



**Submission to the Parliament of Victoria March 2013  
Road Safety Committee - Inquiry into serious injury in motor  
vehicle accidents**

Submission No. *SI06*  
Received  
Road Safety Committee

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**Bicyclists – serious injuries – cycle helmet and other considerations**

This submission relates to terms of reference 'd' and 'e' as listed below<sup>1</sup>.

d)

“determine the correlation between reductions in fatalities and serious injuries (including for different levels of severity) resulting from different road safety countermeasures;”

e)

“identify cost effective countermeasures to reduce serious injury occurrence and severity;”

The Parliament of Victoria tabled a two-part Social Development Committee report in 1987, 'Inquiry into Child Pedestrian and Bicycle Safety'<sup>2</sup> (at that time the Road Safety Committee existed as the Social Development Committee). This was the first and last time mandatory helmet wearing was mentioned in a Victorian Parliamentary report. In 1990, the Victorian Government introduced legislation on mandatory wearing of bicycle helmets. In May 1991 a petition seeking repeal of the mandatory helmet law for cyclists aged 18 years and over was submitted to the Parliament of Victoria<sup>3</sup>, it mentioned an increased accident risk due to wearing helmets.

**Listing examples of reports showing concern**

- Curnow 2008<sup>4</sup> concluded: “Compulsion to wear a bicycle helmet is detrimental to public health in Australia but, to maintain the status quo, authorities have obfuscated evidence that shows this” and “Cycling declined after the helmet laws by an estimated 40% for children, with loss of the benefits of the exercise for health. As serious casualties declined by less, the risks to cyclists, including death by head injury, increased”. The helmet law discouraged cycling and reduced health and safety.
- Erke and Elvik 2007<sup>5</sup> stated: “There is evidence of increased accident risk per cycling-km for cyclists wearing a helmet. In Australia and New Zealand, the increase is estimated to be around 14 per cent.” Helmet wearing increased the accident rate.
- Robinson 1996<sup>6</sup> stated “This suggests the greatest effect of the helmet law was not to encourage cyclists to wear helmets, but to discourage cycling” and “Consequently, a helmet law, whose most notable effect was to reduce cycling, may have generated a net loss of health benefits to the nation”. Robinson states “Thus both in NSW and Victoria, even two years after the law, the estimated decrease in numbers of child cyclists

was 3-5 times greater than the increase in number wearing helmets.” Melbourne surveys showed 30 more teenagers wearing helmets but 623 fewer cycling.

- Clarke 2007 reported on ‘Mistakes in helmet assessments from Australia’ including several from Victoria.<sup>7</sup> The report detailed 10 mistakes and how issues were not properly assessed. As one example, Victoria the Regulatory Impact Statement (RIS) 1989 did not provide any details or discussion of health effects from people being discouraged from cycling.

## Problems with helmet legislation

### Melbourne surveys

A comparison of cyclists counted in Melbourne 1990 with 1991 shows a 36% reduction in numbers of cyclists - decreases of 26 children, 623 teenagers and 461 adults counted, compared to increases in numbers wearing helmets of 13 children, 30 teenagers and 254 adults. Overall, 3121 cyclists were observed in 1990. In 1991, 1110 (36%) fewer cyclists were counted, compared to an increase of 293 cyclists wearing helmets. The age group 12-17 (a high TAC claims rate group) had a reduction in the number cycling of 48% in Melbourne by 1991. Fig 2 shows the overall changes.

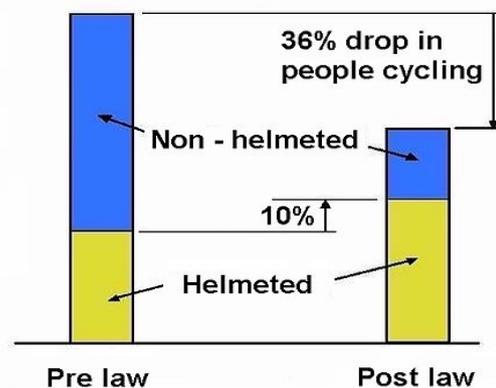


Fig 2

### Census data

Census data shows a larger reduction in the proportion cycling in regional areas of Victoria compared with Melbourne, Table 1 provides the details. (based on ‘Travel to work in Australian capital cities, 1976-2006’ and census data reported<sup>8, 9</sup>). None of the reports from Monash University has fully

reported on the drop in cycling for country areas. Total hours cycled per day are not available for Melbourne or country areas.

