New Zealand Chief Coroner's Inquiry into Cycling Deaths – Evidence

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1. My full name is Dr GLEN FRANCIS KOOREY. I am currently a Senior Lecturer in Transportation in the Department of Civil and Natural Resources Engineering at the University of Canterbury, Christchurch. I have Bachelors' degrees in Engineering (Civil Engineering with Honours) and Science (Computer Science), a Masters degree in Engineering (Civil Engineering) and a Doctorate (PhD) in Transportation Engineering.

2. I have nearly 20 years of experience working as a consultant and researcher in traffic engineering and transportation planning, with a particular focus in road safety and sustainable transport. This includes more than 20 journal articles, conference papers, research reports and invited presentations into aspects of cycling safety, and more than 30 other publications on more general aspects of cycling or road safety.

3. The following notes have been prepared to guide the Joint Inquiry into cycling deaths, initiated by the Chief Coroner. The notes are based on an investigation into **84 fatalities** involving cyclists on New Zealand roads or pathways between January 2006 and December 2012 (7 years), i.e. they do not include off-road fatalities such as mountain biking accidents. These include the 12 fatalities currently being considered by the Coroner in this Inquiry. Police crash data, crash investigation reports, and other reports from the media were used to inform the analysis.

4. It is my belief that this personal investigation I have undertaken will provide more useful analysis of the factors behind cycling road deaths in New Zealand than a cursory examination of the 12 (somewhat randomly selected) recent cases alone.

5. It is appreciated that other non-fatal crashes (especially serious ones) could also be used to inform this analysis, and even "near misses" could provide useful clues to reduce the number of cycling deaths. However the scale of that potential exercise was beyond the available resources (e.g. over the same period of time there were over 1200 serious injury cycle crashes and over 4500 minor injury crashes). It is also apparent that some factors prevalent in fatalities are not as evident when considering crashes with lesser injuries.

6. Before continuing further, two important points should be considered as part of this investigation:

    i. Although the Inquiry was triggered by the five fatalities in November 2010, it is imperative to acknowledge that (despite the media attention) cycling is **not inherently dangerous**, nor any more dangerous than previously. The five deaths in Nov 2010 simply brought the average number of motor-vehicle related cycle fatalities in the year up to the annual average for the previous decade (which has remained relatively static). During the period over which the 84 cycling deaths studied were recorded, New Zealanders collectively cycled for about 180 million hours (according to the NZ Household Travel Survey, Ministry of Transport), i.e. more than **2 million hours for every cycling death**. Over this same period, more than 5800 cycling injury crashes with motor vehicles were reported, which equates to about **one crash for every 30,000 hours of riding**. These relatively small risks of death and injury are also swamped by the typical life-years gained by people who take up regular cycling as part of their health and well-being; a number of overseas studies have found gains in the order of 20:1 over any safety losses.

    ii. This Inquiry is not investigating the deaths of a number of ***cyclists***, but rather the deaths of a number of ***people*** who were cycling. This semantic distinction is important as it helps to inform the implications of the recommendations that may arise from this Inquiry. This is not a relatively small group of individuals we are concerned with protecting; **more than one million New Zealanders typically cycle in a given year**. Cycling is an everyday activity that virtually anyone can do (and there are many benefits to society from encouraging such a take-up); however that opportunity will be severely curtailed if recommendations arise that strongly limit easy access to this valuable mode of transport and recreation.

Specific Issues

Reporting of non-motor vehicle cycle crashes

7. The 84 fatalities identified during this period include 18 (21%) that did not involve a motor vehicle. A typical cycle-only crash involved a cyclist losing control and hitting an object off the road; in some cases there was alcohol or a medical condition involved. These crashes however were generally not able to be identified by means of the normal Ministry of Transport (MoT) Crash Analysis System (CAS) database, as CAS has a policy of not recording non-motor vehicle crashes. It was generally only through media reports that these crashes could be identified, often with relatively limited information. There may in fact have been more such fatalities during the analysis period that were not identified.

