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Modelling the Trauma Reductions of Applying Mobile Phone Detection Cameras to Enforce Seatbelt Compliance in NSW

Final Report

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Modelling the Trauma Reductions of Applying Mobile Phone Cameras to Enforce Seatbelt Compliance in NSW: Final Report

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1. EXECUTIVE SUMMARY

This report presents modelling conducted by Monash University Accident Research Centre to estimate the road trauma reductions of applying NSW' existing Mobile Phone Detection Cameras (MPDC) to enforce seatbelt non-compliance among front seat motor vehicle occupants.

This modelling work is centred upon such an enforcement program encouraging drivers and front seat passengers to wear seatbelts (i.e. reducing the prevalence of seatbelt non-compliance).

The current prevalence of seatbelt non-compliance was calculated from analysis of NSW crash data (i.e. the proportion of front seat vehicle occupants injured in police-reported casualty crashes across areas of NSW that the program reaches, that were not wearing an available seatbelt). The prevalence of seatbelt non-compliance amongst NSW front seat occupants involved in casualty crashes was 1.39%.

Other inputs to the modelling include:

- The increased injury risk associated with not wearing a seatbelt (i.e. a relative risk of injury of 1.82);
- The injury reductions that seatbelts achieve (i.e. one severity level reduction);
- The expected reach of the program (i.e. 99.5% of the NSW population);
- The expected deterrent effect of the program (i.e. 20 - 30%); and
- The cost of injuries in NSW (Transport for NSW, 2018).

The choice of inputs to this modelling erred on the side of conservatism, to ensure that the potential benefits of such a program are not overstated.

This modelling estimated that an MPDC seatbelt enforcement program could realise the following trauma reductions and benefits over a 5 year period:

- Prevention of 16.9 - 25.6 fatalities and 41.1 - 61.6 serious injuries (or 58.0 - 87.2 FSI, in total),
- A total cost saving of $138.9 - $210.5 million.

2. BACKGROUND

NSW began using fixed and transportable mobile phone detection cameras (MPDC) to detect drivers who are illegally using mobile phones in 2019, with enforcement commencing in March 2020. NSW CRS engaged the Monash University Accident Research Centre (MUARC) to estimate the potential reduction in road trauma that could be realised from applying these cameras to enforce speeding and seatbelt compliance.

This report and the accompanying spreadsheet present the findings of modelling the effect of MPDC for seatbelt compliance on road trauma, taking into account likely program reach and likely levels of deterrence.

The results from the modelling relating to speed enforcement are provided in a separate report.

3. METHOD

Estimating the potential reduction in road trauma that could be realised by applying MPDC to seatbelt enforcement requires an understanding of several factors relating to seatbelt noncompliance by front seat occupants[1], the increased risk of injury associated with seatbelt noncompliance in the event of a crash, the number and cost of crashes in NSW and details of the proposed program itself. Specifically, information is required about the following:

1. the prevalence of seatbelt noncompliance amongst front seat occupants injured in crashes, stratified by injury severity
2. the increased injury risk associated with not wearing a seatbelt in the event of a crash
3. injury reduction scenarios
4. the proposed reach of the automated mobile phone enforcement program (that is, what proportion of drivers would be exposed to the program?)

[1] The cameras will only be able to detect seatbelt non-use in drivers and front seat passengers, so it was assumed that the program would only deter drivers and front seat passengers from not wearing a seatbelt.

5. the expected deterrent effect of the program (that is, what proportion of drivers would cease not wearing a seat belt whilst driving as a result of the program?)
6. the number of injuries that would be expected to occur without the program, by severity
7. the cost of those injuries

Separate modelling of estimated trauma reductions was conducted for NSW as a whole, as well as for specific high-value breakdowns:

- Metropolitan (Sydney) vs other areas of NSW (excluding remote and very remote areas that the MPDC program does not reach),
- Injury severity
- Heavy vs. light vehicle drivers

The methods used to estimate the trauma reductions are slightly different for seatbelt compliance than were used for mobile phone use (Stephan, Stephens & Newstead, 2019). Instead of using the prevalence of illegal behaviour as measured by the MPDC, the prevalence of seatbelt noncompliance in people injured in crashes was used. There is a strong rationale for choosing a different source of data for calculating prevalence, in that preventing the use of mobile phones while driving will reduce the occurrence of crashes, therefore the population prevalence of mobile phone use whilst driving was of interest. Preventing seatbelt noncompliance will reduce injuries in the event of a crash (rather than the occurrence of a crash), therefore it is the prevalence of seatbelt noncompliance in crashes that is most useful for estimating the benefits. An added advantage of this approach is that the trauma reductions can be estimated separately for different injury severities.