**Table 1**

<b>Victoria</b>	<b>Melbourne</b>	<b>Rest</b>
<b>Vic 76</b>		
1.35%	1.0%	3.37%
<b>Vic 81</b>		
1.79%	1.2%	4.42%
<b>Vic 86</b>		
1.75%	1.1%	4.58%
<b>Vic 91</b>		
1.36%	1.1%	2.90%
<b>Vic 96</b>		
1.15%	0.9%	2.09%
<b>Vic 01</b>		
1.15%	1.0%	1.75%
<b>Vic 06</b>		
1.40%	1.3%	1.62%
<b>Vic 11</b>		
1.53%		

Note; Pre law surveys were conducted on 30 June of each census year and post law surveys in early August (slightly warmer conditions and approximately 42 minutes extra daylight). Promoting cycling to work on census day has occurred in recent times.<sup>10</sup> The City of Melbourne population has increased from 34659 in 1991 to 67193 in 2006 (projected 86162 by 2011<sup>11</sup>) and this will have contributed to increase cycling in the inner Melbourne area.<sup>12</sup> Extra cycling facilities provided will have encouraged more people to cycle.

### **Cycling to school levels and recreational cycling**

It was reported that 6% of primary and 14% of secondary children cycled to school in Victoria in 1984<sup>13</sup> but in 2011 only 2.6% cycle to school in Melbourne.<sup>14</sup> Survey details for Victoria (published 1991<sup>15</sup>) counted 2995 primary and 5998 secondary children cycling in March 1990 and by November, 908 primary and 2179 secondary children. Totals were 8993 compared with 3087, a reduction of 65%. Later survey results reported for Melbourne recreational cyclists, 3488 counted in March 1990 and 1963 counted in March 1991,<sup>16</sup> a reduction of 44%.

The helmet law was a disaster for children and regional cycling levels.

### **Background information**

McDermott and Klug 1982<sup>17</sup> reported on data from 1975 to 1980 for Victoria, with 73 fractures of the skull for bicyclists compared with 31 for motorcyclists and concluded that bicyclists had a significant greater incident of fractured vault of the skull. Their study reported the number of fatalities as 181 for bicyclists compared with 451 for motorcyclists but did not include information regarding exposure. The travel survey data available for 1985/86<sup>18</sup> details bicyclists spending 114,500 hours per day cycling in Victoria compared with 17,500 hours per day for motorcycling. Per hour of travel motorcyclists

generally wearing helmets were 16 times more likely to be killed and nearly 3 times more likely to suffer a skull fracture compared with bicyclists who were generally not wearing helmets. Both McDermott and Klug were members of the Road Trauma Committee, Royal Australian College of Surgeons that requested the Government of Victoria to introduce bicycle helmet legislation.

The Victorian Parliament tabled a report in 1987, Inquiry into Child Pedestrian and Bicycle Safety<sup>2</sup> that details TAC claims 1980 - 85 involving motor vehicles and cyclists and the rate per 100,000 population for deaths and injuries. For the 0-16 age range, they had a rate of 77.9 and for other age groups 21.2. The highest rate of 154.7 was for those aged 12-16 years (Table 11, p47). Details were provided for both child pedestrian and cyclists and the reduction in the percentage distribution for head injury. At this time helmet wearing was increasing.

Percentage severe head injury 1980 – 85 for child cyclists and pedestrians. (from Table 12 p48 and Table 6 p39).

	Cyclist	Pedestrian
1980	10.6	14.3
1981	9.9	13.4
1982	9.0	11.9
1983	8.7	10.2
1984	6.1	9.5
1985	5.6	8.5
% reduction 1980/85	47%	41%

Note; Cyclist 5.6% were 'head', approximately 1 in 18 injuries.

