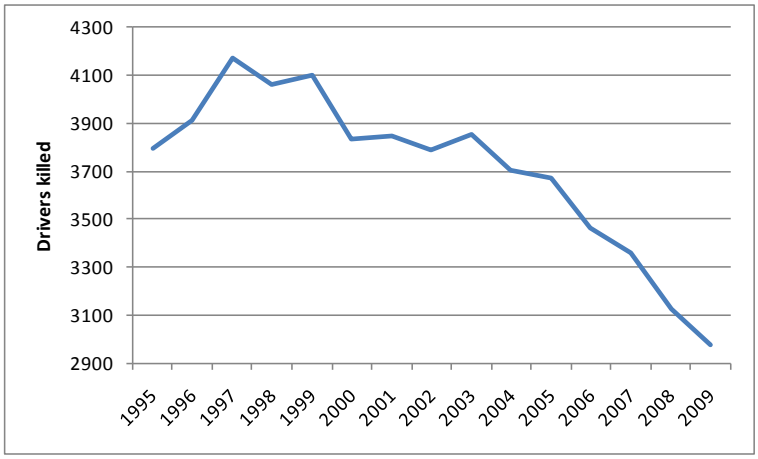

Figure 6: US drivers killed in light motor vehicle crashes who are aged 65+, by year

Future age-group contributions to fatalities in Australia and New Zealand

Time will inevitably bring changes in the contributions of various age groups to all road fatalities. These changes are illustrated in figure 7 (Australia) and figure 8 (New Zealand).

