THE LIMIT OF SPEED LIMITS

EVIDENCE FROM 10+ YEARS OF VICTORIAN CRASHES

Council iWatch
KEEPING THEM HONEST

MAR 2025

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ACKNOWLEDGEMENTS

We would like to express our deepest gratitude to our members, volunteers, and those in the general public that have donated and contributed time or money either as part of this effort or in previous opportunities. Without you Council Watch would not exist.

EXECUTIVE SUMMARY

Road accidents and speed limits have become the target of much press and policy proposals in the last five years. The State government, and Councils such as Yarra and Stonnington have implemented, or are planning to implement, further speed limit reductions on the back of, however, ever-low rates of accidents. These figures are not usually reported on or referred to since they do not drive headlines or desired policies, but it is nonetheless the reality of Victoria and Australia when the somewhat stable number of yearly accidents is contrasted against the ever-growing population of the State/Country.

This study was commissioned to address some of the pitfalls of the current policy conversations and bring to light the reality that Australia enjoys despite all the negative coverage: we are a country where it is increasingly safe to drive, to be a pedestrian, or a cyclist.

We analyse the publicly available crash data from the Department of Transport and analyse it from 2021 to 2023 (as 2024 still has pending investigations by Victoria Police) and focus on general trends as well as on the target (vulnerable) accidents relevant for the currently discussed policies (i.e. pedestrians, cyclist, and motorbike riders).

We find that:

- The number and proportion of accidents has remained somewhat stable across the years, however when adjusted by population growth, **this results in decreasing accident rates by 100,000 people**. This decrease is seen **for all accident types and severities analysed**.
- The aforementioned decreases in accident rates are in line with projections and estimations by the World Health Organization's Global Health Observatory and follow a downward trajectory that can be observed starting as far back as 25 years ago. This strongly suggests that **recent decreases in accident rates could be attributed to a wider trend towards safer driving and improved outcomes after a crash (due to many factors), rather than being the consequence of more recent reductions in speed limits**.
- **There is no compelling evidence that reducing speed limits below 50 km/h decreases the likelihood of a vulnerable road user experiencing serious or fatal injuries**. This applies to pedestrians as well as the wider "vulnerable" group.

Based on these observations, we thus recommend that:

- **All 30 km/h zones (current or in plan) are discarded**, to allow the current '50 km/h unless otherwise signed' rule to take place in local streets. This is a much cheaper policy approach than changing all signs for new ones.
- **40 km/h zones are considered only for highly sensitive times and areas**, such as around school pick-up and drop-off times, as it is current practice, and that 40 km/h zones are abandoned around busy business precincts wherever safe to do so based on patronage data.
- **Lower limits are kept for very specific settings only**, such as carparks and shared driveways.

These recommendations are guided by the current data available from the Department of Transport and follow international trends, as well as the historical safety guidelines that have allowed Australia to become the safe place it has been (and is still further becoming). This approach strikes the ever-elusive political balance without further interventions that create risks of slowing down the economy, create unnecessary population discontent, and create the risk of having to remove said limits once more in the future (at further taxpayer cost). For policymakers, following these recommendations is sure to bring respite from ever-increasing population criticism and avoids unnecessary costs; issues that will be key in the upcoming State and other elections.

INTRODUCTION

Road accidents and speed limits have become the target of much press and policy proposals in the last five years. The City of Yarra, for example, is currently expanding the reach of 30 km/h zones[1], and the Stonnington Council is currently considering implementing many such zones across its jurisdiction as part of its Road Safety Improvement Program[2]. The State government has also recently announced such policies State-wide[3]. This, however, against a backdrop of extremely low rates of fatal accidents, especially involving pedestrians, which are the main road users being used to justify these changes.

Analysis of the news coverage shows a similar picture. The Age, for example, has recently published[4] that "a total of 3890 people have died on Victoria's roads over the past 15 years", but without the context that Victoria has had over 5.5 million people since mid 2010, and that 3890 deaths in 15 years is ~259 deaths per year, equating a rate of less than 5 people per 100,000 residents, per year, on average. Coverage by Yahoo News[5] similarly focuses on raw numbers, however this time over all of Australia: "Research conducted by the federal Bureau of Infrastructure and Transport Research Economics (BITRE) showed that 1,300 people died on Australian roads in 2024 — up from 1,258 in 2023." This however omits the fact that Australia was a nation of already over 27 million as of mid 2024, and thus shows a rate comparable to Victoria of less than 5 per 100,000 people for the last year. To put this in perspective, this is below the rate for a disease to qualify as rare according to the Department of Health and Aged Care.[6] In fact, and according to the Global Health Observatory data repository from the World Health Organization, Australia enjoys some of the safest roads in the world in terms of road deaths[7], with a steady downward trend from the last 25 years going down from 9.9 per 100,000 in the year 2000 to 4.9 in the year 2019. With comparable rates, Victoria gets to share in the glory.

These exceedingly low rates and global leadership in terms of road safety have however not stopped policymakers proposing new changes aimed at further reducing the numbers of deaths – mainly in the form of reductions in speed limits, at the risk of population discontent (and an ever-increasing cost to the taxpayer) –, all while ignoring studies and data. Between 2017 and 2020, the City (Council) of Yarra commissioned a 30 km/h speed limit trial to Monash University's Accident Research Centre[8], and implemented the 30 km/h zone despite the report's findings showing meagre returns for said proposal: "the risk of sustaining a serious or fatal injury (given a collision) reduced from 0.24% before to 0.23% after treatment." Similarly, Stonnington is aiming to expand 40 km/h zones and trialling 30 km/h zones across many local streets, despite the fact that most of the crashes involving those defined as "vulnerable users" (people who were walking, riding a bike or riding a motorbike) do *not* occur on local streets as shown in the (publicly available) interactive visualisation of Transport Victoria's Victorian Road Crash Data[9].