8. Crashes involving only a single motor vehicle are recorded in CAS (in fact they make up about half of all rural crashes) and these are often very useful in identifying deficiencies in our roading network. It seems incongruous that similar data is not recorded within CAS for crashes on the road involving only a cyclist.

Recommendations

a. Require MoT/Police to record all reported on-road cycle crashes in CAS, regardless of the involvement of a motor vehicle.

Victim Age

9. A striking feature about the fatal crashes is that the average age of the victims is 47 years old; this compares with the average age of 33 years for all cycling travel in New Zealand. This includes 23 fatalities (27%) aged 65 years and over (maximum age 93), when they undertake less than 5% of all cycling travel (according to the NZ Travel Survey). In contrast, only 10 victims (12%) were aged under 15 (who undertake 21% of the cycling).

10. While some of this can be explained by the relative fragility of young and old people, it also possibly highlights that older cyclists are more likely to make mistakes (possibly due to diminished senses or reactions) with fatal consequences. Many may have switched to cycling more when they were no longer able to drive a motor vehicle safely; thus transferring the risk to their new transport mode.

11. Although cycle training for older or returning cyclists is a logical step (similar to the successful "Safe with Age" driver training programmes), it is also important to consider the environment in which they are attempting to travel in. Continuing mobility is very important as people get older and all efforts should be made to ensure that they are able to do so using the travel modes that are available to them, e.g. via lower speeds and separated facilities. It is significant that the best countries in the world for cycling have proportions of elderly people cycling that are far greater than our national average for young adults.

Recommendations

b. Encourage the provision of suitable cycle training and support for older cyclists.

c. Encourage the adoption of lower traffic speeds and lower speed limits in community and residential areas to support local cycling.

Road User Fault

12. I have re-reviewed each case to make a determination of road user fault. Ignoring the 18 cyclist-only fatalities, approximately half (31) of the remaining 66 fatalities were deemed the fault of the motorist, with another 9 at least involving partial fault. This continues to highlight what is evident in cycling crashes in general; that **motorists are far too often responsible for these crashes**. This points towards greater efforts in driver education and enforcement, and possibly legislation that places greater responsibility on drivers.

13. However, cyclist fault is more prevalent in the younger or older age groups; for both children under 15 and adults ≥ 65, three-quarters of motorists involved were not at fault. This highlights (a) the need for suitable protection for young cyclists (e.g. lower speed limits, cycle training) and (b) as mentioned previously, road safety education to make older road users aware of their limitations when cycling.

14. Of the cyclist-only crashes, loss of control due to speed was a common factor; again more widespread cycle training may be useful.

Recommendations

d. Support the development of national campaigns that encourage drivers to behave appropriately in mixed traffic.

e. Require all drivers charged with serious cycle crash offences to undertake a suitable road-sharing course, e.g. Cycling Advocates Network's "Road User Workshops".

f. Investigate the introduction of European-style "stricter liability" laws, whereby a motorist (through their insurance company) has the burden of proof in a crash with a more vulnerable road user that they were not at fault.

g. Require cycle training to national standards (i.e. NZTA Grade 2) for all school children by Year 6.

h. Implement lower speed (30-40 km/h) zones around all schools in NZ.

Heavy Vehicles

15. Nationally, trucks and buses are only involved in about 6% of all cycle crashes. However 20 out of the 66 multi-vehicle fatalities (30%) involved a heavy vehicle. Although the crash movements vary, a reasonably common incident involves a cyclist being caught on the left-hand side of a truck (possibly turning left) and being swept underneath the truck wheels. This highlights the benefits of truck side under-run protection (as used in other countries), something that groups such as CAN (the Cycling Advocates Network of NZ) has been calling to make mandatory here for over a decade.

16. Both drivers and cyclists also need to be aware of the blind-spot limitations when cyclists are near heavy vehicles. Experience of each other's position is a useful way to obtain the necessary empathy and understanding, and this is currently being achieved through workshops between cyclists and bus/truck drivers run by CAN. Additional side mirrors focused on blind spots may also be prudent, as is now required in Europe.