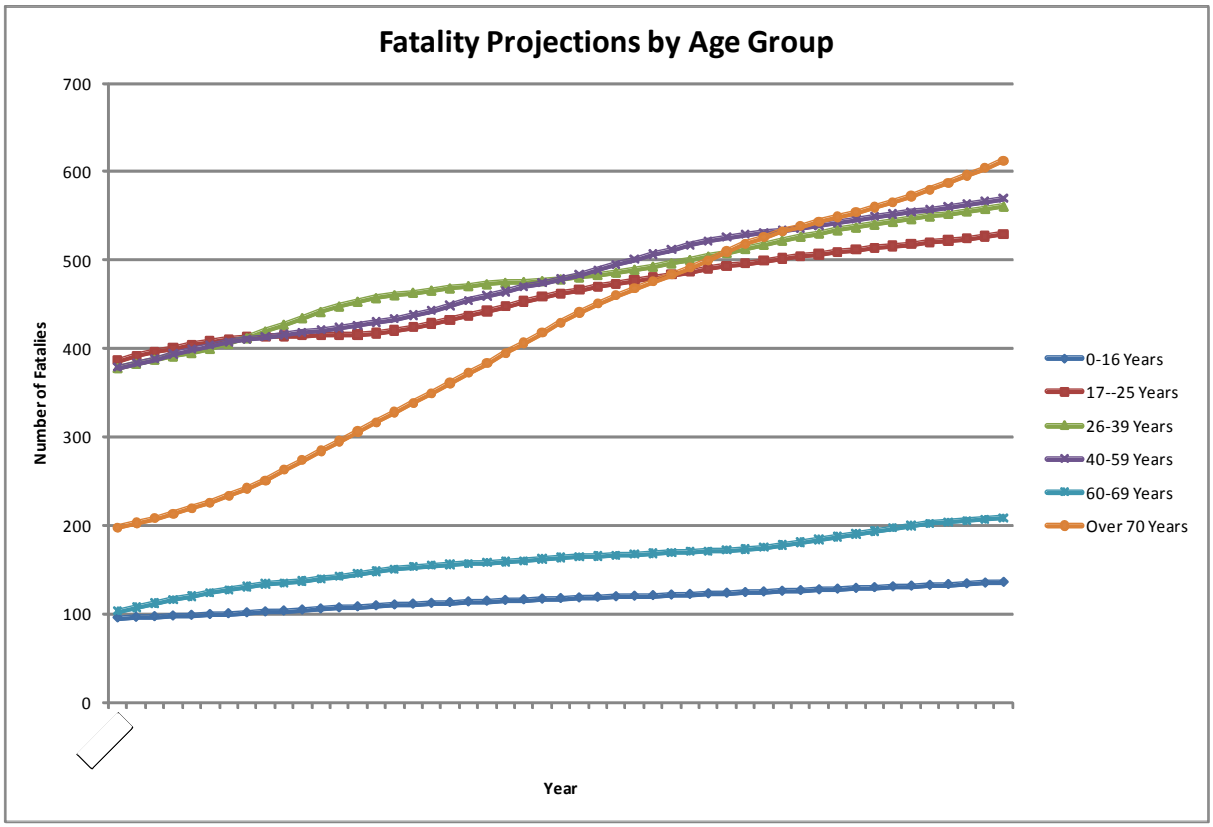

Figure 7: Projections of fatalities by age band for Australia (ABS series B-medium growth population projections)

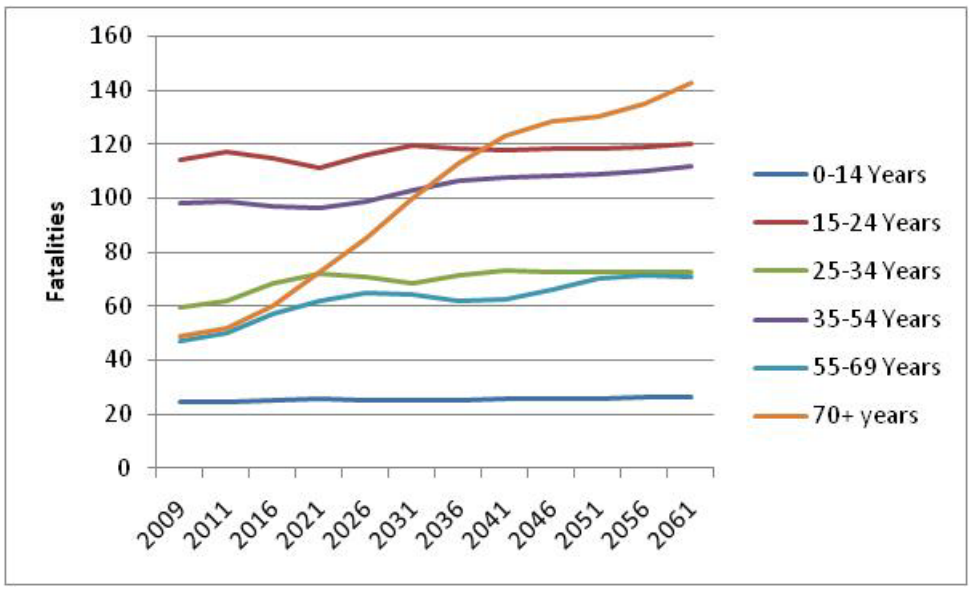

Figure 8:- Projections of fatalities by age band for New Zealand (Statistics NZ series 5 - medium growth population projections)

Assuming a constant road safety performance within all age-groups, and medium population projections, in both New Zealand and Australia, the numbers of fatalities from the 70+ age group will increase approximately three-fold to rival fatalities for some younger age groups by around 2040

The special case of older pedestrians

Projections of annual time spent walking[3] are given in Figure 9, (for all ages) and figure 10 (for the 65+ age-group.) There is an expected total increase in walking of 32% by 2056, most of which (22%) is expected to happen by 2031. Figure10 indicates that walking by the over 65s may increase by 173% by 2056, of which the first 113% is expected to occur by 2031

