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Preliminary Review of Reductions in Fatal and Serious Casualty Crashes in Victoria during late 1996 and early 1997

by

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Abstract:

An on-going system of data gathering and analysis to monitor and evaluate countermeasures was established during 1995. The data collected by the system, including number of random breath tests, number of speed-related traffic infringement notices, television publicity levels associated with various themes (ie. drink-driving, speed, concentration, fatigue, seat belts), unemployment rates, weather data, alcohol sales and fuel sales, was used to review the apparent reduction in fatal and serious casualty crashes that occurred in Victoria during late 1996 and early 1997.

A reduction in fatal crashes occurred in Victoria during September 1996 to June 1997, with the reduction being primarily in rural areas. Country Victoria experienced larger reductions in fatal crashes than Melbourne during the December 1996, March 1997 and June 1997 quarters relative to the average of the corresponding quarters of the previous five years. In parallel, a reduction in serious casualty crashes occurred in Victoria, commencing about September 1996, but was relatively smaller than the fatal crash reduction. For rural areas the serious casualty crash reduction may have begun earlier – about June 1996 – but for Melbourne a decrease was not evident until November 1996.

A reduction in the number of vehicle kilometres travelled in Victoria was found for July 1996-June 1997. This may have contributed to the crash reduction. However, when the number of fatal crashes and the number of serious casualty crashes were adjusted by the amount of travel in Victoria, there was still evidence of reductions during late 1996 and early 1997 for rural areas and for Victoria as a whole, but less so for Melbourne. This suggests that some factor other than a reduction in exposure (ie. vehicle travel) is contributing to the fatal and serious casualty crash reductions.

In addition to the decreased vehicle travel and decreased crash rates, a substantial reduction in rainfall was found for both Melbourne and country Victoria during September 1996-June 1997 when compared to the same period a year earlier. There was also a small increase in average daily sunshine hours during September 1996-March 1997, with the increase being greater in rural areas than in Melbourne. These changes may also have contributed to the crash reductions.

In view of the exploratory nature of this preliminary study, further research involving statistical modelling as well as the collection and analysis of a further six months crash and explanatory data (ie. for the period July-December 1997) is needed to determine the contribution and significance of the above factors in the reduction in crashes that occurred during late 1996 and early 1997.

Key Words: (IRRD except when marked*)

Fatal crash, serious casualty crash, vehicle travel, crash rate, rainfall, sunshine hours, countermeasures*

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EXECUTIVE SUMMARY

An on-going system of data gathering and analysis to monitor and evaluate countermeasures was established during 1995. The data collected by the system, including number of random breath tests, number of speed-related traffic infringement notices, television publicity levels associated with various themes (ie. drink-driving, speed, concentration, fatigue, seat belts), unemployment rates, weather data, alcohol sales and fuel sales, was used to review the apparent reduction in fatal and serious casualty crashes that occurred in Victoria during late 1996 and early 1997.

A reduction in fatal crashes occurred in Victoria during September 1996 to June 1997, with the reduction being primarily in rural areas. Country Victoria experienced larger reductions in fatal crashes than Melbourne during the December 1996, March 1997 and June 1997 quarters relative to the average of the corresponding quarters of the previous five years.

In parallel, a reduction in serious casualty crashes occurred in Victoria, commencing about September 1996, but was relatively smaller than the fatal crash reduction. For rural areas the reduction may have begun earlier – about June 1996 – but for Melbourne a decrease was not evident until November 1996. In addition, for rural areas, the percentage reductions in serious casualty crashes were larger than the corresponding fatal crash reductions during the December 1996, March 1997 and June 1997 quarters. For Melbourne, however, small increases occurred during the March 1997 and June 1997 quarters relative to the average of the corresponding quarters of the previous five years.

A reduction in the number of vehicle kilometres travelled in Victoria was found for July 1996-June 1997. This may have contributed to the crash reduction. However, when the number of fatal crashes and the number of serious casualty crashes were adjusted by the amount of travel in Victoria, there was still evidence of reductions during late 1996 and early 1997 for rural areas and for Victoria as a whole, but less so for Melbourne. This suggests that some factor other than a reduction in exposure (ie. vehicle travel) is contributing to the fatal and serious casualty crash reductions.

In addition to the decreased vehicle travel and decreased crash rates, a substantial reduction in rainfall was found for both Melbourne and country Victoria during September 1996-June 1997 when compared to the same period a year earlier. There was also a small increase in average daily sunshine hours during September 1996-March 1997, with the increase being greater in rural areas than in Melbourne. These changes may also have contributed to the crash reductions.

In view of the exploratory nature of this preliminary study, further research involving statistical modelling as well as the collection and analysis of a further six months crash and explanatory data (ie. for the period July-December 1997) is needed to determine the contribution and significance of the above factors in the reduction in crashes that occurred during late 1996 and early 1997.

1. INTRODUCTION

An on-going system of data gathering and analysis to monitor and evaluate countermeasures was established during 1995. Monitoring includes systematic recording of dates of implementation, levels of activity, available data on road user perceptions and behaviour, and other operational measures. Crash data is obtained regularly for Victoria and from another State (New South Wales) to provide a comparison in the case of evaluations of Victoria-wide countermeasures. A documentation of the system developed to monitor and evaluate countermeasures can be found in Gantzer et al (1995).

The data used to monitor the system includes Police operational data (eg. number of random breath tests, number of speed-related traffic infringement notices, drink-driving, speed, concentration, fatigue and seat belt television publicity measures); economic indicators (eg. unemployment rate); social factors (eg. alcohol sales, fuel sales) and environmental factors (eg. monthly rainfall, average daily sunshine hours). Data (up to June 1997) for these factors has been collected and maintained in a database.