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[1] Your Say Yarra - Yarra City Council green lights expanded 30km speed limit trial, 9 May 2024. https://yoursayyarra.com.au/30km/Council-green-lights-new-30km-h-speed-limit-trial, visited on 4 Mar 2025.
[2] Road Safety Improvement Program | Connect Stonnington, https://connectstonnington.vic.gov.au/RSIP, visited on 4 Mar 2025
[3] Alexandra Feiam. *State's proposal to slash speed limits on residential streets to 30km/h*, News.com.au, 4 March 2025
[4] Brittany Busch and Craig Butt, *Victoria's road toll by the numbers: View 15 years of data for your suburb*. The Age, 3 Jan 2025.
[5] Joe Attanasio, *12-YEAR HIGH: Urgent warning over deadly trend on Aussie roads*. Yahoo! News, 28 Jan 2025
[6] *What we're doing about rare diseases*, Department of Health and Aged Care, Australian Government, https://www.health.gov.au/topics/chronic-conditions/what-were-doing-about-chronic-conditions/what-were-doing-about-rare-diseases, visited on 5 Mar 2025.
[7] Road traffic deaths - Data by country, Global Health Observatory data repository. World Health Organization. Accessed 5 Mar 2025.
[8] Lawrence B., Thompson L., Newstead S. Oxley J. & Fildes B. (2020) *Final Report of the Evaluation of the 30km/h Speed Limit Trial in the City of Yarra*
[9] Transport Victoria – Victorian Road Crash Data. https://experience.arcgis.com/experience/80651f18ee9242d4a64269520a1a4a0f/, visited 5 Mar 2025.

On the other hand, other comparable governments are slashing said policies. The current New Zealand government has recently announced[10] that they would be *reversing* the previous government's blanket approach to speed limits – approach similar to what we are currently observing in Victoria – citing the limits slowed down the economy and that the limits, in some cases, made no sense. The move is also reported to have wide population support and reflects the sentiments of many interviewed as part of the aforementioned 30 km/h Yarra zone trial.

Many questions are left unanswered by the officials' statements, so this study was commissioned to address some of these pitfalls. Considering that more people by logical extension imply more accidents, what happens when we normalise by population like many other reports do? What is the trend in time for the available data? How do we compare with the wider world? At what point do reductions in speed limits enter the zone of diminishing (or negative) returns? Policy implementations are costly, after all, and while all human lives are precious and every life lost on the road is one too many, road deaths will never be zero, especially in a growing country such as Australia. Councils and State governments are also facing economic and popularity pressures, so determining what policies are sound investments is critical as well.

The aforementioned data from Transport Victoria is a rich, publicly available data source that can be visualised, downloaded and analysed by the general public. This study has thus analysed the data from 2012 to 2023 and focused both on general trends as well as on the target (vulnerable) accidents on focus for the currently discussed policies. We have also calculated the likelihood of accidents for the relevant group of becoming fatal or serious, to complement the analyses and discussions pertinent to said user group.

We found that although the number of accidents in the years after Victorian lockdowns has been higher than some pre-pandemic years, **the rate of accidents by population keeps decreasing**, in line with the trend shown by the aforementioned WHO data. Additionally, the rate of accidents is **decreasing for all types of injuries** (fatal, serious, and non-serious accidents). When we focus on accidents involving vulnerable road users (hereby labelled *vulnerable accidents*) we find that, although on average they account for ~21% of all road accidents on a yearly basis, **only 0.4 – 0.5% of them are fatal**; a figure that remains stable throughout the years. The rate of these vulnerable accidents is also decreasing for all the injury types described. Finally, we show that **the proposed speed reduction policies will *not* reduce the likelihood of these vulnerable accidents becoming serious or fatal**, as the likelihood is not significantly reduced with limits lower than 50 km/h.

The results obtained in this study are consistent with global trends and external analyses, and thus can be regarded as very reliable. For example, the calculated fatal rates are within the boundaries of estimates performed by the WHO, and the likelihood of reduction in injury risk with decreasing speeds shows a behaviour similar to what has been observed in previous studies analysing the impact of speed reductions in Victoria[11]. Additionally, comparison with the historic WHO data **strongly suggests that the recently observed reductions in fatal or serious accidents has *not* been a result of recent changes in speed limits**, as the downward trend predates said interventions.

Taken together, **we find no compelling evidence for implementing limits below 50 km/h in local streets**. We nonetheless recognise there is still room for exceptional 40 km/h zones around schools during pick-up and drop-off times, and lower speed limits in very specific places such as shared driveways and carparks, as it is current practice.

[10] Hon. Simeon Brown. *Government delivers sensible approach to speed limits*. 28 Sep 2024.
[11] Fildes, B.N., Lawrence, B., Thompson, L., Oxley, J. (2022). *Speed-Limits in Local Streets: Lessons from a 30 km/h Trial in Victoria*, Australia. In: Edvardsson Björnberg, K., Belin, MÅ., Hansson, S.O., Tingvall, C. (eds) The Vision Zero Handbook. Springer, Cham. https://doi.org/10.1007/978-3-030-23176-7_34-1

METHODS AND RESULTS

State-wide Accidents, 2012-2023

As previously mentioned, headlines and announcements have focused on the increasing number of road accidents in Victoria in the years since returning to "business as usual" after the pandemic. While in absolute terms the number of accidents has indeed increased in the years following Victorian lockdowns, the numbers are not substantially higher than pre-pandemic years (Figure 1A). Furthermore, when controlling for population, the rate of accidents shows a clear downward trend in time (Figure 1B). This effectively shows that accidents are becoming less frequent as a function of population growth.