Recommendations

i. Highlight to cyclists the dangers of "sneaking up" on the inside of heavy vehicles.

j. Introduce mandatory side under-run protection for all trucks.

k. Encourage greater take-up by cyclists and heavy vehicle operators of CAN's "Road User Workshops".

l. Investigate mandatory use of "blind spot mirrors" in heavy vehicles.

Speed Limits

17. Nearly half of the fatalities (40) occurred on high-speed (≥80 km/h) roads. However only one third of all cycling distance travelled (and a lesser proportion of time travelled) is on high-speed roads. And, mainly due to the generally lower volumes, fewer than 10% of all cycle crashes occur in rural areas.

18. This highlights the significant effect of speed on the safety of active travel modes like cycling. Historically little specific protection has been provided for cyclists on high-speed roads (e.g. sealed shoulders, separate paths, treated pinch-points). In many cases, it may also be appropriate to introduce a lower speed limit than the default 100 km/h limit.

19. In urban areas, a 50 km/h speed limit is clearly still not enough to avoid serious injury and death, given that 44 people still lost their lives. Worldwide, lower (30-40 km/h) speed limits and traffic

calmed areas are very prevalent in urban areas, and the safety benefits have been immense; yet in New Zealand they are still the exception rather than the norm. A lot of this has to do with the existing NZTA *Setting of Speed Limits* guidelines, which do not pro-actively encourage such speed limits where appropriate, such as around schools, shopping areas, and residential zones.

Recommendations

m. Encourage greater investment in rural safety treatments such as sealed shoulders, separated pathways, and removal of pinch-points.

n. Investigate options for lower rural speed limits, especially on minor roads that are popular for cycle touring and training rides.

o. Review the existing Setting of Speed Limits guidelines in New Zealand, to make it easier to introduce a lower urban speed where it is warranted.

State Highways

20. Only one-sixth of cycling distance travelled occurs on State Highways. This is not surprising as many cyclists typically try to avoid high-volume arterial roads. Despite this, 31% (26) of fatalities occur on State Highways, a reflection probably of the higher exposure to traffic and typically higher speeds (interestingly, the proportion of heavy vehicles involved in fatalities on State Highways is only slightly higher than the norm). This is of some concern, given the status of these roads. State Highways generally reflect a higher standard of safety for motorists; this may not be the case for cyclists.

21. While new State Highways often provide for cycling as part of their construction, there is a considerable network of existing highways with deficiencies that require retro-fitting.

Recommendations

p. Introduce greater review of existing State Highways (e.g. using NZTA Non-Motorised User Audits) and implement programmes for improvements for cycling e.g. shoulders or separate paths, treated pinch-points

Intersection crashes

22. Typically at least half of all cycle crashes nationally occur at intersections; two-thirds if one includes driveways too. However only 28% (23) of the fatal crashes were identified as occurring at intersections, with no particular type of intersection form standing out. This may reflect the higher speeds associated with non-intersection situations.

23. The role of intersections in urban areas is however quite evident; of the 30 motor vehicle vs bike crashes in urban areas, 60% (18) were at an intersection. This is often where people cycling encounter the greatest difficulties (and often where there are the least amount of facilities for cycling). Given that most cycling continues to occur in urban areas, it is therefore imperative to see increased investment in safe provision for cycling at intersections.

24. Most intersection crashes typically involved one party or the other failing to give way to or see the other party. Fault was fairly evenly distributed. Again, education and training on both sides would help.

Recommendations

q. Provide increased investment for treatment of cycling at intersections, particularly busy ones.

r. Ensure that driver education and cycle training clearly highlights the obligation of all road users to properly check for and give way to other parties where appropriate.