The data collected by the system was used to review the apparent reduction in Victorian fatal crashes that occurred during late 1996 and early 1997. Serious casualty crashes for this period were analysed in conjunction with the above factors to explain the reduction. The preliminary findings of the initial exploratory analysis are summarised in this report.

2. REDUCTIONS IN ROAD TRAUMA IN VICTORIA

2.1 FATAL CRASHES

Crash data for January 1991 to June 1997 was obtained from the VicRoads-enhanced database of Police-reported accidents. Figure 2.1 gives the monthly number of fatal crashes in Victoria as a whole, as well as for Melbourne and country Victoria for January 1991-June 1997, whilst Figure 2.2 gives the corresponding monthly fatal data expressed as 12-month moving totals to smooth out random fluctuations apparent in the former graph.

There appears to have been a progressive reduction in the 12-month moving totals from about September 1996 to June 1997 (Figure 2.2). This reduction has occurred for both Melbourne and country Victoria during the same period - although the decrease was not as steep for the Melbourne region. Figure 2.2 suggests the reduction in fatal crashes was primarily in rural areas.

Figure 2.1: Number of FATAL Crashes per month for Victoria, Melbourne & Country Victoria, January 1991-June 1997

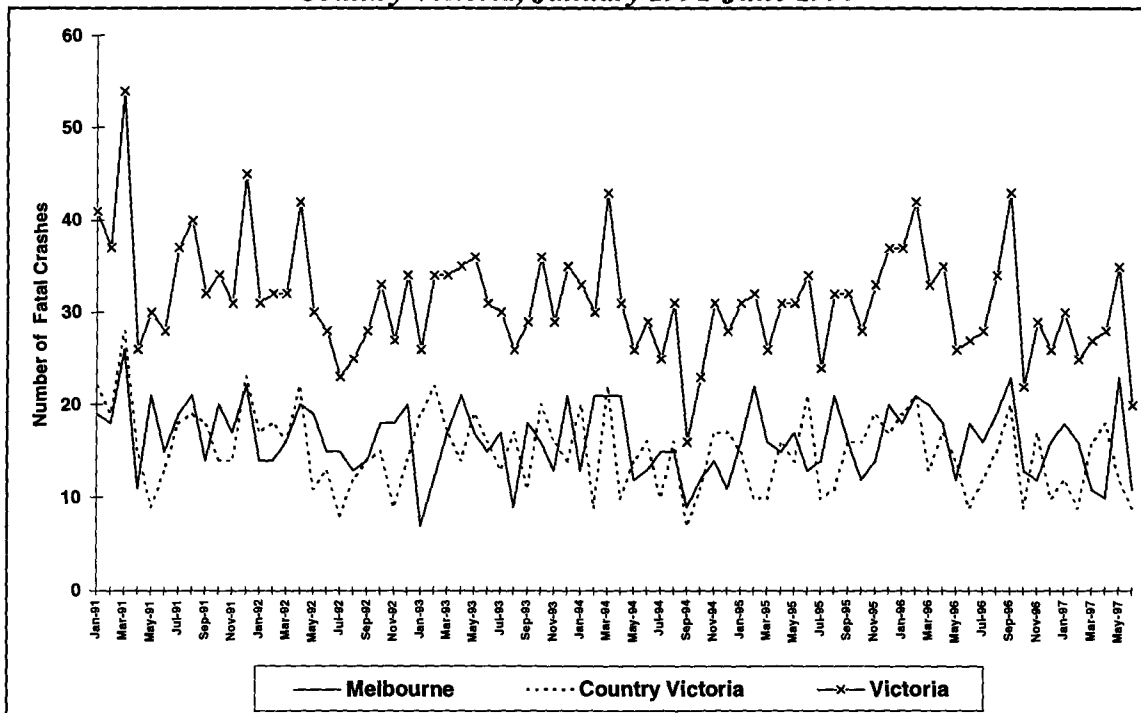


Figure 2.2: Number of FATAL Crashes per month, expressed as 12-MONTH MOVING TOTALS, for Victoria, Melbourne & Country Victoria, December 1991- June 1997



Table 2.1 displays the percentage change in fatal crash frequencies for the December 1996, March 1997 and June 1997 quarters, relative to the average of the previous five years' corresponding quarters, to show the magnitude of the drop in fatal crashes during October 1996-June 1997.

Table 2.1: Percentage change in FATAL crashes for the December 96, March 97 & June 97 quarters relative to the average of the corresponding quarters of the previous five years, for Victoria, Melbourne & Country Victoria

Quarter	Number of Fatal Crashes			%change in fatal crashes relative to average of previous 5 years' quarters		
	Melbourne	Country Victoria	Victoria	Melbourne	Country Victoria	Victoria
Dec. 1991-95 average	49.6	47.2	96.8	-	-	-
Mar. 1992-96 average	49.6	49.6	99.2	-	-	-
Jun. 1992-96 average	49.2	45.2	94.4	-	-	-
Dec. 1996	41	36	77	-17.3	-23.7	-20.5
Mar. 1997	45	37	82	-9.3	-25.4	-17.3
Jun. 1997	44	39	83	-10.6	-13.7	-12.1