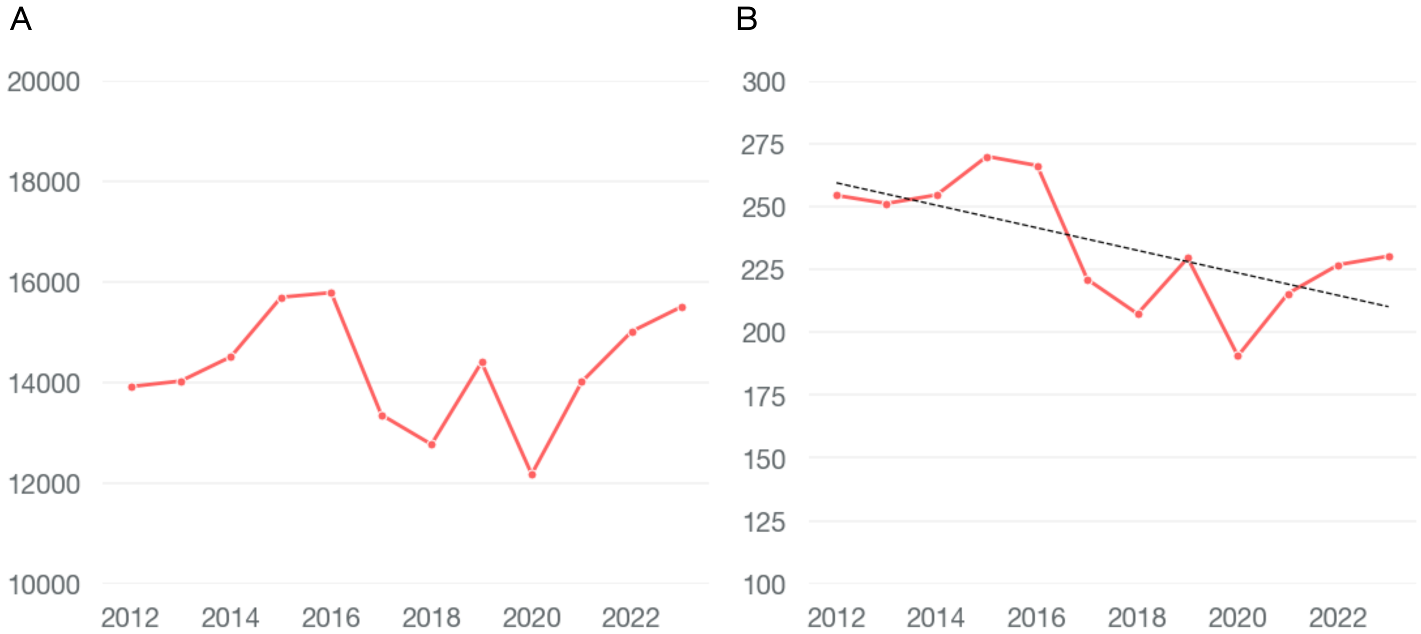

Fig 1. Accidents in Victoria. A: Total number of accidents by year. B: Rate of accidents by year by 100,000 people.

Breakdown by Severity

When analysed by severity, accidents tend to show a somewhat stable pattern, despite some dispersion in some severity categories. Fatal accidents average 235 ± 24 a year for the period analysed, serious injuries average 5173 ± 411 a year, and accidents involving 'other injuries' are the events with the most dispersions, averaging 8851 ± 1073 a year (Figure 2A). Nonetheless, the proportion of these accidents remains remarkably stable in time: fatal accidents are on average 1.6% ± 0.1 of the total accidents across these categories, serious accidents 36.4% ± 3.5, and 'other injuries' are 61.9% ± 3.6 (Figure 2B). When normalised by the growing population in Victoria, however, the observed stability across the years transforms into a downward trend for all three types of categories (Figure 3A-C). This shows that the aforementioned downward trend in total accidents is an effect of all types of accidents showing a decrease in relative frequency.

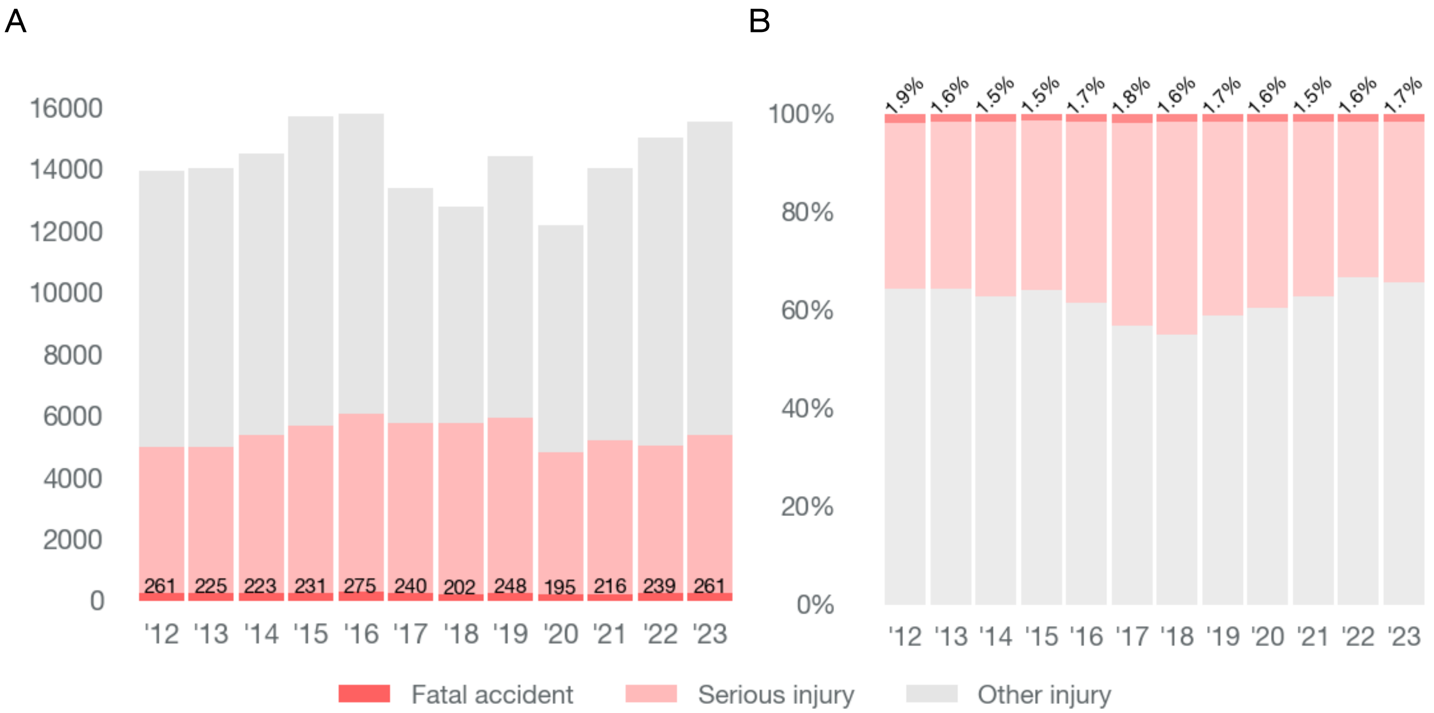

Fig 2. Accidents in Victoria by severity. A: Total number of accidents. B: Proportion of total accidents. Data corresponding to fatal accidents is highlighted