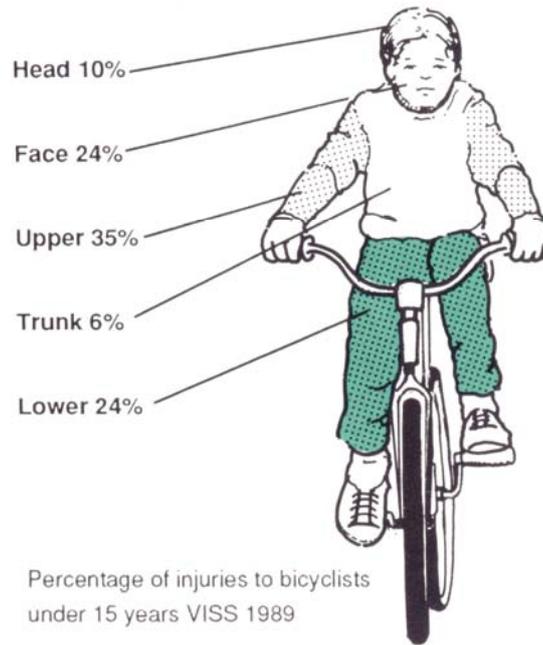
The 1987 report also details the child casualty rate from the claims data. (from Table 11 p47 and Table 5 p37)

	Cyclist	Pedestrian
1980	66.5	84.1
1981	73.5	83.9
1982	82.0	88.0
1983	85.4	94.4
1984	90.9	90.1
1985	77.9	83.8
(the 1985 figures had unresolved claims pending)		
% change	+17%	-0.4%
% change 1980/84	+37%	+7%

Overall child pedestrians fared better than cyclists but this was not fully considered.

Whately 1987<sup>19</sup> (Table 25 of report) details cyclist hospital admissions by main injury and by length of stay (LOS). Bicycle/motor vehicle accidents LOS averaged 10.6 days and bicycle alone 4.5 days. Leg fractures accounted for 34% of hospital days and had the highest average LOS at 16.4 days.

In 1989, Hazard<sup>20</sup> published details of the proportion of injuries to children (mainly due to falls), as shown below, Fig 1.



**Fig 1**

### Outcome from helmet legislation

In 2013 VicRoads reported "Two years after the legislation was introduced, there was a 16% reduction in head injuries in metropolitan Melbourne and 23% reduction in head injuries throughout Victoria."<sup>21</sup>

- Clarke 2007<sup>7</sup> explains that for Melbourne cycling in 1992 was still down by 34% on weekdays.
- Survey data for the age group 12-17 reported 1293 counted in 1990 and 713 in 1992, a reduction of 45%.<sup>6</sup> (this age group had approximately 50% of TAC claims pre law)
- Cycling had reduced by more than the 16% reduction in head injuries, therefore it suggests that safety was reduced.

In 2013 VicRoads reported "There was also an immediate reduction in bike riders, however by 1992 the numbers of bike riders had approached pre-legislation levels. Even though bicycle helmets are mandatory, the number of people cycling is increasing each year."<sup>22</sup>

- Census data shows 1.75% cycling to work in 1986, 1.36% in 1991 and 1.15% in 1996. VicRoads reported cycling increasing by 47% between 1986 and 1989<sup>13</sup>, therefore by 1990 a rate of approximately 2.5% could be estimated as cycling to work. The VicRoads claim is unsuitable.
- In 2011 the Auditor-General reported "Despite recent growth, the first Victorian Survey of Travel and Activity in 2007-08 showed that bicycles were used for only 1.6 per cent, or 184 000, of the 11.6 million journeys made on a typical weekday".<sup>23</sup> This compares with pre helmet law in 1985/86 of 4.2% of trips by bicycle and 466000 trips by bicycle<sup>18</sup>.