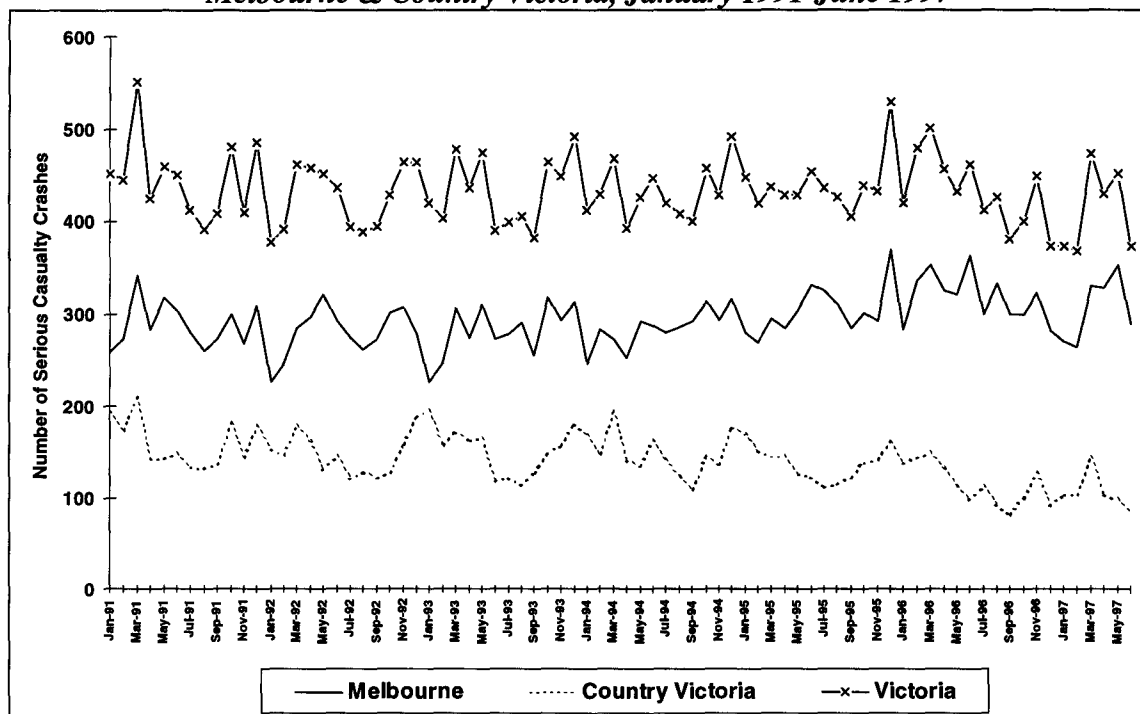
For all Victoria, a 20.5% reduction in fatal crashes occurred for the December 1996 quarter relative to the previous five years' December quarters. Smaller, but still substantial reductions occurred for the March 1997 quarter (17.3% reduction) and for the June 1997 quarter (12.1% reduction). Melbourne and country Victoria experienced reductions as well, but Melbourne had relatively smaller decreases than rural areas during all three quarters. As can be seen from the numbers in Table 2.1 the reductions in actual crash frequencies were also greater in rural areas.

2.2 SERIOUS CASUALTY CRASHES

To investigate whether the reduction in fatal crashes was also evident for crashes involving serious injuries, the monthly trends in serious casualty crashes (ie. crashes in which at least one person was killed or seriously injured) were explored.

Figure 2.3 presents the number of serious casualty crashes per month for Victoria, Melbourne and country Victoria that occurred during January 1991-June 1997, whilst Figure 2.4 expresses this information as 12-month moving totals.

Figure 2.3: Number of SERIOUS CASUALTY Crashes per month for Victoria, Melbourne & Country Victoria, January 1991-June 1997



For Victoria, a relatively smaller reduction in annual serious casualty crash trends occurred compared to the annual fatal crash trends, and appeared to commence about September 1996 (Figure 2.4). This reduction was also evident for country Victoria but may have begun earlier - about June 1996 - in rural areas, but for Melbourne a decrease did not occur until about November 1996.

The rural changes appear more consistent over time, with Figure 2.4 suggesting a significant change between the metropolitan and rural trends from 1995 onwards.

Figure 2.4: Number of SERIOUS CASUALTY Crashes per month, expressed as 12-MONTH MOVING TOTALS, for Victoria, Melbourne & Country Victoria, December 1991-June 1997

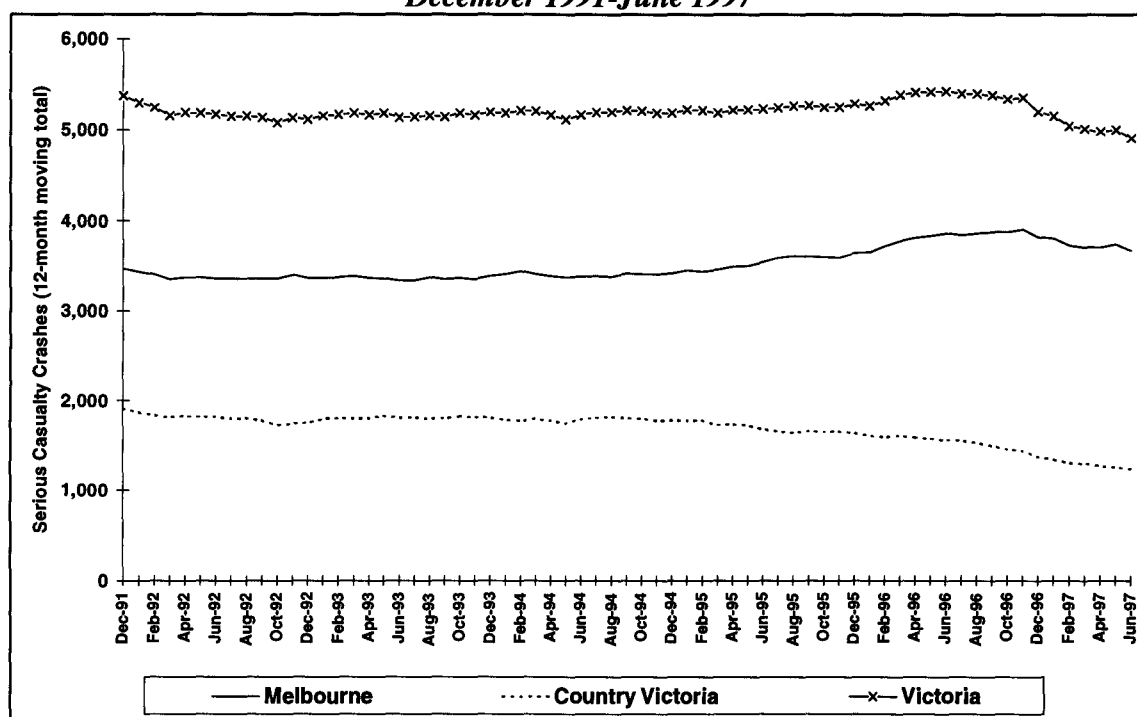


Table 2.2 gives the percentage change in serious casualty crash frequencies for the September 1996, December 1996, March 1997 and June 1997 quarters relative to the average of the previous five years' corresponding quarters.