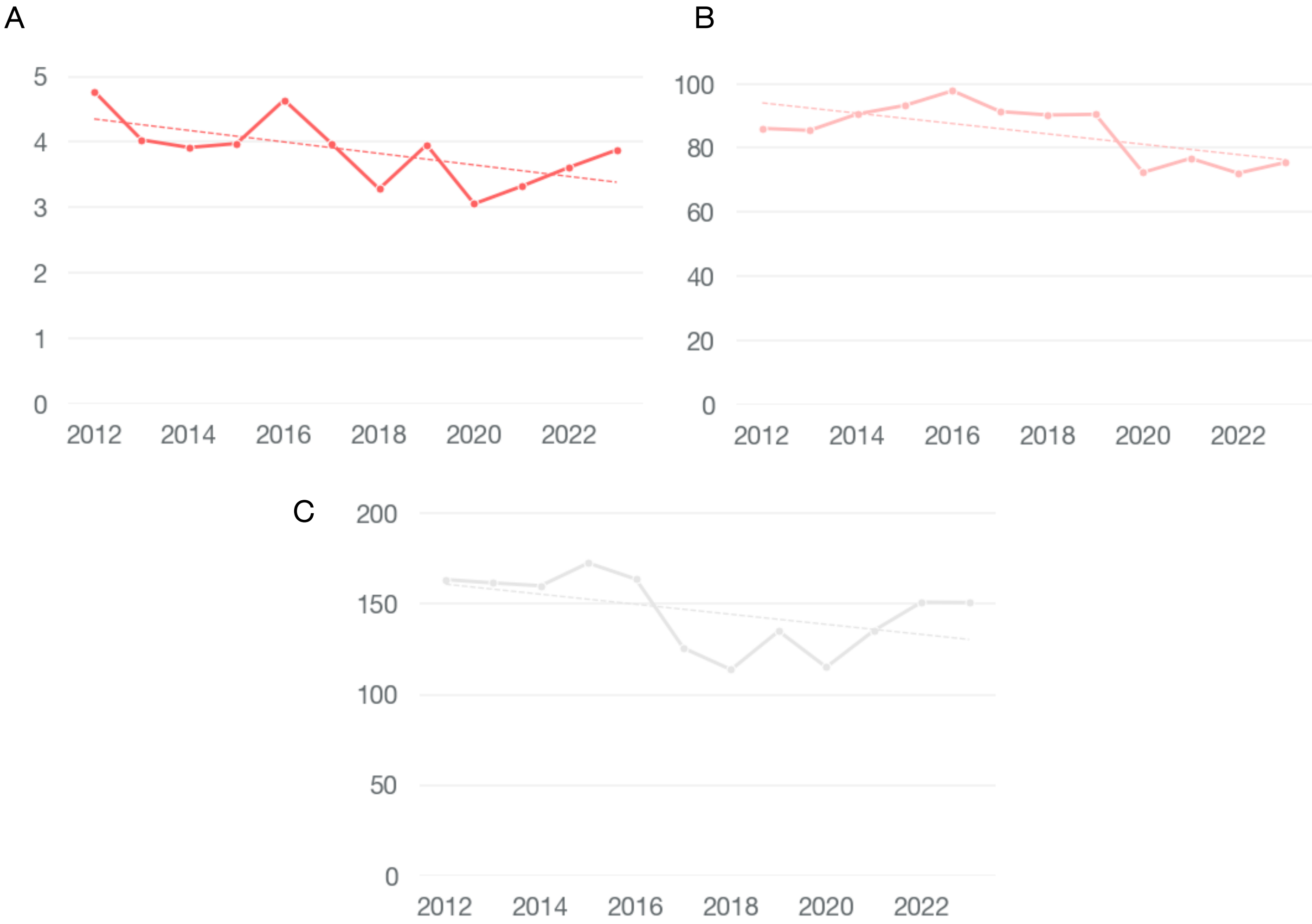

Fig 3. Rate of accidents in Victoria by severity, by 100,000 people. A: Fatal accidents. B: Serious injury accidents. C: 'Other injury' accidents

The fatal road rate observed follows the historical trend for Australia that can be observed in the road traffic deaths dataset by the Global Health Observatory data repository of the World Health Organization – the rate is within the lower bounds of the estimations (Fig 4). This strongly suggests that the current reductions in fatal and serious injury accident rates across Victoria are the result of a historical downward trend that predate many of these interventions, rather than a result of the speed reductions observed in the last decade.

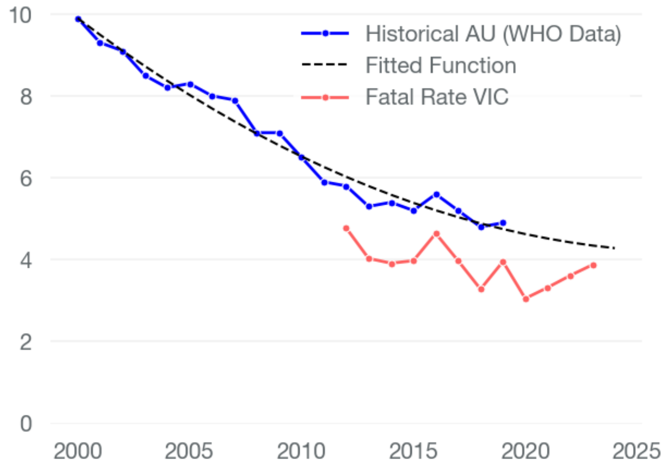

Fig 4. Rate of fatal accidents in Victoria and Australia, by 100,000 people. Rate of fatal accidents for Australia (mean of estimates) and Victoria, by 100,000 people, and fitted quadratic function for trend visualisation purposes.

Vulnerable Accidents

Many proposed road management policies focus on those who have been deemed by policymakers as "vulnerable road users", which include pedestrians, cyclists and motorcycle riders. Accidents where these road users are involved understandably deserve special consideration due to the higher likelihood of these people suffering severe or fatal injuries following a crash, and speed reduction policies espoused by governments of all levels and political leanings are aimed towards reducing the likelihood of these users of suffering irrecoverable injuries.

There are, however, vehicles that are not subject to these policies. Trains, for example, do not follow road speed limits. Trams and tractors also travel much more slowly than the road limit of the road where they normally transit. As such, to understand the accidents and situations that would be in scope for the aforementioned policies, accidents involving such vehicles were excluded from analyses of vulnerable users. Incidents where a tram hit a bike were excluded, for example (see the methodology in detail for the complete list of exclusions). This exclusion meant a reduction of around 3.9% of accidents across the dataset, and this result is relevant in the context of the implementation of speed reduction policies for more "general" vehicles, such as cars, motorcycles, and trucks, as it is thus estimated that ~4% of accidents will be out of scope and will require new or revamped personal awareness policies, such as the ones aimed at train users to stay behind yellow lines.