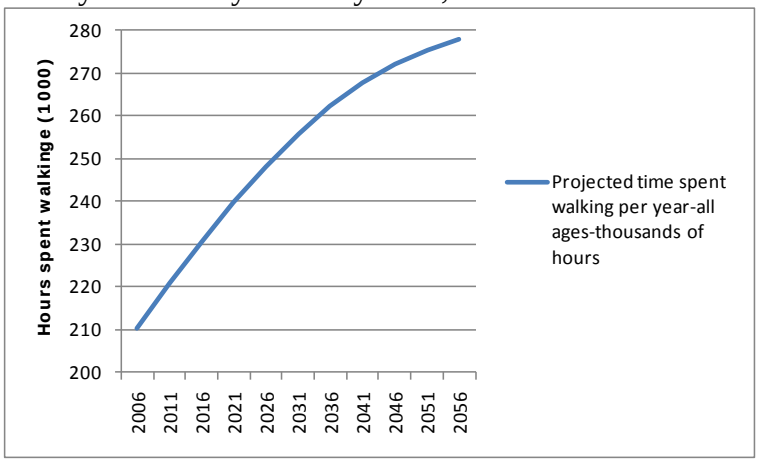

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Figure 9: Projected time walked per year-all ages-thousands of hours

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[3] Using New Zealand Travel Survey data and Statistics New Zealand age disaggregated medium population projections.

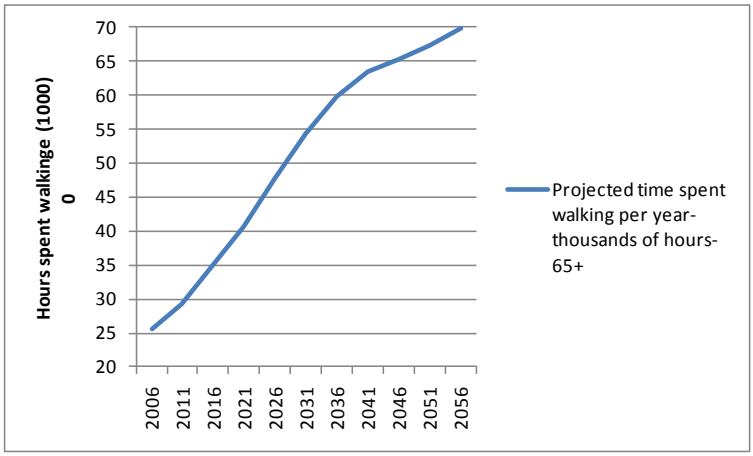

Figure 10: Projected time walked per year-65+thousands of hours

A major issue for older pedestrians is their increased fragility due to ageing. The older the pedestrian, the greater the risk of death or injury from a crash with a motor vehicle or from other injuries not related to a motor-vehicle. (Frith and Thomas, 2011) Older pedestrians account for increasing numbers of hospital admissions, with those aged 80 years and over having the highest admission rates. In New Zealand there are more than 20,000 insurance claims for pedestrian injury associated with the road or roadside per year. Figure11.(Frith and Thomas, 2011) shows estimates of Accident Compensation Corporation (ACC)[4] claims for non-motor-vehicle pedestrian injuries in New Zealand main urban areas, per million hours walked, compared to motor-vehicle risks for drivers, passengers and pedestrians.