Monash University Accident Research Centre (MUARC) did a follow up review on the effects of mandatory wearing of bicycle helmets in 1994. They reported "...the number of insurance claims from bicyclists killed or admitted to hospital after sustaining a head injury decreased by 48% and 70% in the first and second years after the law, respectively. Analysis of the injury data also showed a 23% and 28% reduction in the number of bicyclists killed or admitted to hospital who did not sustain head injuries in the first and second post-law years, respectively."<sup>24</sup> The previous data comparing 184000 journeys in 2007-08 with 466000 trips in 1985/86 indicates that cycling may have been reduced by more than was reported. Robinson criticised the MUARC study on the grounds that it ignored the similar trends for pedestrians, in particular that numbers of pedestrians with concussion fell by 29% and 75% in the first and second years after the introduction of the bicycle helmet law in Victoria.<sup>25</sup> From 83 pedal cyclist head injury claimants to the TAC in 1989, 59 were aged less than 18 years of age<sup>26</sup>. TAC claimants under age 18 had a head injury rate of approximately 14% compared to adults with approximately 9%. Carr reported cyclist head injury hospital admissions with motor vehicle involvement and the data suggested a decrease of 48% rather than the 70% reported<sup>27</sup>. The MUARC report may not be reliable because it did not relate to the reduction in cycling for country areas or to the large reduction in the highest risk group, those aged 12-16 years.

In the early 1990's road safety improved substantially with deaths reducing from 777 in 1989 to 396 in 1992. Primarily anti-drink drive and speed limit enforcement measures reduced road deaths. In December 1989 22.8% of motor vehicles were exceeding the threshold limit and this reduced to 3.8% by June 1993. Research by Janssen and Wiseman<sup>28</sup> showed the effects of lateral impacting by vehicles on pedestrians and cyclist dummies at speeds of 40 and 30km/hr. From a small change in driving speed a large change in the head injury criteria (HIC) values can occur. The change in driving speeds and the reduction in teenagers and children cycling would result in fewer head injuries compared to other injuries. The 'insurance claims' reflecting motor vehicle accidents and 'hospital admissions' reflecting more general accidents.

Robinson discussing TAC data<sup>25</sup> (details copied below) states:

"Table 3 shows that, in the two years before the law, deaths and serious head injuries (DSHI) represented 26.5% of all serious injuries (ASI) to cyclists in bike/motor vehicle collisions in Victoria. This fell by 1.7 percentage points to 24.8% in the 2 years after the law. For pedestrians, the fall over the same period was actually greater – 2.5 percentage points."

**Table 3. TAC (Transport Accident Commission) data for average numbers of deaths and serious head injuries (DSHI) and all serious injuries (ASI) per year in Victoria**

Injuries due to collisions with motor vehicles (average number per year)	Cyclists			Pedestrians		
	DSHI <sup>1</sup>	ASI	%DSHI	DSHI	ASI	%DSHI
Pre-law (1988/90)	72.5	274.0	26.5	285.5	828.0	34.5
Post-law (1990/92)	41.0	165.0	24.8	211.0	660.0	32.0
2 post-law yrs as % of 2 pre-law years	56.6	60.2	93.6	73.9	79.7	92.7
Adjusted for 30% fall in cycling	80.8	86.0				

<sup>1</sup>DSHI as defined by TAC (skull fracture or brain injury excluding concussion).

## Injury changes

Cameron et al 1994<sup>29</sup> provides details of TAC data (from motor vehicle/cyclist accidents) with the percentage reduction in severe bicyclist casualties relative to the 1989/90 financial year. For Melbourne, (Table 4, p11 in report, shown below) bicyclists without head injuries fell by 4% and 12% for the years 1990/91 and 1991/92.

**TABLE 4**  
**PERCENTAGE REDUCTIONS IN SEVERE BICYCLIST CASUALTIES**  
**RELATIVE TO 1989/90 FINANCIAL YEAR**  
**MELBOURNE : TAC CLAIMS**

<b>Financial Year</b>	<b>Bicyclists with head injuries</b>	<b>Bicyclists without head injuries</b>
1990/91	36%	4%
1991/92	64%	12%
1992/93	40%	35%

Generally cycling was reduced by 36% compared to the reported 4% and 12% reductions. The highest risk group for TAC cyclist claimants were aged 12-16 years and their cycling levels reduced in Melbourne by approximately 45% - 48%. There was a substantial increase in risk of serious injury for Melbourne cyclists, relative to cycling levels, according to the available information.