3.1. THEMES IDENTIFIED WITHIN RELEVANT NSW CRASH DATA

Data from NSW on crashes that occurred between 2015 and 2019 across areas of NSW that the program reaches was used to calculate the current prevalence of seatbelt non-compliance in front seat occupants injured in crashes where a seatbelt was available.

The overall prevalence of seatbelt non-compliance amongst front seat occupants was **1.39%**.

However, seatbelt non-compliance among front seat vehicle occupants varied across the areas of NSW that the program would reach, and by vehicle type:

- Seatbelt noncompliance is proportionally less common for light vehicles in the Sydney metro area **(0.7%)**
- Seatbelt noncompliance is proportionally more common for:
    - heavy vehicles in the Sydney metro area **(3.3%)**, and
    - light vehicles outside the Sydney metro area **(2.1%)**
- Seatbelt noncompliance is proportionally even more common for heavy vehicles outside the Sydney metro area **(7.2%)**

Table 1: Seatbelt non-compliance among front seat vehicle occupants by area of the state and vehicle type

Sydney Metro		Belt not worn	Belt available and use known	Prevalence
Front seat occupants in light vehicles	Killed	12	128	9.38%
	Seriously Injured	90	6,292	1.43%
	Moderately Injured	85	14,288	0.59%
	Minor / Other Injury	80	17,056	0.47%
	Sydney metro total light vehicle front seat occupant casualties:	**267**	**37,764**	**0.71%**
Front seat occupants in heavy vehicles	Killed	0	3	N/A
	Seriously Injured	5	102	4.90%
	Moderately Injured	6	224	2.68%
	Minor / Other Injury	3	100	3.00%
	Sydney metro total heavy vehicle front seat occupant casualties:	**14**	**429**	**3.26%**
Sydney Metro total front seat occuapant casualties (All Vehicle Types):		**281**	**38,193**	**0.74%**

Areas Outside of Sydney Metro (that the MPDC Program Reaches)		Belt not worn	Belt available and use known	Prevalence
Front seat occupants in light vehicles	Killed	110	675	16.30%
	Seriously Injured	249	7,033	3.54%
	Moderately Injured	143	14,562	0.98%
	Minor / Other Injury	86	6,098	1.41%
	Not Sydney Metro total light vehicle front seat occupant casualties:	**588**	**28,368**	**2.07%**
Front seat occupants in heavy vehicles	Killed	7	24	29.17%
	Seriously Injured	28	290	9.66%
	Moderately Injured	24	515	4.66%
	Minor / Other Injury	13	173	7.51%
	Not Sydney Metro total heavy vehicle front seat occupant casualties:	**72**	**1,002**	**7.19%**
Not Sydney Metro total front seat occuapant casualties (All Vehicle Types):		**660**	**29,370**	**2.25%**

		Belt not worn	Belt available and use known	Prevalence
Front seat occupants in all vehicle types	Killed	**129**	**830**	**15.54%**
	Seriously Injured	**372**	**13,717**	**2.71%**
	Moderately Injured	**258**	**29,589**	**0.87%**
	Minor / Other Injury	**182**	**23,427**	**0.78%**
All NSW modelled areas, all vehicle types, total front seat occupant casualties:		**941**	**67,563**	**1.39%**

3.2. MODELLING INPUTS

Table 2 lists the required modelling inputs along with the specific estimates used in this study and the sources. The sources of all but one of the estimates were from NSW, or from consultation with NSW CRS. The exception was the injury risk associated with seatbelt noncompliance for front seat occupants, which came from existing literature.

3.3. BRIEF REVIEW OF THE LITERATURE

While the previous research has consistently found that the risk of an injury in a crash is reduced for occupants who wear seatbelts, the size of this reduction varied across studies. For the current modelling, two estimates of the decrease in fatal or serious injury (FSI) risk associated with using a seatbelt were chosen based on our review of the literature: a 45% reduction in the risk of being fatally or seriously injured if involved in a crash when wearing a seatbelt compared to when not wearing a seatbelt (which corresponds to a relative risk of injury of 1.82, or 82% higher, compared to when not wearing a seatbelt), to a 60% decrease in the risk of FSI if involved in a crash when wearing a seatbelt, compared to when not wearing a seatbelt (which corresponds to a relative risk of injury of 2.5, or 150% higher when not wearing a seatbelt).