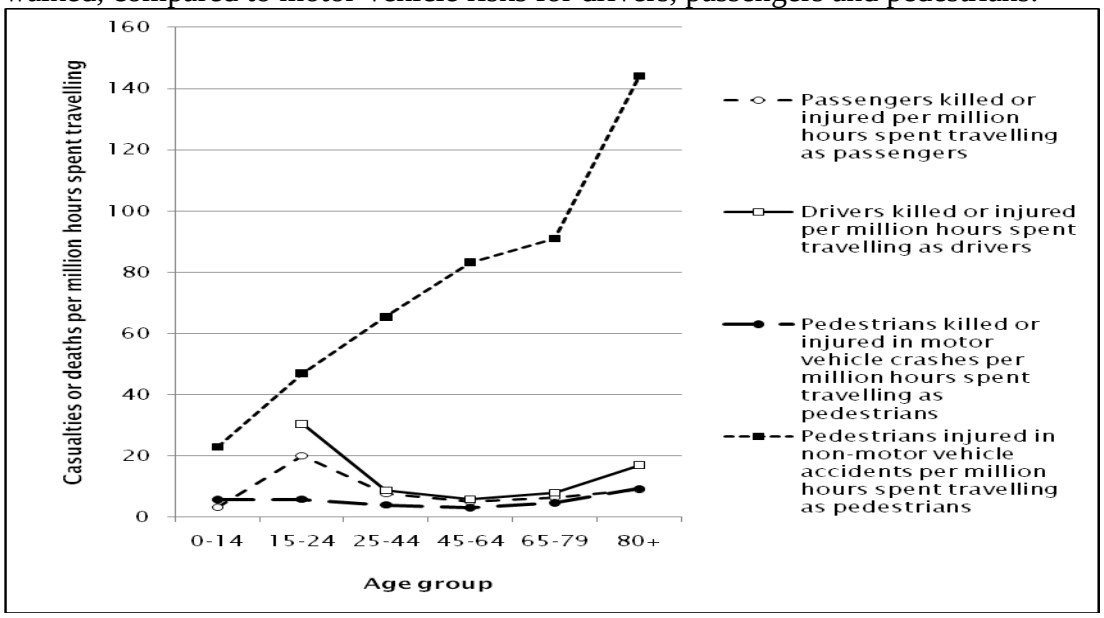

Figure 11: Urban risks per million hours travelled for drivers, passengers, pedestrians injured in motor vehicle crashes and pedestrians injured in non-motor vehicle accidents

It is apparent from figure 11 that the total injury rate per million hours walked for older pedestrians (composed of both vehicle and non-vehicle related injuries) substantially exceeds the rates for older drivers and passengers. How the severity of the non-motor vehicle

[4] The Accident Compensation Corporation (ACC) is New Zealand's no-fault personal injury insurance provider.

component of these pedestrian injuries compares with the motor vehicle component would be a profitable area for further research. It also shows that on the basis of time spent travelling, pedestrians are at less risk of fatal or serious injury from motor vehicle crashes, compared to drivers or passengers, until the age of 80 is passed, at which their risk approaches that of passengers.

The slopes of the curves indicate that older people are vulnerable as pedestrians, and become increasingly so with age. There is also the problem that those pedestrian injuries not involving a motor vehicle, though a substantial source of trauma, do not feature in our databases of road crashes, which includes only motor vehicle-related crashes. This has the effect of placing them generally below the radar of those engaged in road safety work, either locally or centrally, leading to a tendency towards benign neglect. Frith and Thomas, 2011 identified a number of infrastructural issues related to preventing non-motor-vehicle related pedestrian injury. These related generally to the predictability of the walking environment and the elimination of hazardous pavement discontinuities. Safer walking requires attention to these issues. Looking specifically at pedestrian injuries from vehicle crashes, different solutions are required – for example, greater pedestrian crashworthiness for vehicles, lower speeds, and better separation of pedestrians and vehicles. With the pending large increase in the older population, these significant pedestrian issues will become more urgent.

Regional projections of older road user fatalities for Australia and New Zealand

Projected older road user fatalities by Australian jurisdiction

Figure 12 shows the projected absolute numbers of older road user fatalities for 2011, 2031 and 2056 for each Australian jurisdiction and for Australia as a whole. These projections are based on the actual 2008 per-population fatality rates for those aged 70 years and older and the 2011–2056 ABS medium population projections (Australia and each jurisdiction).