Notwithstanding this exclusion step, and in line with previous results, the proportion and total number of vulnerable accidents remained remarkably stable in time, averaging 3014 ± 223 incidents a year, or 21.2% ± 1.3 of the total accidents in scope (Figure 5A). As with previous results, the observed stability transformed into a decreasing rate of vulnerable accidents as population increased in Victoria throughout the analysis period (Figure 5B).

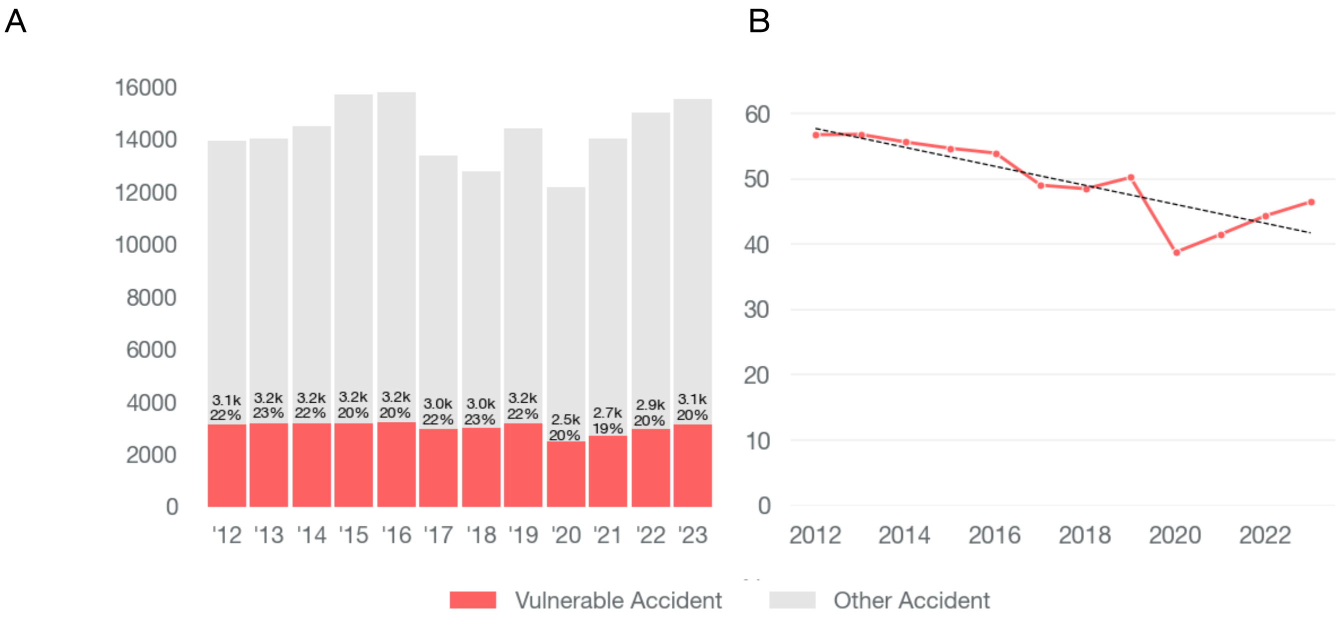

Fig 5. Vulnerable accidents. A: Total number of accidents. Data corresponding to vulnerable accidents is highlighted. B: Rate of vulnerable accidents by 100,000 people.

As accidents involving these vulnerable users also range in severity, decomposition of these is critical, and so are the appropriate frequency calculations as part of the larger road usage context. In this light we observed that fatal vulnerable accidents consistently range between 0.4 – 0.5% of the total accident pool, while serious injuries constitute on average 9.0% ± 0.9 of the total accident pool on a given year (Figure 6A). Once again, this stability translated into a decreasing rate of vulnerable accidents in time for all accident severities (Figure 6B-D).