Of the two estimates of injury risk reduction including in our modelling, the less conservative estimate of 60% reduction (RR of injury of 2.5 when not wearing a seat belt) was from studies that used more recent data where the vehicle fleets was more likely to be representative of the current NSW fleet. However, the more recent data may also be prone to over-reporting of seat belt use, due to the introduction of seat belt laws in regions where these studies were carried out. The more conservative estimate of 45% reduction (RR of injury of 1.82 when not wearing a seat belt) is from studies involving vehicle fleets that are older than the current NSW vehicle fleet. However, because seat belts were not compulsory at the time, reporting of seat belt use was likely to be more accurate since there was no incentive for drivers or passengers to falsely report seat belt use.

There was no good evidence available to suggest that the injury risk reduction varies according to injury severity, vehicle type, or whether the crash occurred in metropolitan or rural areas (that is, where evidence exists, credible estimates from the previous research varied between 45% to 60% reduction in injury risk for these different situations).

3.4. INJURY REDUCTION SCENARIOS

One of the difficulties in applying the risk reduction in the models to estimate trauma reduction is that it is not always clear from the literature the specific injury outcome that occurred when an injury of a particular severity was prevented when a seatbelt was used. For example, with the use of a seatbelt, a fatality may become a serious injury, a moderate injury, a minor/other injury, or no injury at all (that is, outright prevention of injury).

Most of the previous research involved using existing crash data to estimate the reduction in fatal and serious injury (FSI) with the use of a seatbelt. Considering the methodology of those studies, this implies that the FSI then becomes a non-FSI crash. However, there is rarely enough information provided about the actual crash data used (in terms of what types of crashes are included) to fully understand what the non FSI crashes are. For example, if the crash data included all crashes in a population, then the FSI prevented would then become a crash of lesser injury severity, or a property damage only crash. If the crash data only included casualty crashes, then the FSI prevented would become a lesser injury severity crash. This also provides no information on what happens to the reduction in the risk of injuries of lower severity than FSI.

For the purposes of the modelling exercise, we used four different injury reduction scenarios to model the potential trauma reductions. These were:

1. Injuries were prevented outright with the use of seatbelts
2. The severity of the injury was reduced by two severity levels with the use of seatbelts, that is:
    a. Fatal injuries become moderate injuries
    b. Serious injuries become minor/other injuries
    c. Moderate and minor/other injuries become no injury
3. Fatal, serious and moderate injuries become minor injuries with the use a seatbelt, but seatbelts have no effect on minor injuries
4. The severity of the injury was reduced by one level, that is
    a. Fatal injuries become serious injuries
    b. Serious injuries become moderate injuries
    c. Moderate injuries become minor/other injuries
    d. Minor/other injuries become no injury

Of the four scenarios, scenario one reflects the maximum possible benefits while scenario four reflects the smallest benefit in terms of FSI reductions and associated cost savings. While it is useful to quantify the maximum possible benefit if seatbelts prevented all trauma outright (among the 45% or 60% of crashes for which wearing a seatbelt reduces the level of trauma) – it is more appropriate to assume a reduction in trauma rather than outright prevention. Therefore, **the results reported here are based on the most conservative scenario** (i.e. seat belt use reduced the severity of injury by one level for all injury severity levels)**.**

Table 2 Required inputs and sources for calculating the potential trauma reductions of applying MPDC for seatbelt enforcement for front seat occupants or drivers only (where inputs for drivers only are different to front seat occupants, these are shown in parentheses).