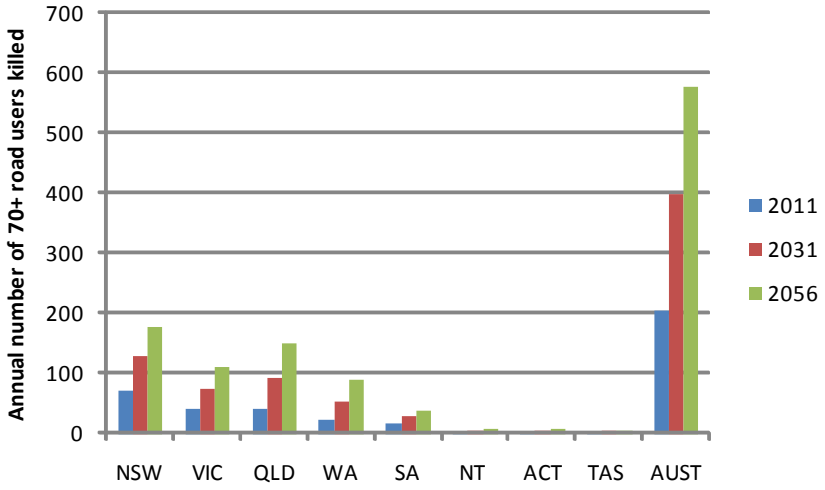

Figure 12: Projected absolute numbers of road users aged 70+ years killed for 2011, 2031 and 2056 for each Australian jurisdiction and for Australia as a whole.

All jurisdictions can expect a substantial increase in the numbers of older road user fatalities, with the highest numbers being in NSW, Queensland and Victoria. Figure 13 shows for Australian jurisdictions, older road user fatalities as a proportion of all projected road user fatalities at 2011, 2031 and 2056.

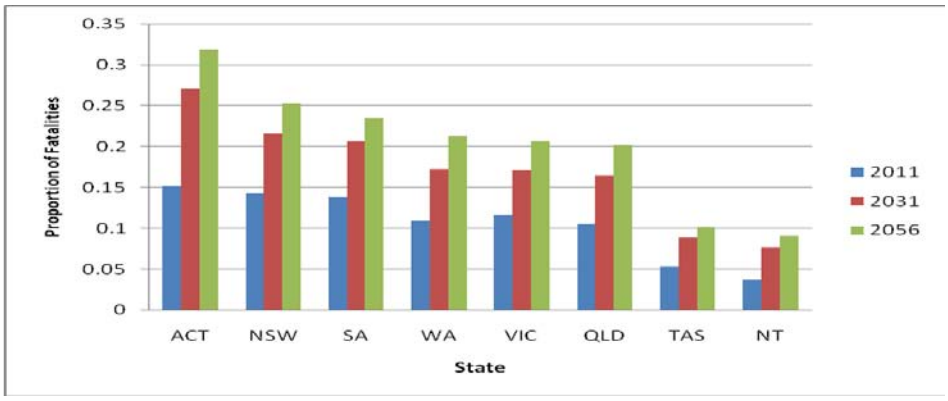

Figure 13: Projected proportions of all fatalities who are road users aged 70+ years for 2011, 2031 and 2056 for each Australian jurisdiction.

The ACT consistently has the highest proportion of road fatalities from the older age group, followed by NSW and SA. Tasmania and the Northern Territory consistently have the lowest proportion of older road user fatalities. It is expected that for the largest jurisdictions (NSW, Victoria, Queensland and WA), older road user fatalities will be in the range 20–25% of all fatalities by 2056, with Queensland only just exceeding 20% by 2056. Thus, Queensland, while having the largest projected fatality growth, has a relatively low 70+ projected fatality proportion. This is related to Queensland's projected interstate and international migration drawing more heavily upon younger age groups[5]. These projected differences between jurisdictions in both the absolute number and proportion of older road user fatalities mean that in moving towards a safe road transport system, each jurisdiction will need to apply Safe System principles to its particular situation. One size will not fit all.