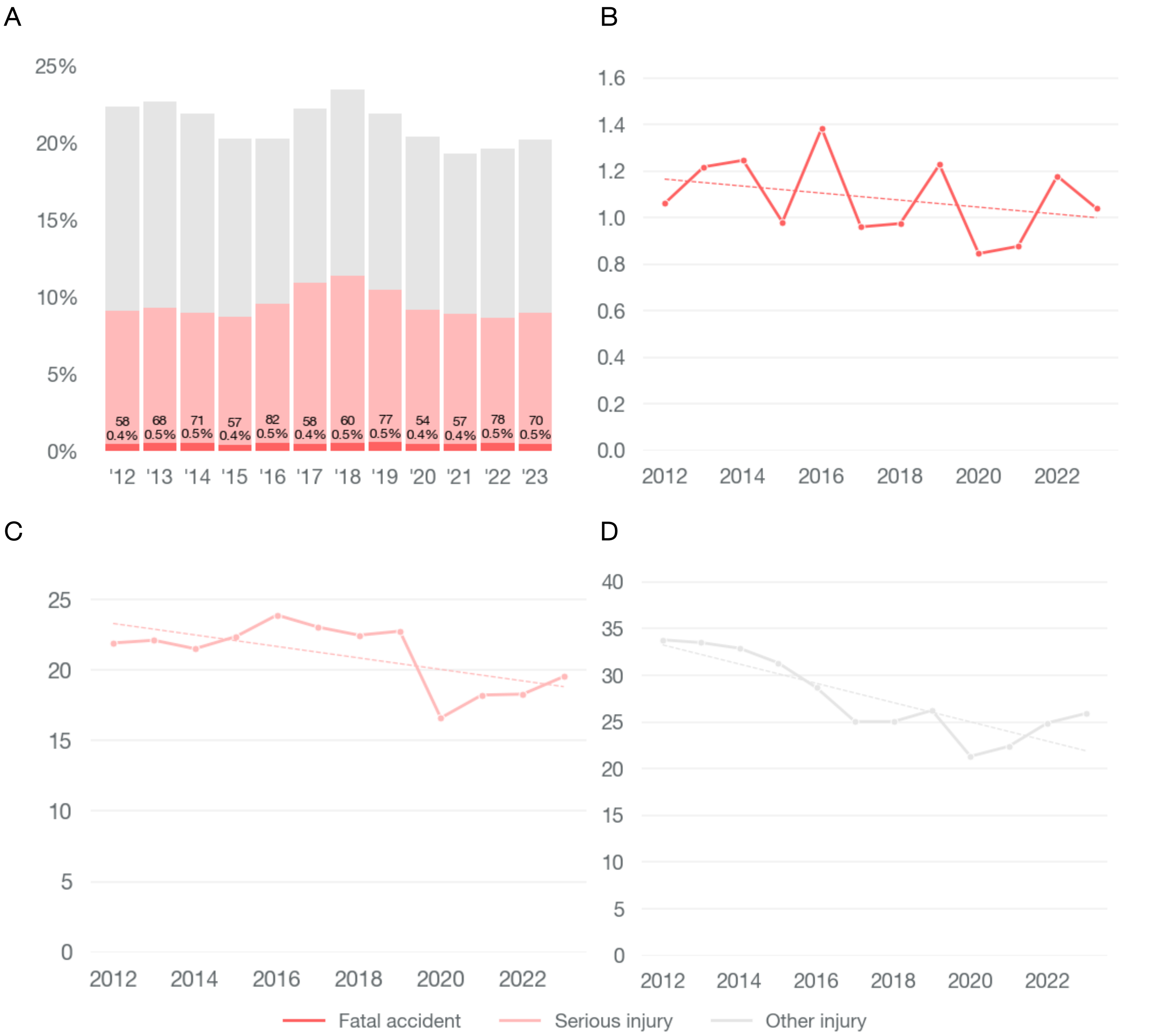

Fig 6. Rate of vulnerable accidents. A: Proportion of vulnerable accidents broken down by severity. Data corresponding to fatal accidents is highlighted. B-D: Rate of vulnerable accidents by 100,000 people for fatal (B), serious injuries (C) or "other injuries" (D).

What is the limit when decreasing speed limits?

There is no argument that lowering speed limits reduces the likelihood of an accident being serious or fatal, but at what point further reductions in speed do not have a significant effect? The question is relevant when we consider that a reduction from, for example, 80 to 40 km/h is very different to a reduction from 40 km/h to 30 km/h, and that the effect is different for a car driver than for the aforementioned vulnerable users.

We calculated the likelihood of these vulnerable accidents, by severity, for each speed zone available in the dataset, for each year. We observed a trend congruent with previous reports: the likelihood of vulnerable accidents becoming serious or fatal decreases significantly with lower speeds, as expected (Kruskal statistic = 53.05, $p < 0.001$), however the average likelihood stops becoming significantly lower for limits below 50 km/h (Fig 7, Table 1). Put differently, speeds below 50 km/h do not contribute to lowering the likelihood of vulnerable users sustaining serious or fatal injuries.

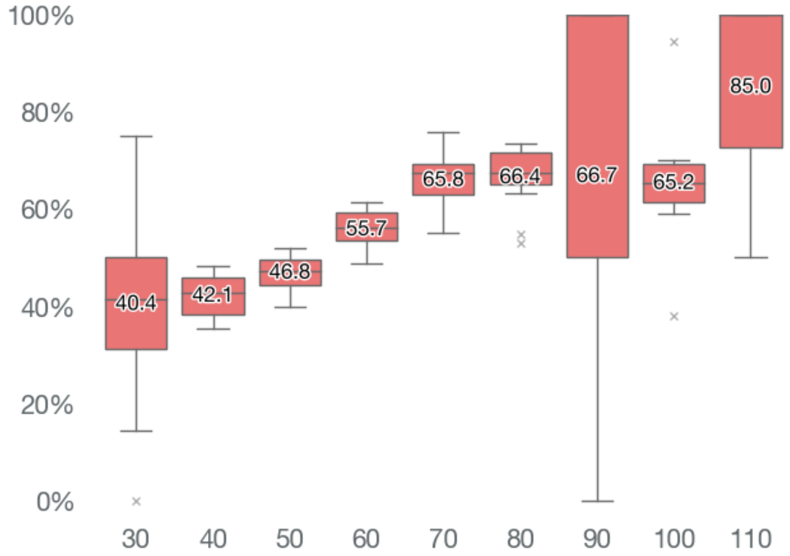

Fig 7. Likelihood of serious or fatal vulnerable accidents, by speed zone. Box plots showing the distributions of likelihoods of serious or fatal vulnerable accidents across different speed zones. The average likelihood across all years for each speed zone is highlighted.

Table 1. Dunn's post-hoc results (p-values) for multiple comparisons when evaluating the likelihood of fatal or serious injuries for vulnerable accidents across speed zones. Significant or near-significant p-values are highlighted

Speed Zone	30	40	50	60	70	80	90	100	110
30	1.000	1.000	1.000	0.053	0.007	0.001	1.000	0.000	0.012
40	1.000	1.000	1.000	0.306	0.052	0.006	1.000	0.000	0.069
50	1.000	1.000	1.000	1.000	1.000	0.400	1.000	0.004	1.000
60	0.053	0.306	1.000	1.000	1.000	1.000	1.000	0.504	1.000
70	0.007	0.052	1.000	1.000	1.000	1.000	1.000	1.000	1.000
80	0.001	0.006	0.400	1.000	1.000	1.000	1.000	1.000	1.000
90	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.637	1.000
100	0.000	0.000	0.004	0.504	1.000	1.000	0.637	1.000	1.000
110	0.012	0.069	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Note that for the previous analysis both fatal and serious accidents were combined, similar to how some Councils have done to communicate their policy positions (e.g. Stonnington). Nonetheless, and below 70 km/h, the results are primarily a reflection of the likelihood of serious accidents only, as the likelihood of fatal vulnerable accidents is exceedingly low (Fig 8), owing to the average rarity of these accidents (Fig 9). This rarity, combined with the much fewer number of nodes (accident locations) with speed zones of 90 or 110 km/h, translated into unreliable distributions composed of only a handful of points for these latter speed zones, as seen below.