Robinson 1996<sup>6</sup> analysed children's data for Victoria to investigate the effects of helmet legislation. The VISS data showed a 15% relative increase, (Table 5 of the 1996 report) 'equivalent number of injuries for pre law cycle use'. The data behind this report was based on substantial surveys and hospital admissions and treatments.

For Victoria, cyclists seriously injured with high threat to life due to road vehicle traffic crashes is shown in Table 3 (based on Table 3.2, Trends in serious injury due to land transport accidents, Australia 2000-01 to 2007-08)<sup>30</sup>

Table 3

Road user type	Hospitalisations 2000/01 – 2007/08			
	00-02	02-04	04-06	06-08
Pedestrian	627	552	540	596
Pedal cyclist	274	347	388	505
C/P%	43.7%	62.9%	71.9%	84.7%

It appears that the increase in cycling hospitalisations, from 274 to 505, is above what could be expected, even taking account of increased cycling in Melbourne. Pedestrians by comparison had a 5% reduction. It was reported

“VicRoads CrashStats data show that cyclist serious injuries increased from 201 in 2000 to 421 in 2008, an increase of 109%.”<sup>31</sup>

A recent study<sup>32</sup> of admissions to the Alfred and Sandringham hospital EDs provided details of injuries to cyclist, Table 20 ‘Distribution of cyclists by AIS body region and injury severity’ listed the proportions as follows.

Head 9.5%  
 Face 18.9%  
 Neck 3.2%  
 Chest 9.5%  
 Abdomen/pelvis 13.3%  
 Spine 1.3%  
 Upper 79.7%  
 Lower 41.8%

The study indicates a high rate of falls with arm injuries and leg injuries. It reported that 96% of cyclists sustained injuries with an injury severity score of 9 or less.

### Fatality changes<sup>33</sup>

In 1986 the road accident fatality rate per 100,000 population for Victoria was 16.1 and this reduced to 8.9 by 1992. Cyclists and pedestrians generally both benefit from improved road safety behaviour. Table 5 shows the changes over time for cyclists and pedestrians. Considering the proportion cycling to work, 1.76% in 1986 and 1.4% in 2006 plus the drop in cycling following legislation, the figures do not suggest a clear benefit in saving lives due to the helmet law.

**Table 5** (fatality data 1986 -2012 omitting data for year 1990)

	86-89	91-94	95-98	99-02	03-06	07-10
Pedestrians	588	319	315	274	197	189
Cyclists	92	50	45	36	34	29
C/P%	15.6	15.6	14.2	13.1	17.2	15.3

### Submission requirements –

d)

determine the correlation between reductions in fatalities and serious injuries (including for different levels of severity) resulting from different road safety countermeasures;

When related to the levels of cycling activity and general road safety trends the available evidence suggests that cycle helmet requirements do not provide a significant positive outcome for fatalities and serious injuries. It appears that helmets provide some protection from minor head injuries but also they increase neck injuries and increase the overall accident rate. For Melbourne, generally cycling was reduced by 36% compared to the reported 4% and 12% reductions in TAC serious injuries. This indicates accident involvement increased by up to 50% ( $0.96/0.64 = 1.5$  and  $0.88/0.64 = 1.37$ ).

Erke and Elvik 2007<sup>5</sup> mentions there is evidence of increased accident risk per cycling-km for cyclists wearing a helmet of 14%. Robinson 1996 report (Table 5 p466) shows data for children in Victoria. The equivalent number of injuries for pre law level of number of cyclists increased by 15% from 897 in 1990 to 1035 in 1992.

The ratio of fatality to serious injury appears to be approximately 1:45<sup>34</sup> for cyclists, with approximately 85% of serious injuries coming from cyclist/motor vehicle collisions. In the case of cyclists seriously injured with high threat to life the ratio appears to be approximately 1 to 20<sup>32</sup>. One report details "In the 5 years, 25 920 bicycle-related ED presentations were recorded, 10552 bicyclists were admitted to hospital, 298 bicycling injuries were classified as major trauma (VSTR), and there were 47 bicycling fatalities. From 2001 to 2006, the incidence of bicycle-related ED presentations (incidence rate ratio [IRR] = 1.42; 95% CI, 1.37–1.48), hospital admissions (IRR = 1.16; 95% CI, 1.09–1.23) and major trauma (IRR = 1.76; 95% CI, 1.22–2.55) increased significantly."<sup>35</sup> The ratio fatality to major trauma being 1:6 and for admitted 1:224. These results appear similar to the Alfred and Sandringham study in that only a small proportion of cyclists sustain major trauma injuries.