Projected older road user fatalities by New Zealand Region

There is large regional variation in the growth of older drivers' travel relative to the growth of all drivers' travel. (Frith, Langford and Mara, 2011). All regions expect older driver growth greater than 80% by 2031. Six regions have overall growth under 10% with two, West Coast and Southland, having a projected reduction in travel. Fatal and serious injury data have been projected at a regional level for the age groups 0-14 years, 15+years and 65+years up to 2031. Figure 14 shows the percentage change in fatal and serious injurys in the three specified age-groups, indexed to the actual figures for the five year period 2004 to 2008. Figure 15 indicates that large increases in the percentage of all deaths and serious injuries accounted for by older people's are projected to occur by 2031. As .in Australia, any road safety programmes related to older road users will need to be worked out locally in relation to the local network needs.

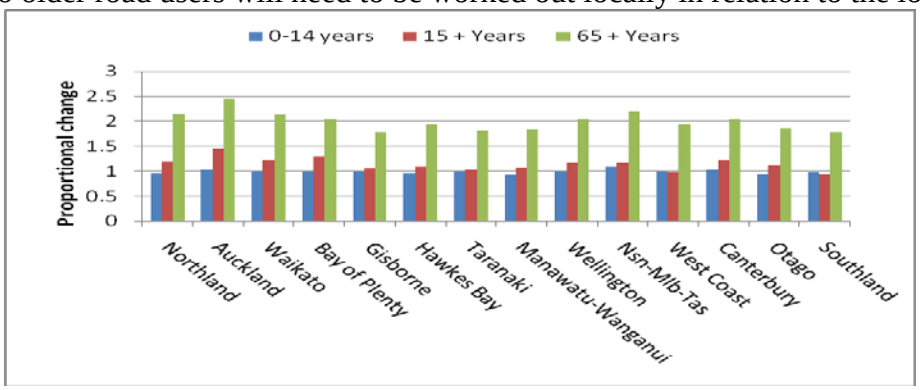

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Figure 14: Percentage change in fatal and serious injuries in the three specified age-groups, indexed to the actual figures for the five year period 2004 to 2008.

[5] http://www.cabinet.qld.gov.au/mms/StatementDisplaySingle.aspx?id=67555

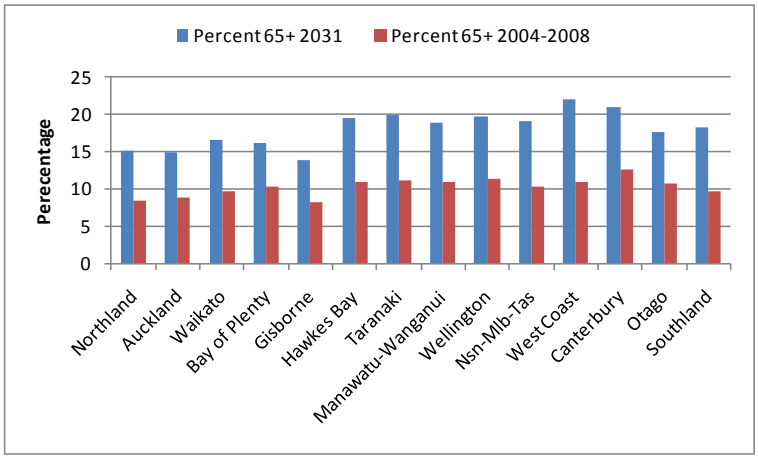

Figure 15: Percentage of all fatal and serious injuries happening to people 65+ 2004-2008(actual) and projected 2031.

The impact of health status on future older road user fatalities

There is divergent opinion on the future health status of ageing baby boomers – with the OECD Working Group, 2001 pointing to possible improvements relative to previous generations, and Dobbs, 2008 and others suggesting that baby boomers in their old age may be less healthy than their parents. The purpose of this section is to assess the impact of different assumptions regarding health status on future older road user road fatalities. This has been done by projecting New Zealand[6] per-population fatality rates using low, medium and high, age specific population projections over the period 2011–2056 to estimate expected fatalities. This is illustrated, for all ages by figure 16. The low growth series assumes high mortality (i.e. less healthy population) and the high growth series, low mortality (healthier population). It is evident from Figure 16 that possible changes in future health status would have a direct impact of around 10 percent on 'middle of the road' fatality projections by 2031 and of around 15% by 2056. However it is possible that changed health status may have indirect, and interrelated, impacts on future fatality and serious injury levels not reflected in population based fatality projections.