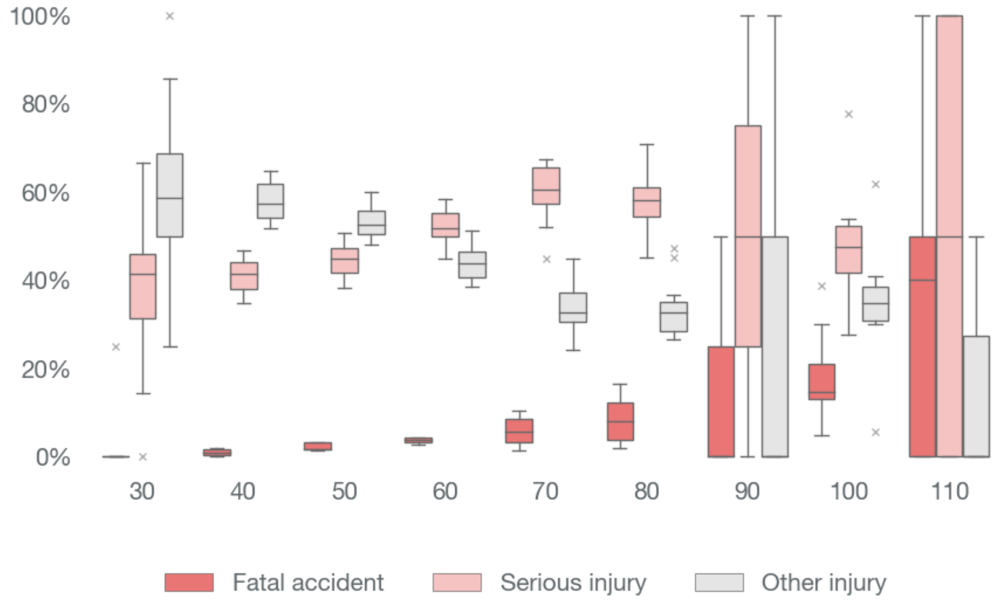

Fig 8. Likelihood of vulnerable accidents, by severity and speed zone. Box plots showing the distributions of likelihoods fatal, serious or "other injuries" for vulnerable accidents across different speed zones.

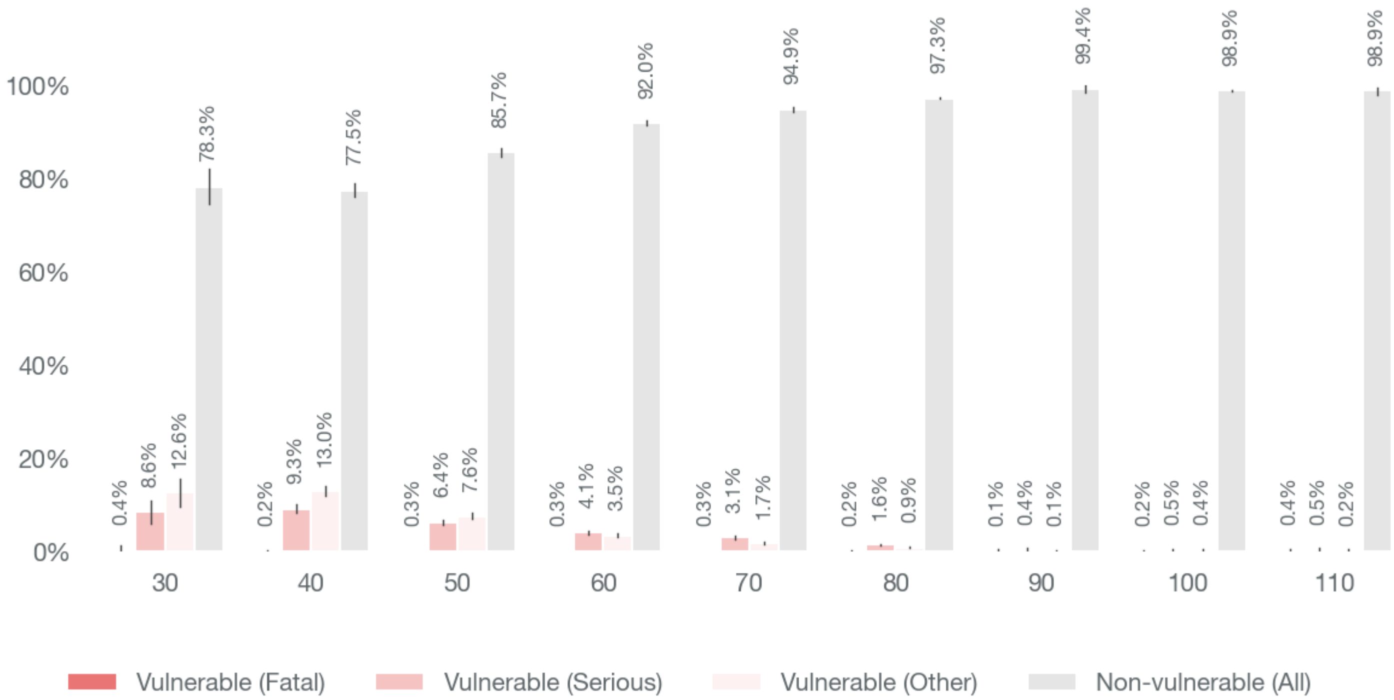

Fig 9. Proportion of vulnerable and non-vulnerable accidents, by severity and speed zone. Bar plots showing the average (yearly) proportion of fatal, serious or "other injuries" for vulnerable accidents across different speed zones, as well as the proportion for non-vulnerable accidents (irrespective of severity).

Noting that not all vulnerable road users included in the aforementioned policies face the same likelihood of injuries due to differences in protective gear (e.g. motorcycle users wear a full helmet and protective armour, while pedestrians do not), we repeated the analysis on vulnerable accidents but for pedestrians being struck only. The results were nonetheless similar: the likelihood of vulnerable accidents becoming serious or fatal decreases significantly with lower speeds, as expected (Kruskal statistic = 51.89, $p < 0.001$), but the average likelihood stops becoming significantly lower for limits below 50 km/h (Table 2).

Table 2. Dunn's post-hoc results (p-values) for multiple comparisons when evaluating the likelihood of fatal or serious injuries for vulnerable accidents (pedestrians only) across speed zones. Significant or near-significant p-values are highlighted.