### **Submission requirements –**

e)

identify cost effective countermeasures to reduce serious injury occurrence and severity; and

One measure that may be cost effective would be introducing a minimum clearance of one metre for motor vehicle passing cyclist and this could enhance safety and make drivers more careful when overtaking or approaching. Having suitable penalties for anyone opening a car door and causing an accident could result in more careful driving habits. A consultation for a code of conduct for bunch cycling, to take account of slow and fast cycling and social aspects may be of benefit but cyclists themselves are probably best placed to consider this issue. Assessing speed limits on country roads to reduce risks may also provide benefits.

Robinson reported "Effective road safety initiatives are great news. The speed camera/anti-drink-driving campaign, introduced in Victoria about the same time as the bike helmet law saved the community AUD 200 million in 1990 for just AUD 5.5 million. Graph 1 (left) shows the size of the drop in pedestrian fatalities."<sup>36</sup>

A health benefit model developed at Sydney's Macquarie University and published in March 2009<sup>37</sup> suggests Australia's national mandatory bicycle helmet laws incur a health cost to the country of approximately half a billion dollars every year. In 1986 the road accident fatality rate per 100,000 population for Victoria was 16.1 and this reduced to 5.1 by 2011, therefore major improvements to avoid fatal accidents as occurred. In 2010 more than 11000 deaths in Victoria were due to circulatory disease<sup>38</sup>. Moderate cycling has many physical and mental benefits (BMA 1992<sup>39</sup>) by reducing the risk of developing heart disease<sup>40,41,42,43</sup> diabetes, high blood pressure, colon cancer and depression, and helping to control weight and increase fitness. Dr Hillman from the UK's Policy Studies Institute calculated the life years gained by

cycling outweigh life years lost in accidents by a factor of 20 to 1. Having a mandatory requirement to wear a cycle helmet is not a cost effective measure when the full issues are considered in detail.

Curnow, "Bicycle Helmets: A Scientific Evaluation"<sup>44</sup> provides a good basis to consider the merits of changing from the present mandatory requirement towards the European Cycling Federation approach of 'Improving bicycle safety without making helmet use compulsory'<sup>45</sup>. A Parliamentary inquiry into the helmet issue could be the best approach.

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<sup>1</sup> <http://www.parliament.vic.gov.au/rsc/article/2014>

<sup>2</sup> Safe roads for Children, Social Development Committee, Parliament of Victoria 1987

<sup>3</sup> [http://tex.parliament.vic.gov.au/bin/texhtmlt?form=jVicHansard.dumpall&db=hansard91&dodraft=0&house=ASSEMBLY&speech=5089&activity=Petitions&title=Safety+helmets+for+bicyclists&date1=28&date2=May&date3=1991&query=true%09and+%28+activity+contains+Petitions'+%29%09and+%28+hdate.hdate\\_3+=+1991+%29%09and+%28+hdate.hdate\\_2+contains+'May'+%29%09and+%28+hdate.hdate\\_1+=+28+%29%09and+%28+house+contains+'ASSEMBLY'+%29](http://tex.parliament.vic.gov.au/bin/texhtmlt?form=jVicHansard.dumpall&db=hansard91&dodraft=0&house=ASSEMBLY&speech=5089&activity=Petitions&title=Safety+helmets+for+bicyclists&date1=28&date2=May&date3=1991&query=true%09and+%28+activity+contains+Petitions'+%29%09and+%28+hdate.hdate_3+=+1991+%29%09and+%28+hdate.hdate_2+contains+'May'+%29%09and+%28+hdate.hdate_1+=+28+%29%09and+%28+house+contains+'ASSEMBLY'+%29)

<sup>4</sup> Curnow WJ, Bicycle helmets and public health in Australia, Health Promotion Journal of Australia, 2008 Apr;19(1):10-15