Information required	Data source	Estimate			
Prevalence of seatbelt noncompliance amongst front seat occupants injured in crashes, stratified by injury severity	NSW crash data (2015-19)	**Light vehicle – metro Sydney**		**Light vehicle – non-metro**	
		Fatality	9.38% (11.43%)	Fatality	16.30% (17.59%)
		Serious injury	1.43% (1.29%)	Serious injury	3.54% (3.40%)
		Moderate injury	0.59% (0.55%)	Moderate injury	0.98% (0.91%)
		Minor/Other injury	0.47% (0.42%)	Minor/Other injury	1.41% (1.12%)
		Heavy vehicle – metro Sydney		**Heavy vehicle – non-metro**	
		Fatality	0.0% (0.0%)	Fatality	29.17% (28.57%)
		Serious injury	4.90% (4.17%)	Serious injury	9.66% (9.03%)
		Moderate injury	2.68% (2.27%)	Moderate injury	4.66% (4.61%)
		Minor/Other injury	3.00% (3.26%)	Minor/Other injury	7.51% (7.88%)
Increased injury risk associated with not wearing a seatbelt in the event of a crash	Existing research literature	Lower limit (more conservative estimate) of Relative risk of injury when not wearing a seatbelt = 1.82 (2.00) Higher limit (less conservative estimate) of Relative risk of injury when not wearing a seatbelt= 2.50 (3.33)			
Injury reduction scenario		**1.** Injuries are prevented by seatbelts **2.** Injury severity is reduced by 2 levels when seatbelts are used **3.** Fatal, serious & moderate become minor injuries if seatbelts used, but seatbelts do not affect minor injuries **4.** Injury severity is reduced by 1 level when seatbelts are used			
Proportion of the driving population exposed to the enforcement cameras	Consultation with NSW CRS Average number of checks per vehicle (NSW CRS, personal communication, 2019)	99.5% of the population live in areas covered by the program (i.e. not remote or very remote). On average, every vehicle will be checked at least once per year from the start of the program (Stephan, Stephens & Newstead, 2019)			
Deterrence effect of the program	Consultation with NSW CRS	Range modelled: 10% to 100% (in 10% increments), with expected deterrence of 20-30%			
Current size of the road trauma problem (excluding remote and very remote areas): Average annual number of injuries over 2015-2019, by severity	NSW crash data	**Light vehicle – metro Sydney**		**Light vehicle – non-metro**	
		Fatality	25.6 (21.0)	Fatality	135.0 (108.0)
		Serious injury	1258.4 (1086.6)	Serious injury	1406.6 (1189.0)
		Moderate injury	2857.6 (2603.0)	Moderate injury	2912.4 (2603.8)
		Minor/Other injury	3411.2 (2979.2)	Minor/Other injury	1219.6 (1034.8)
		Heavy vehicle – metro Sydney		**Heavy vehicle – non-metro**	
		Fatality	0.6 (0.6)	Fatality	4.8 (4.2)
		Serious injury	20.4 (19.2)	Serious injury	58.0 (55.4)
		Moderate injury	44.8 (44.0)	Moderate injury	103.0 (99.8)
		Minor/Other injury	20.0 (18.4)	Minor/Other injury	34.6 (33.0)
Average injury costs: Inclusive Willingness to Pay costs per injury, by injury severity	Transport for NSW (2018, Table 54, page 277)	**Metro** Fatal: $7,278,105 Serious injury: $436,643 Moderate) injury: $67,045 Minor/other injury: $67,045		**Rural** Fatal: $7,968,950 Serious injury: $578,107 Moderate) injury: $86,016 Minor/other injury: $86,016	

3.5. ESTIMATING THE LEVEL OF TRAUMA THAT COULD BE PREVENTED BY ELIMINATING SEATBELT NONCOMPLIANCE

The proportion of injuries within a population (e.g. NSW front seat occupants injured in crashes) that could be prevented or reduced in severity by preventing exposure to a risk factor (e.g. not wearing a seatbelt) can be estimated by calculating the quantity known, in epidemiological terms, as the Population Attributable Fraction (PAF). The formula includes two variables: i) an estimate of the prevalence of the risk factor in the crash population (seatbelt noncompliance in front seat passengers injured in a crash), and ii) the relative risk of injury associated with the risk factor:

$$\text{Population Attributable Fraction (PAF)} = (P_p \text{ X } (RR-1))/(P_p \text{ X } (RR-1)+1),$$

where P_p is the proportion of the population exposed to the risk factor, that is, the proportion of front seat passengers injured in crashes in NSW (excluding remote and very remote areas) who were not wearing a seatbelt;

and RR= the relative risk = the risk of being injured if involved in a crash whilst not wearing a seatbelt compared to the risk of being injured whilst wearing a seatbelt if involved in a crash.

The PAF (the proportion of injuries that would be prevented or reduced in severity if seatbelt noncompliance was eliminated) can be directly applied to calculate the number of injuries in NSW that would be prevented or reduced if drivers and front seat passengers wore a seatbelt. Adjustments can also be made to take into account program reach (the proportion of drivers exposed to automated seatbelt enforcement cameras) and likely deterrence (proportion of drivers who would be deterred from seatbelt non-compliance by the camera program).