For all Victoria, the percentage reductions in serious casualty crash frequencies were relatively smaller than the corresponding fatal crash frequencies given in Table 2.1 for the December 1996, March 1997 and June 1997 quarters (ie. about half the size). However, for country Victoria the percentage reductions in serious casualty crashes were relatively large, and were larger than the corresponding fatal crash reductions during the December 1996, March 1997 and June 1997 quarters. There was also a 22% reduction in serious casualty crashes during the September 1996 quarter relative to the previous five years for rural areas. For Melbourne, only a marginal 1% reduction occurred during the December 1996 quarter, with small increases occurring during the March 1997 (4%) and June 1997 (7%) quarters.

Table 2.2: Percentage change in SERIOUS CASUALTY crashes for the September 96, December 96, March 97 & June 97 quarters, relative to the average of the corresponding quarters of the previous five years, for Victoria, Melbourne & Country Victoria

Quarter	Number of Serious Casualty Crashes			%change in serious casualty crashes relative to average of previous 5 years' quarters		
	Melbourne	Country Victoria	Victoria	Melbourne	Country Victoria	Victoria
Sep. 1991-95 average	843.8	370.4	1,214.2	-	-	-
Dec. 1991-95 average	913.4	470.6	1,384.0	-	-	-
Mar. 1992-96 average	830.2	480.0	1,310.2	-	-	-
Jun. 1992-96 average	904.6	410.2	1,314.8	-	-	-
Sep. 1996	930	289	1,219	+10.2	-22.0	+0.4
Dec. 1996	904	319	1,223	-1.0	-32.2	-11.6
Mar. 1997	864	350	1,214	+4.1	-27.1	-7.3
Jun. 1997	969	285	1,254	+7.1	-30.5	-4.6

3. EXPLANATORY FACTORS

A range of potential factors that may explain the reduction that occurred in fatal and serious casualty crashes during late 1996 and early 1997 in Victoria were investigated. These factors included:

- the monthly unemployment rate for Victoria
- the monthly number of “Booze bus” Random Breath Tests (RBTs)
- the monthly number of speed-camera Traffic Infringement Notices (TINs)
- the number of vehicle kilometres travelled per month in Victoria
- the amount of alcohol sold per month in Victoria
- television publicity levels associated with various themes (ie. drink-driving, speed, concentration, fatigue, seat belts)
- the average daily number of sunshine hours per month in Victoria
- the average daily rainfall per month in Victoria.

For the period under consideration, September 1996-June 1997, only vehicle kilometres travelled, monthly average daily rainfall and monthly average daily sunshine hours showed any significantly different patterns from earlier years. It was decided that changes in these factors may potentially explain the reduction in fatal and serious injury crashes, so monthly trends in these factors were explored in the next sections.

3.1 VEHICLE KILOMETRES TRAVELLED IN VICTORIA

Total fuel sales can be used as a proxy for vehicle travel in studies which require some measure of exposure to risk, however this measure does not take into account changing efficiencies in its usage which affects total travel from a given quantity of fuel. It would be better to use an absolute measure of total vehicle travel. Newstead (1995) developed a method to estimate total vehicle travel in Victoria by combining monthly fuel sales with travel estimates given by the ABS Surveys of Motor Vehicle Usage. Because total fuel sales are only given at a statewide level, total vehicle travel estimates used in the analysis were only available for Victoria as a whole, and not for Melbourne and country Victoria separately.

Figure 3.1 presents the monthly number of vehicle kilometres travelled in Victoria during January 1991-June 1997, whilst Figure 3.2 shows the monthly vehicle kilometres travelled expressed as 12-month moving totals. Beginning from about June 1996 there appears to be a decrease in the number of kilometres travelled in the second half of 1996, with a slight increase occurring in January 1997, before a further decline until June 1997. Thus a reduction in the amount of vehicle travel in Victoria in late 1996 and early 1997 could partially explain the reduction in the number of fatal and serious casualty crashes that occurred during the same period.

Figure 3.1: Vehicle kilometres travelled per month in Victoria, January 1991-June 1997