Driver Observation

25. An analysis of driver behaviours and reports in the 66 multi-vehicle fatalities suggested that at least 28 motorists did not see the cyclist prior to impact, with another seven seeing them too late to avoid

them – in other words, **more than half** of the motorists were not sufficiently aware of the presence of the cyclist. Particularly, in the case of many heavy vehicles, even after the collision they were not immediately aware that they had struck someone; three quarters of heavy vehicle drivers did not see the cyclist or not until it was too late.

26. Some of these situations may be attributable to dark clothing being worn by cyclists, and a reasonable number (5) attributed sun-strike for not seeing the cyclist. However quite a few simply seem to be the result of poor observation and checking; "inattentive" drivers were commonly noted. Rather than "not seeing", more often than not this would appear to be more a case of **"not looking"**.

27. Fatigue was also mentioned in four crashes, although it is difficult to identify in crashes and likely to be higher. It was particularly prevalent with truck drivers and highlights the issue of the long driving hours legally allowed in New Zealand for commercial drivers.

Recommendations

s. Ensure that driver education clearly highlights the obligation of all road users to properly check for other parties where appropriate and to "drive to the conditions" when road visibility is not optimal.

t. Encourage greater take-up by cyclists and heavy vehicle operators of CAN's "Road User Workshops".

u. Investigate reductions in the maximum allowable driving hours between breaks for commercial drivers.

Victim Gender

28. Only about one-quarter (20) of all fatalities were female. However this is in keeping with the relative amounts of cycling undertaken by males and females (from NZ Travel Survey). This is in contrast to countries where cycling has high usage and the gender balance is even, and highlights the work needed here for many women to see cycling as a convenient and safe option.

Recommendations

v. Invest in cycle facilities that appeal to a wider range of prospective riders.

Helmet wearing

29. Only nine victims were noted as not wearing a helmet, similar to current national helmet-wearing rates (92%). This highlights the fact that helmets are generally no protection to the serious forces involved in a major motor vehicle crash; they are only designed for falls. In fact, in only one case did the Police speculate that a helmet may have saved the victim's life. There is a suspicion that some people (children in particular) have been "oversold" on the safety benefits of their helmet and have been less cautious in their riding style as a result.

30. One disappointing aspect with the dataset is the fact that helmet-wearing was not identified in every case; about 10% of records had no information on this. This should be a relatively easy thing to record in most circumstances.

Recommendations

w. Improve road user education to clarify the value and limitations of wearing a helmet when cycling.

x. Improve Police reporting of helmet wearing in crash reports.

Cyclist clothing and visibility

31. Reporting of cyclist clothing colours was very sporadic, with many details not recorded. This seems like a simple piece of information to capture; yet fewer than half of the records had any information on this. Of those that were, 18/38 noted either "dark" or "non-reflective" cycle clothing, with an

almost equal number noting bright or reflective clothing. Interestingly, there was no difference to the split when cycling during day or night.

32. Clearly bright clothing did not guarantee a safer outcome; many motorists did not notice the cyclist prior to the crash even when they were wearing reflective or bright colours. In fact the proportion of drivers not noticing a cyclist prior to a crash was **no different regardless of whether they were wearing high-visibility ("hi-vis") clothing or not**. This mirrors research elsewhere, which has generally been inconclusive as to the effects of hi-vis clothing on rider conspicuity.

33. Nevertheless, it is accepted that wearing high-vis clothing when cycling should be encouraged in appropriate circumstances, particularly in low-visibility or busy road environments. However mandatory requirements for high-visibility clothing are not at all sensible, due to practical difficulties in complying with and enforcing such a law and the effect it would have on encouraging anyone to cycle for everyday trips or on a casual one-off basis. There is also a real fear that, with a mandatory requirement, the *absence* of hi-vis gear would be seen as a major contributor to a crash, irrespective of the circumstances of the case, which has implications for Police charges or insurance.

34. It is important to also recognise the differences between "fluorescent" clothing (which shows up well under UV light like sunlight) and "reflective" clothing (which shows up well under reflected lights such as headlights and street-lights). Thus, some hi-vis garments appropriate for daytime riding may not be appropriate for night-time riding (and vice versa).