Speed Zone	30	40	50	60	70	80	90	100	110
30	1.000	1.000	1.000	0.042	0.007	0.001	1.000	0.000	0.003
40	1.000	1.000	1.000	0.281	0.064	0.007	1.000	0.000	0.021
50	1.000	1.000	1.000	1.000	1.000	0.426	1.000	0.011	0.572
60	0.042	0.281	1.000	1.000	1.000	1.000	1.000	1.000	1.000
70	0.007	0.064	1.000	1.000	1.000	1.000	1.000	1.000	1.000
80	0.001	0.007	0.426	1.000	1.000	1.000	1.000	1.000	1.000
90	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.941	1.000
100	0.000	0.000	0.011	1.000	1.000	1.000	0.941	1.000	1.000
110	0.003	0.021	0.572	1.000	1.000	1.000	1.000	1.000	1.000

CONCLUSIONS AND RECOMMENDATIONS

The current study was undertaken to take a deeper dive into the available official data describing road accidents, to answer some of the critical questions that we estimate policymakers should be asking when evaluating speed reduction proposals. Based on the current analysis, we found no compelling evidence to reduce speed limits below 50 km/h in local roads. Furthermore, we found evidence strongly suggesting that the current reductions in fatal and serious injury accident rates across Victoria are the result of a historical downward trend that predate many of these interventions, rather than a result of the speed reductions observed in the last decade.

The results obtained in this study nonetheless reinforce the case made by the current New Zealand government – a case we believe should be mirrored by Victoria and Australia at large – and adds much needed depth and nuance to the current discussions by policymakers.

This study nonetheless recognises that there is room to keep certain lower-limit practices in place, especially to save on implementation costs and unnecessary population discontent. Such practices are however limited to school zones during pick-up and drop-off times, around high-risks precincts (such as car parks and shared areas like driveways of multi-unit developments), and around busy business zones during sensible hours – hours that could be revised to increase traffic flow during peak hours.

We therefore recommend that:

- **All 30 km/h zones (current or in plan) are discarded**, to allow the current '50 km/h unless otherwise signed' rule to take place in local streets. This is a much cheaper policy approach than changing all signs for new ones.
- **40 km/h zones are considered only for highly sensitive times and areas**, such as around school pick-up and drop-off times, as it is current practice, and that 40 km/h zones are abandoned around busy business precincts wherever safe to do so based on patronage data.
- **Lower limits are kept for very specific settings only**, such as carparks and shared driveways.

These recommendations are guided by the current data available by the Department of Transport and follow international trends and the historical safety guidelines that have allowed Australia to become the safe place it has been (and is further becoming). Further, they can help achieve the ever-elusive political balance without further interventions that create risks of slowing down the economy, create unnecessary population discontent, and create the risk of having to remove said limits once more in the future, at further taxpayer cost.

METHODOLOGY IN DETAIL

Coding Environment

All analyses were performed on Python 3.10 using Pandas 1.5.2, SciPy 1.12.1, scikit-posthocs 0.11.2, and Numpy 1.24.1.

Data Analysed

Victorian Road Crash Data was obtained from the official website of the Department of Transport and Planning during December 2024, as published on the 11/12/2024 and last updated on 13/12/2024. Data was manually enriched using the descriptions in the metadata (i.e. descriptions were added to, for example, accident severity scores following information in the metadata). For general interpretation of the variables contained in the data and not included in this report please refer to the relevant metadata or the relevant website.

Population data was obtained from the ABS censuses data for 2011, 2016 and 2021 as of December 2024, and population for in-between years was estimated using simple linear interpolation between censuses years (i.e. using different rates of growth between 2011 and 2016, and between 2016 and 2021, as appropriate). Population estimates for 2022 and 2023 were determined using linear projections following the 2016-2021 trend.

Data was normalised as Rate by 100,000 people following other relevant reports when appropriate, for appropriate comparisons.

For comparison with external sources, additional historical data for Australia's average rate of fatal road accidents was sourced from the Road traffic deaths dataset by the World Health Organization's Global Health Observatory data repository, accessed on 05/03/2025.

Data Exclusions

Considering 2024 still had open and ongoing investigations regarding many crashes, only data up to 2023 was analysed. Importantly, and as the relevant policies in discussion focus on speed limits that apply to vehicles that are either subject to said policies (e.g. trains are exempt) or to vehicles that normally travel at speed higher than the proposed limits (e.g. trams are too slow to be considered in scope), crashes involving trains, trams, parked trailers, and agricultural machinery were excluded when analysing "vulnerable accidents" (see below). Crashes involving unknown vehicles, or when a vehicle description was not applicable were also excluded when analysing this type of accidents.

Accidents recorded as "non injury" accidents were excluded for *all* analyses.

Number of Accidents

Accidents were counted based on their unique identifier codes (`ACCIDENT_NO` variable), and not on the number of people or vehicles involved. All records sharing the same `ACCIDENT_NO` were thus treated as belonging to the same one accident. Standard deviations are used as measure of dispersion unless otherwise noted.

Vulnerable Accidents

Some Councils have focused on "vulnerable road users" (pedestrians, cyclists and motorbike riders) to drive their communications and rationale for their policies. Accidents involving these vulnerable users have thus hereby been deemed "vulnerable accidents" by extension. Specifically, this applied either

- when the `ACCIDENT_TYPE_DESC` variable equalled to `Collision with vehicle` and the `VEHICLE_TYPE_DESC` variable equalled to either `Motor Cycle`, `Bicycle` or `Motor Scooter` in the relevant datasets, or
- when the `ACCIDENT_TYPE_DESC` variable equalled to `Struck Pedestrian` in the relevant datasets,

when at least one of the entries for a given `ACCIDENT_NO` met either condition. All other accidents were labelled as "other accident" for this variable.

Likelihood of Accidents

Likelihood for a given accident type was calculated as the proportion of accidents of a target severity and type at a given speed limit in a given year (e.g. fatal vulnerable accidents at 50 km/h in 2012) over the total number of accidents of the same type for the same speed limit in the same year (e.g. all vulnerable accidents at 50 km/h in 2012). For example, if there were 10 vulnerable accidents in all 50 km/h zones in 2012 and 3 of them were fatal, the likelihood for said fatal accidents at said speed zone and said year would be 30%. To determine differences between likelihoods across speed zones we applied the Kruskal-Wallis test with Dunn's post-hoc for multiple comparisons due to unequal sample sizes and variances. Kruskal-Wallis test was applied with SciPy's `kruskal()` function, and Dunn's post-hoc was applied with scikit-posthocs's `posthoc_dunn()` function. All results are statistically significant at alpha 0.05.

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