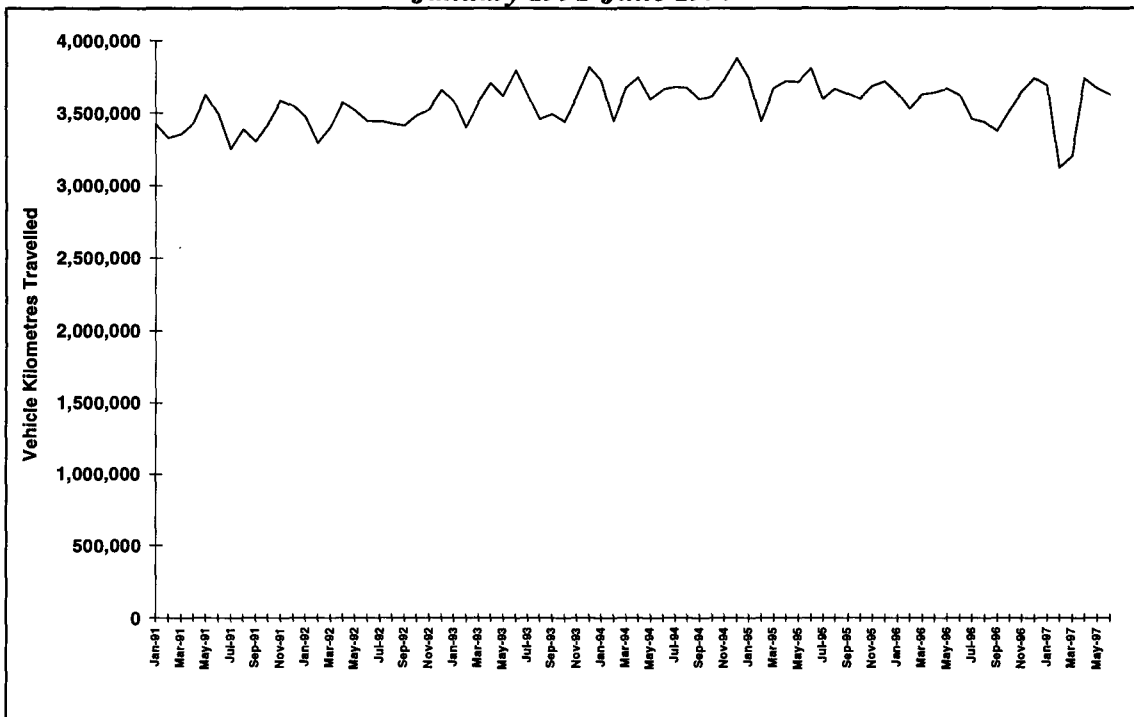
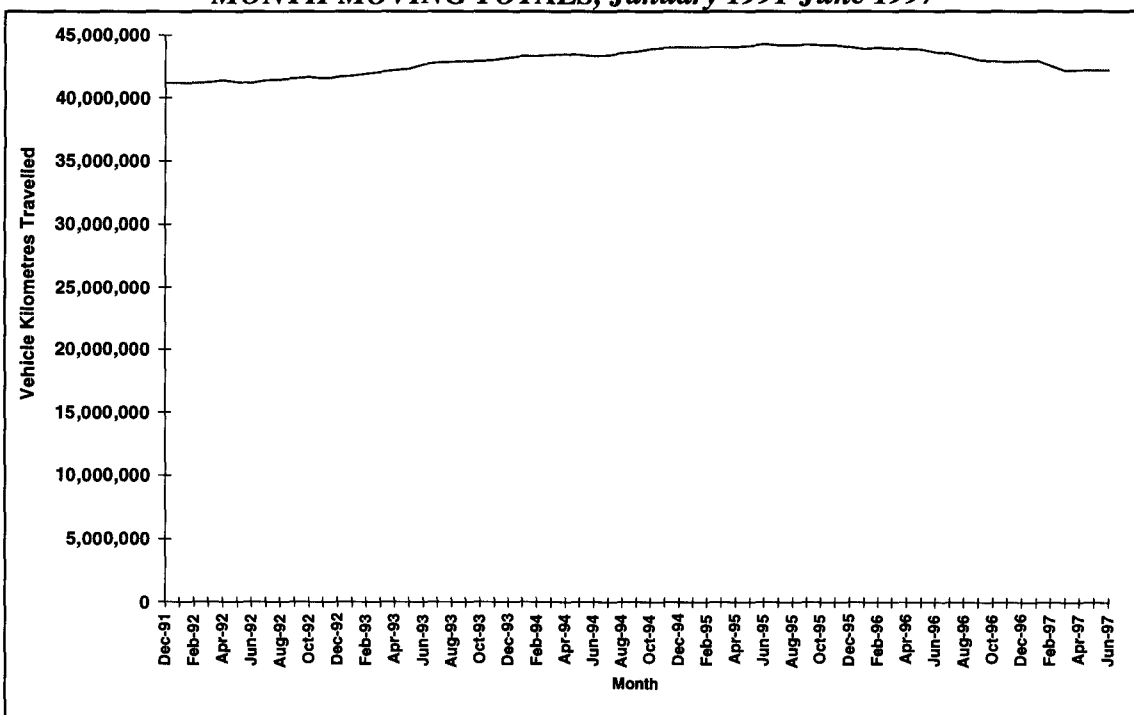


Figure 3.2: Vehicle kilometres travelled per month in Victoria, expressed as 12-MONTH MOVING TOTALS, January 1991-June 1997