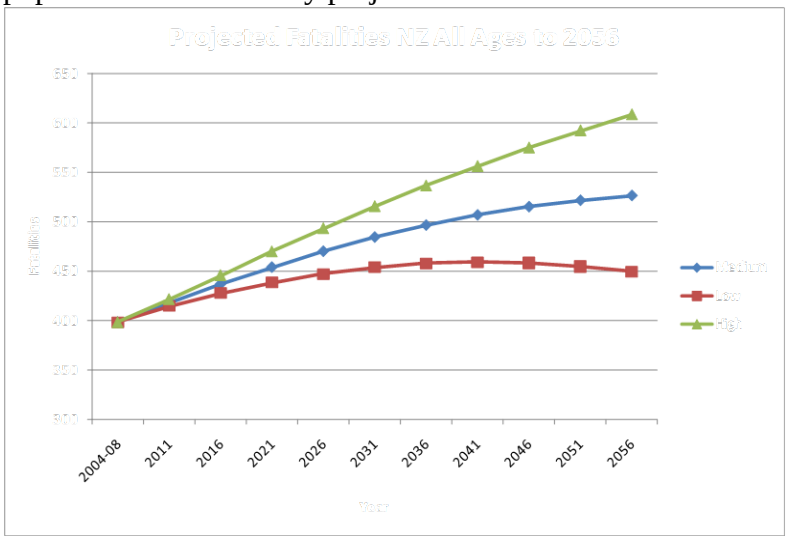

Figure 16: Projections of all age-group fatalities for New Zealand using high medium and low assumptions

[6] Published Australian population projections suitable for this purpose were not available

Possible examples are:

- reduced health resulting in reduced fitness to drive leading to more crashes and injuries
- reduced health resulting in reduced driving and fewer crashes and injuries
- improved health resulting in increased fitness to drive and thus reduced crash involvement, including fewer crash-related deaths and serious injuries;
- improved health .resulting in increased driving, and thus greater crash involvement, including more crash-related deaths and serious injuries

How the combined impact of health-related factors will affect future fatalities is yet to be assessed with any precision.

Conclusions

Assuming, conservatively, that present levels of road-safety across the board persist, by weight of numbers, older people are expected to contribute to a larger percentage of the road toll. By around 2040 this contribution is estimated to be about as large as the other main age-groups. Notwithstanding, the total road toll is projected to be only slightly larger than for the same population and today's age distribution, given no change in road safety performance.

Over the last decade or so road safety has generally improved in developed countries, including Australia and New Zealand. If this trend continues, projections based on the assumption of constant safety performance will be proven to pessimistic.

Large projected increases in pedestrian traffic among older age-groups are likely to result in more pedestrian trauma, both motor vehicle related and non-motor-vehicle related. Because non-motor vehicle related pedestrian trauma does not feature in crash data bases, the full problem of pedestrian injuries is largely invisible to the road safety community

Older people's contribution to road trauma will vary with the population age profiles of in the various regions of Australia and New Zealand. This means that in order to move towards a safe road transport system, each jurisdiction will need to look at the appropriate mix of measures for its particular situation. One size will not fit all.

Variations in mortality (as a surrogate for health status) are likely to make only moderate direct differences to older age-groups' future road fatalities. However, other health related impacts on driving behaviour may occur and are difficult to predict.

Recommendations

- That road safety decision makers at both national and regional levels take full regard to demographic change in setting up their safe system based road safety programs.

- That non-motor vehicle pedestrian injury prevention be recognised as an important part of road safety and brought into the road safety mainstream as an area for developing countermeasures within the safe system approach.

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