<sup>5</sup> Erke A, Elvik R, Making Vision Zero real: Preventing Pedestrian Accidents And Making Them Less Severe, Oslo June 2007. page 28  
<https://www.toi.no/getfile.php/Publikasjoner/T%D8I%20rapporter/2007/889-2007/889-2007-nett.pdf>

<sup>6</sup> Robinson DL; Head injuries and bicycle helmet laws; Accid Anal Prev, 28, 4: p 463-475, 1996 <http://www.cycle-helmets.com/robinson-head-injuries.pdf>

<sup>7</sup> Clarke CF, The Case against Bicycle Helmets and Legislation [http://www.nationaler-radverkehrsplan.de/eu-bund-laender/eu/velocity/presentations/velocity2007\\_pp\\_17c\\_long\\_public.pdf](http://www.nationaler-radverkehrsplan.de/eu-bund-laender/eu/velocity/presentations/velocity2007_pp_17c_long_public.pdf)

<sup>8</sup> Travel to work in Australian capital cities, 1976-2006' and census data reported<sup>8</sup>: an analysis of census data. Paul Mees, Eden Sorupia & John Stone, December 2007

[http://www.abp.unimelb.edu.au/files/miabp/2GAMUT2007\\_DEC\\_02.pdf](http://www.abp.unimelb.edu.au/files/miabp/2GAMUT2007_DEC_02.pdf)

<sup>9</sup> <http://www.cyclehelmets.org/1194.html> accessed 15.03.2013

<sup>10</sup> <http://www.melbournecyclist.com/forum/topics/ride-to-work-on-census-day>

<sup>11</sup> City of Melbourne Facts, Figures and Projections

[http://www.futuremelbourne.com.au/wiki/pub/FMPlan/S3Resources/City\\_of\\_Melbourne\\_Facts\\_Figures\\_and\\_Projections.pdf](http://www.futuremelbourne.com.au/wiki/pub/FMPlan/S3Resources/City_of_Melbourne_Facts_Figures_and_Projections.pdf)

<sup>12</sup> [http://www.futuremelbourne.com.au/wiki/pub/FMPlan/S3Resources/City\\_of\\_Melbourne\\_Facts\\_Figures\\_and\\_Projections.pdf](http://www.futuremelbourne.com.au/wiki/pub/FMPlan/S3Resources/City_of_Melbourne_Facts_Figures_and_Projections.pdf)

<sup>13</sup> Victorian Bicycling Strategy; Vic Roads, Australia 1990.

<sup>14</sup> Why aren't more kids cycling to school? <http://theconversation.edu.au/why-arent-more-kids-cycling-to-school-3531> accessed 18.03.13

<sup>15</sup> Leicester P, Nassau F, Wise A, The introduction of compulsory bicycle helmet wearing, VicRoads GR/91-4, Feb 1991

<sup>16</sup> Morgan M, Pederby J, Rogerson P, Bicycle helmet usage rates in Victoria : 1990-1991, GR91-9 VicRoads.

<sup>17</sup> McDermott FT, Klug GL Differences in head injuries of pedal cyclist and motorcyclist casualties in Victoria. The Medical Journal of Australia[1982, 2(1):30-32

<sup>18</sup> Day-to-Day Travel in Australia, CR 69, INSTAT, FORS 1988

[http://www.infrastructure.gov.au/roads/safety/publications/1988/pdf/Aust\\_Trav.pdf](http://www.infrastructure.gov.au/roads/safety/publications/1988/pdf/Aust_Trav.pdf)

<sup>19</sup> Whately S, Bicycle Crashes in the Austrian Capital Territories, CR 35, FORS, 1985

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<sup>20</sup> Victorian Injury Surveillance System, Hazard Vol 6, Dec 1990.

<sup>21</sup> <http://www.vicroads.vic.gov.au/Home/SafetyAndRules/SaferRiders/BikeRiders/WearingABicycleHelmet.htm> accessed 11.03. 2013

<sup>22</sup> <http://www.vicroads.vic.gov.au/Home/SafetyAndRules/SaferRiders/BikeRiders/WearingABicycleHelmet.htm> accessed 11.03. 2013

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