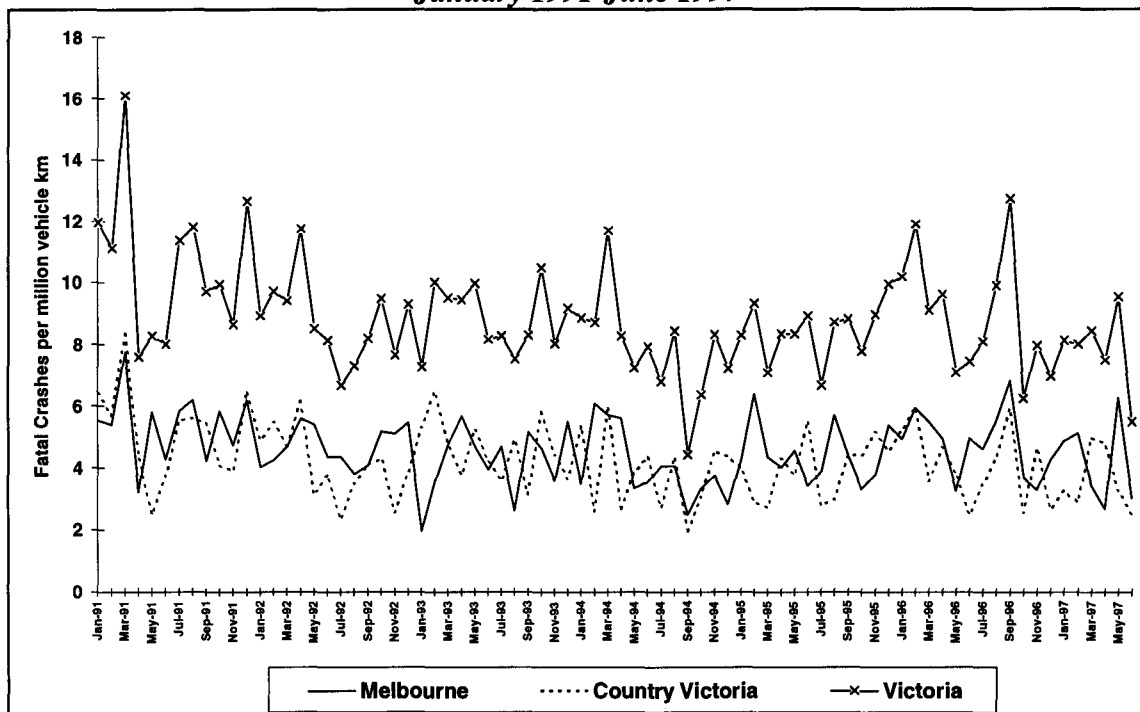


If the reduction in vehicle travel fully explained the reduction in fatal crashes during September 1996-June 1997, then it would be expected that the monthly fatal crash rate (ie. the number of fatal crashes per million kilometres of travel) during that period should remain relatively stable. The next sections examine the fatal and serious casualty crash rates for all Victoria, Melbourne and country Victoria.

3.1.1 Fatal Crash Rates

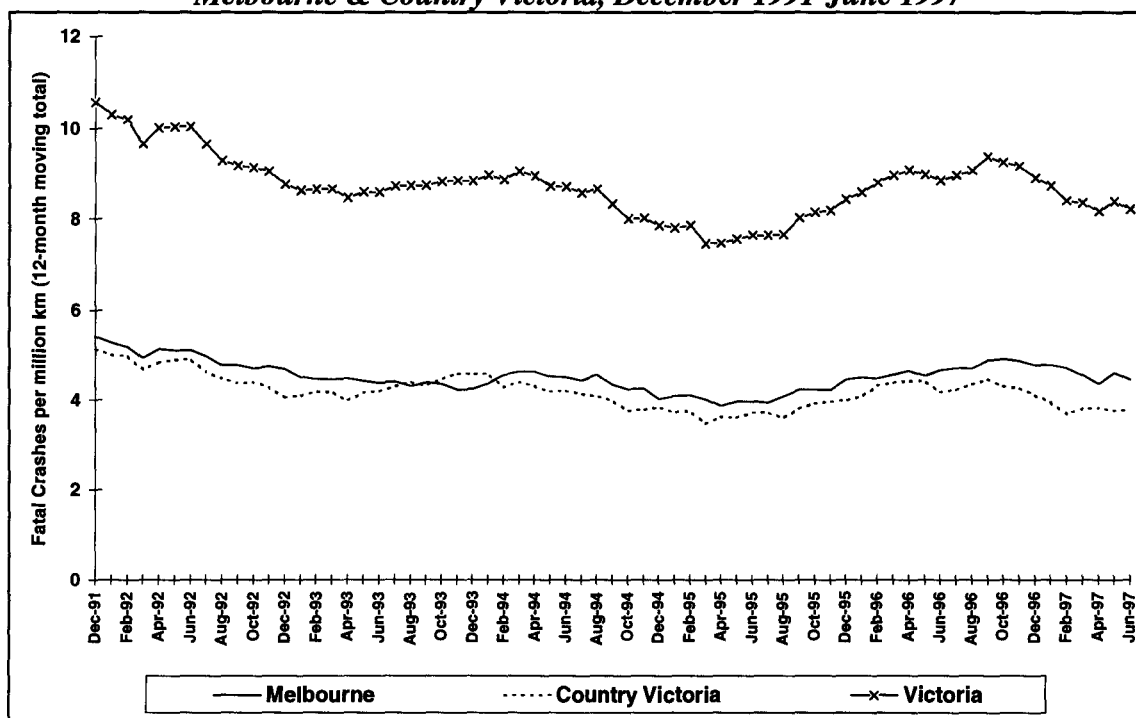
The ratio of the number of fatal crashes per month to the number of kilometres of vehicle travel (in millions) was calculated to give a monthly fatal crash rate. Figure 3.3 displays this information for all Victoria, as well as for Melbourne and country Victoria. For Victoria there appears to be a downward trend in the monthly fatal crash rates from September 1996 onwards. Country Victoria also shows a reduction during this period. However, for Melbourne, a trend is less obvious because of the random monthly fluctuations. To smooth out these fluctuations, the fatal crash rates were expressed as 12-month moving totals, that is, a ratio of the 12-month moving total of fatal crashes to the 12-month moving total of vehicle kilometres was calculated for each month of the series. The "12-month moving total" fatal crash rates are shown in Figure 3.4 for all Victoria, Melbourne and for country Victoria.

Figure 3.3: Monthly number of FATAL crashes per million kilometres of vehicle travel in Victoria¹, for Melbourne, Country Victoria & Victoria, January 1991-June 1997



¹ In Figure 3.3, only the Victoria crash rates have been calculated with the correct denominator. The Melbourne & country Victoria crash rates used the vehicle kilometres travelled in Victoria as a whole.