4. RESULTS

The results presented in this report focus on the most conservative modelling scenarios:

- Relative risk of injury with seatbelt noncompliance = 1.82
- Front seat occupants
- Expected deterrence of 20% or 30%[2]
- The most conservative injury reduction scenario (severity of injury is reduced by one level) with the use of seatbelts

The report is accompanied by an excel spreadsheet showing the results of all different possible scenarios and assumptions which were:

1. MPDC used for detecting seatbelt noncompliance in front seat occupants, vs drivers only
2. Relative risk of injury when not wearing a seatbelt of 1.82 vs 2.50
3. Different levels of deterrence associated with the program 10% - 100% (in 10% increments)
4. Four different injury reduction scenarios from outright prevention of injury with the use of seatbelts (least conservative) to injury severity being reduced by one severity level with the use of seatbelts (most conservative)

Results are reported separately for light vehicles, heavy vehicles, Sydney metropolitan area, other areas of NSW (excluding remote and very remote), and the combined savings.

4.1. CONSERVATIVE ESTIMATES OF THE BENEFITS ASSOCIATED WITH USING MPDC FOR ENFORCING SEATBELT NONCOMPLIANCE

The benefit of the program (based on 99.5% reach of the NSW population, that is, all except remote and very remote, 20% deterrence and a 1.82 relative risk of injury without seatbelt) was estimated to be as follows (**Error! Reference source not found.**):

- Prevention of 3.4 fatalities annually (2.9 of these in front seat occupants of light vehicles in non-metro crashes)
- Prevention of 8.2 serious injuries annually (7.4 in front seat occupants of light vehicles; 2.5 in metro crashes and 4.9 in non-metro crashes)
- A net increase of 3.3% in moderate injuries and increase of 2.5% for minor or other injuries
- A total of 5.8 casualties prevented per year at a cost saving of $27.8 million annually
- Over 80% of the estimated cost benefit was attributed to the prevention of fatal crashes
- About 95% of the estimated cost benefit was attributed to preventing casualties among light vehicle occupants (including reductions in severity of injury)
    - The vast majority of these (83% of estimated total cost benefit) were for crashes in non-Sydney areas of NSW (excluding remote and very remote areas).
- Almost all of the identified benefits are associated with drivers wearing seatbelts (as opposed to front seat passengers also wearing seatbelts).

These results highlight that the effectiveness of this program is strongly dependent on achieving high levels of reach and deterrence for drivers of light vehicles in regional areas of NSW. This is an interesting outcome, because while prevalence of seatbelt non-use is markedly higher among heavy vehicle front seat occupants, there is a much larger number of light vehicles on NSW roads. Therefore, at a population-level, enforcement of seatbelt compliance will lead to a larger trauma reduction in light vehicles than heavy vehicles.

The program focuses on enforcing seatbelt compliance amongst front seat occupants. It is unknown if it will have an effect on seatbelt compliance amongst back seat occupants. It is worth noting, however, that while the overall seatbelt noncompliance is higher amongst back seat occupants (excluding those in child restraints) involved in crashes (3.63%

[2] This level of expected deterrence (20-30%) is slightly lower than that focused on by Stephan et al. (2019) for modelling the potential benefits of MPDC for mobile phone offences (expected deterrence = 30-40%), because there are only a small proportion of the population that do not use seatbelts, and they may be more resistant to deterrence than those who use mobile phones whilst driving. The existing literature is not very informative in helping to select the appropriate level of deterrence. For example, Elvik et al. (2009) report a meta-analysis of 15 studies that showed that a 21% increase in seatbelt wearing with non-automated enforcement, however, this does not equate to a 21% reduction in non-compliance. The % reduction in noncompliance was not reported.

compared to 1.39% for front seat occupants), there are far fewer back seat occupants (2,176; 3.12%) injured in crashes than front seat occupants (67,573; 96.88%) where a seatbelt is available.

Table 1. Conservative scenario: Yearly crash and cost savings if front seat belt noncompliance amongst NSW (excluding remote and very remote areas) front seat occupants injured in crashes was reduced by either 20 or 30%. Note: Assumes injury severity is reduced by one level, and uses a Relative Risk (RR) of injury without a seatbelt of 1.82