35. Only two cyclists were noted as not having adequate headlights in dark conditions, which suggests that this is not a widely prevalent problem. However, given the widespread availability these days of relatively inexpensive but powerful bike-lights (e.g. LED systems), people should be encouraged to invest in sufficiently strong lighting systems for cycling at night. Greater use of visibility aids on wheels (e.g. reflectorised rims and wheels, spoke reflectors) would also improve the visibility of people cycling at night from side-on.

Recommendations

y. Improve Police reporting of cyclist clothing in crash reports.

z. Encourage people cycling to wear suitably visible clothing in appropriate low-visibility or busy road environments.

aa. Encourage people to invest in strong bike-light systems for night-time riding.

bb. Encourage cycle retailers and road safety providers to provide a greater range of options for making bicycles visible at night, e.g. reflectorised rims and spoke reflectors.

Common Crash Patterns

36. Some of the most common cycle crash patterns identified were:

- Motorist passing cyclist (possibly turning left) did not provide sufficient clearance and struck cyclist (25)
- Cyclist lost control, went off road or hit an object (17)
- Cyclist turning or moving over to the right failed to give way to a passing motor vehicle (11)
- Cyclist turning/crossing failed to give way to through motorist with right of way (10)
- Motorist turning/crossing failed to give way to through cyclist with right of way (7)

Recommendations

cc. Consider highlighting aspects of these road user situations in driver and cyclist training and education.

Miscellaneous Factors

37. Factors recorded that did not seem unusually high for the numbers of crashes (particularly in relation to all injury cycling crashes) included: Wet weather (5), Darkness/twilight (16), Driver or cyclist alcohol or drugs (6). Therefore I do not recommend any special focus on aspects relating to these factors in addition to normal road safety practice.

Final Thoughts

38. In reviewing the 84 cases examined above, I have tried to identify what I consider may have helped to prevent each tragedy from occurring. These are the most common factors identified (note that one fatality may have multiple factors identified):

    - Improved education/training/promotion of better motorists behaviours around people cycling, e.g. giving more space, waiting until safe to pass, slowing down, looking for cyclists, road user workshops (39)
    - Improved education/training/promotion of better cyclists behaviours when riding, e.g. adult/child cycle training, placement at intersections and along roads, checking properly for gaps (35)
    - Improved cycling facilities, e.g. cycle lanes, separated cycleways, intersection or crossing facilities (20)
    - Heavy vehicle safety equipment, e.g. truck under-run protection, blind spot mirrors (12)
    - Lower speed limits or lower speed environments *(this is a minimum number; it should be noted that the survivability of virtually all cycling fatalities would be greatly improved if lower impact speeds were present)* (8)

39. It is my belief that concerted efforts to focus on these identified factors would have the greatest chance of improving our current cycling fatality record. They are also likely to greatly improve general cycling safety for New Zealanders.

40. Finally I would like to I add some additional specific comments with regard to the previous hearing into the death of Jane Mary Bishop in Auckland (July 2012). There seems to be in the hearing evidence an incorrect application of the Austroads standard traffic lane width of 3.3-3.5m. This traffic lane width is ***never*** expected to be safely shared between motor vehicles and cyclists unless the traffic speeds can be brought down to something compatible like 30km/h. In the very same Austroads table that this width comes from is another line saying "Wide kerbside lane (Locations where motorists and cyclists use the same lane): 4.2-4.5m" – this is what should have been referred to in this case. So, unless there was no cycle access allowed (e.g. motorway) or the road had a lower speed limit, it would be expected that next to a "standard" traffic lane of ~3.5m there should be either a separate cycle lane or path of appropriate standard (which the off-road shared path there in Auckland certainly wasn't), or there is a wide kerbside lane instead. Since none of those options were provided here, the site did ***not*** "meet industry standards".

I am happy to clarify or expand on any aspects of the above notes for the benefit of the Coroner.

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