Figure 3.4: Monthly number of FATAL crashes (12-month moving totals) per million vehicle kilometres travelled in Victoria² (12-month moving totals) for Victoria, Melbourne & Country Victoria, December 1991-June 1997



As can be seen in Figure 3.4, there is an apparent downward trend in annual fatal crash rates from about September 1996. The fatal crash rates decreased during September 1996-April 1997, before increasing marginally until June 1997. A similar trend emerged for country Victoria. For Melbourne, however, a relatively smaller drop in the annual fatal crash rate was evident during October 1996-April 1997.

Table 3.1 displays the percentage change in the fatal crash rates for the December 1996, March 1997 and June 1997 quarters relative to the same quarters for the previous five years for each region. Reductions have occurred in the fatal crash rates for each region during each quarter when compared to the corresponding quarter of the previous five years, with country Victoria experiencing larger reductions than Melbourne.

Thus, when the monthly number of fatal crashes were adjusted by the amount of vehicle travel in Victoria, there was still an evident reduction in fatal crash rates from September 1996 until about the middle of 1997 for Victoria, Melbourne and country Victoria, suggesting that some factor other than a reduction in exposure (ie. vehicle travel) is contributing to the crash reduction.

² In Figure 3.4, only the Victoria crash rates have been calculated with the correct denominator. The Melbourne & country Victoria crash rates used the vehicle kilometres travelled in Victoria as a whole.

Table 3.1: Percentage change in FATAL crash rates for the December 96, March 97 & June 97 quarters relative to the average of the corresponding quarters of the previous five years, for Victoria, Melbourne & Country Victoria

Quarter	Fatal Crash rates			%change in fatal crash rates relative to average of previous 5 years' quarters		
	Melbourne	Country Victoria	Victoria	Melbourne	Country Victoria	Victoria
Dec. 1991-95 average	4.58	4.35	8.93	-	-	-
Mar. 1992-96 average	4.65	4.67	9.32	-	-	-
Jun. 1992-96 average	4.49	4.12	8.61	-	-	-
Dec. 1996	3.76	3.30	7.06	-17.9	-24.0	-20.9
Mar. 1997	4.50	3.70	8.19	-3.3	-20.8	-12.1
Jun. 1997	3.99	3.53	7.52	-11.2	-14.2	-12.7

3.1.2 Serious Casualty Crash Rates

To investigate whether a reduction was also evident for crash rates involving serious injuries as well as fatalities, the ratio of the number of serious casualty crashes to the number of kilometres of vehicle travel was determined for each region. Figure 3.5 presents the serious casualty crash rates during January 1991-June 1997 for Victoria, Melbourne and country Victoria.

For each region, a reduction in the serious casualty crash rate was evident during June 1996-February 1997 (Figure 3.5). However, during March 1997 there was a substantial peak in the serious casualty crash rate. The March peaks (and other monthly fluctuations) were smoothed out when the data was expressed as 12-month moving totals (Figure 3.6). A reduction in the 12-month moving total serious casualty crash rates was not evident until November 1996 for Melbourne, but for country Victoria the reduction commenced earlier - about July 1996 - and was also larger than the Melbourne decrease. This trend was also found for the annual fatal crash rates presented earlier.

Figure 3.5: Monthly number of SERIOUS CASUALTY crashes per million kilometres of vehicle travel in Victoria³, for Victoria, Melbourne & Country Victoria, January 1991-June 1997

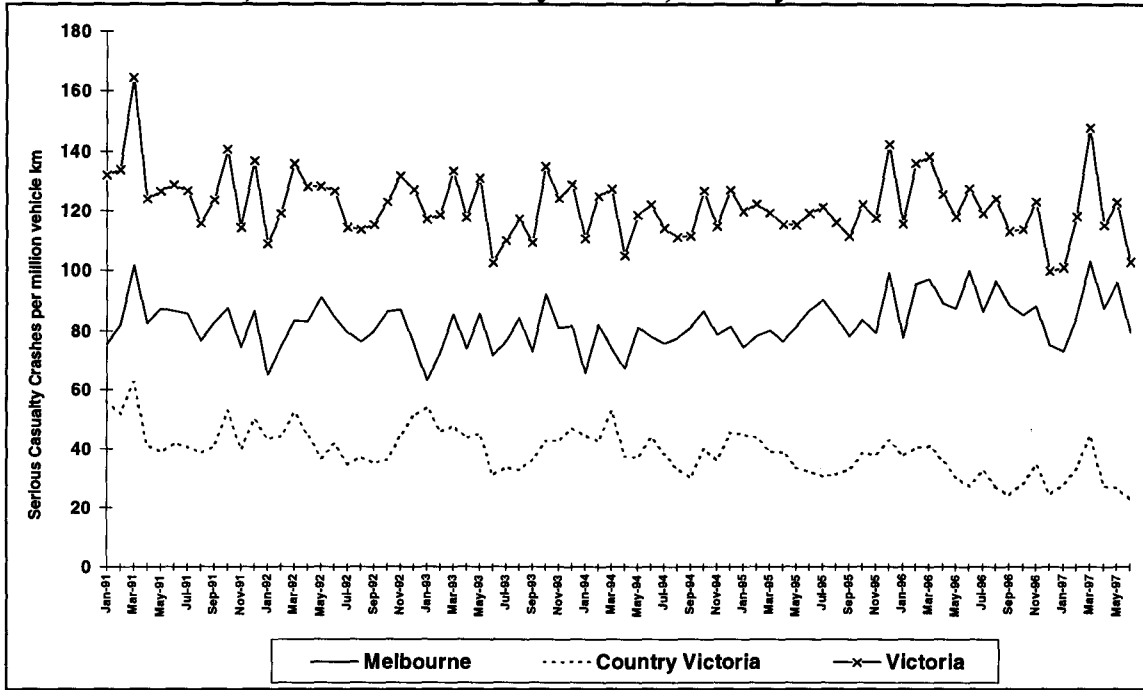
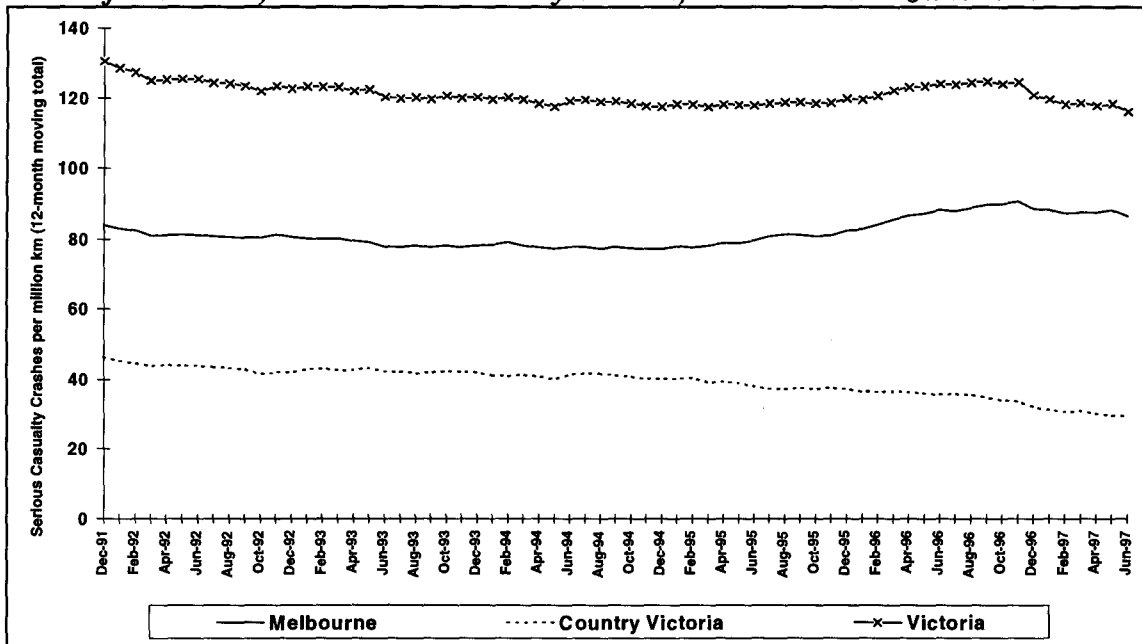