Quantity		**Sydney Metropolitan area**				**Non-Sydney areas (excl. remote & very remote)**				**Total for NSW (excl. remote & very remote areas)**	
		Light vehicles		**Heavy vehicles**		**Light vehicles**		**Heavy vehicles**			
Seat belt noncompliance prevalence amongst NSW drivers & front seat passengers	Fatal	9.38%		0%		16.3%		29.2%		n/a	
	Serious	1.43%		4.90%		3.54%		9.66%			
	Moderate	0.59%		2.68%		0.98%		4.66%			
	Minor/Oth.	0.47%		3.00%		1.41%		7.51%			
		Deterrence Fraction		**Deterrence Fraction**		**Deterrence Fraction**		**Deterrence Fraction**		**Deterrence Fraction**	
		20%	**30%**	**20%**	**30%**	20%	30%	**20%**	**30%**	**20%**	**30%**
Percentage (%) of fatalities / injuries reduced or prevented	Fatal	1.3%	2.0%	0%	0%	2.1%	3.2%	3.2%	5.0%	n/a	
	Serious	0.2%	0.3%	0.7%	1.1%	0.6%	0.8%	1.4%	2.1%		
	Moderate	0.1%	0.1%	0.4%	0.6%	0.2%	0.2%	0.7%	1.1%		
	Minor/Oth.	0.1%	0.1%	0.5%	0.7%	0.2%	0.3%	1.1%	1.7%		
Total number of fatalities prevented		0.34	0.52	0.00	0.00	2.9	4.4	0.16	0.24	3.4	5.1
Number of serious injuries prevented		2.6	3.8	0.15	0.23	4.9	7.3	0.64	0.97	8.2	12.3
Number of moderate injuries prevented		-0.13	-0.19	0.04	0.05	-3.1	-4.7	-0.06	-0.10	-3.3	-5.0
Number of minor/other injuries prevented		-0.16	-0.24	-0.10	-0.14	-1.9	-2.8	-0.35	-0.53	-2.5	-3.7
Total number of casualties prevented		2.6	3.9	0.10	0.10	2.8	4.1	0.38	0.58	5.8	8.8
Fatal crash $ saved per year		$2,355,693	$3,559,317	$0	$0	$19,671,361	$29,867,615	$1,064,040	$1,628,758	$23,091,094	$35,055,690
Serious injury crash $ saved per year		$1,068,380	$1,604,434	$56,456	$85,016	$2,866,835	$4,312,489	$295,801	$447,030	$4,287,472	$6,448,968
Moderate injury crash $ saved per year		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Minor/other crash $ saved per year		$174,698	$262,148	$6,315	$9,495	$185,245	$278,186	$25,664	$38,723	$391,921	$588,552
Total $ saved per year		**$3,598,771**	**$5,425,899**	**$62,771**	**$94,510**	**$22,723,441**	**$34,458,290**	**$1,385,504**	**$2,114,510**	**$27,770,487**	**$42,093,209**

5. CONCLUSION

The purpose of this report was to estimate the potential reduction in road trauma that could be realised by applying existing mobile phone detection cameras (MPDC) to seatbelt enforcement. Relevant information required included the prevalence of seatbelt noncompliance amongst front seat occupants, the increased injury risk associated with seatbelt noncompliance, the reach and deterrent effect of the proposed program, and the number and cost of injuries expected to occur without the program. For those factors with lower levels of certainty, we modelled a range of estimated values.

The estimated benefits of the proposed program based on 99.5% reach of the NSW population and the conservative modelling scenario (20-30% deterrence, 1.82 relative risk of injury without seatbelt, one severity level reduction with use of seatbelts) were:

- Prevention of 3.4-5.1 fatalities and 8.2-12.3 serious injuries per year (or 11.6-17.4 FSI per year);
- A net increase of 3.3-5.0% in moderate injuries and increase of 2.5-3.7% for minor or other injuries;
- A total of 5.8-8.8 casualties prevented per year at a cost saving of $27.8-42.0 million annually;
- Over 80% of the estimated cost benefit was attributed to the prevention of fatalities;
- About 95% of the estimated cost benefit was attributed to preventing casualties among light vehicle occupants (including reductions in severity of injury);
    - The vast majority of these (83% of estimated total cost benefit) were for crashes in non-Sydney areas of NSW (excluding remote and very remote areas).

These results highlight that the effectiveness of the proposed program is strongly dependent on achieving high levels of reach and deterrence for drivers of light vehicles in regional areas of NSW.

Applying those FSI and cost savings over a 5 year period results in estimated benefits of:

- Prevention of 16.9-25.6 fatalities and 41.1-61.6 serious injuries (or 58.0-87.2 FSI),
- A total cost saving of $138.9-210.5 million.

The full range of estimated benefits is provided in a separate spreadsheet.

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