Figure 3.6: Monthly number of SERIOUS CASUALTY crashes (12-month moving totals) per million vehicle kilometres of travel in Victoria³ (12-month moving totals) for Victoria, Melbourne & Country Victoria, December 1991-June 1997



³ In Figures 3.5 & 3.6, only the Victoria crash rates have been calculated with the correct denominator. The Melbourne & country Victoria crash rates used the vehicle kilometres travelled in Victoria as a whole.

Table 3.2 gives the percentage change in serious casualty crash rates for the September 1996, December 1996, March 1997 and June 1997 quarters relative to the same quarters of the previous five years. Reductions occurred during each quarter for country Victoria. The reductions were larger than the corresponding fatal crash rate reductions shown in Table 3.1 for rural areas. However, for Melbourne a small reduction (1.4%) occurred only during the December 1996 quarter. Increases occurred during the September 1996, March 1997 and June 1997 quarters.

Table 3.2: Percentage change in SERIOUS CASUALTY crash rates for the September 96, December 96, March 97 & June 97 quarters relative to the average of the corresponding quarters of the previous five years, for Victoria, Melbourne & Country Victoria

Quarter	Serious Casualty Crash rates			%change in serious casualty crash rates relative to average of previous 5 years' quarters		
	Melbourne	Country Victoria	Victoria	Melbourne	Country Victoria	Victoria
Sep. 1991-95 average	80.1	35.3	115.4	-	-	-
Dec. 1991-95 average	84.0	43.4	127.4	-	-	-
Mar. 1992-96 average	77.9	45.1	123.0	-	-	-
Jun. 1992-96 average	85.5	37.4	119.9	-	-	-
Sep. 1996	90.6	28.2	118.7	+13.0	-20.2	+2.9
Dec. 1996	82.9	29.3	112.2	-1.4	-32.5	-12.0
Mar. 1997	86.3	35.0	121.3	+10.8	-22.5	-1.4
Jun. 1997	87.8	25.8	113.6	+6.4	-40.0	-5.3

Hence, when the number of serious casualty crashes was adjusted by the amount of vehicle travel in Victoria, there was still a reduction in annual serious casualty crash rates during late 1996 and early 1997 for country Victoria and for Victoria as a whole (as was apparent from Figure 3.6), but less so for Melbourne.

Therefore there may be another underlying factor or factors leading to the reduction in fatal crashes (and to serious casualty crashes) in Victoria apart from the reduction in the kilometres of vehicle travel, because the fatal crash rates (and to a lesser extent the serious casualty crash rates) showed a reduction during September 1996-June 1997 for Victoria as a whole, as well as for country Victoria and to a lesser degree for Melbourne.

3.2 RAINFALL AND SUNSHINE HOURS IN VICTORIA

A number of previous studies have found strong links between environmental factors and crash frequencies; however it should be noted that these links were found in countries other than Australia (Fridstrom et al, 1995). For Victorian road trauma, rainfall and sunshine were considered appropriate explanatory factors in modelling road crashes. Environmental data was obtained from the Bureau of Meteorology National Climate Centre in Melbourne. For this study, daily average rainfall and daily sunshine hours were aggregated across individual weather stations to give monthly average rainfall and sunshine hours for Melbourne and country Victoria.

3.2.1 Average Daily Rainfall

Figure 3.7 shows trends in the average daily rainfall in millimetres per month for Melbourne and country Victoria during January 1991-June 1997. There was a considerable amount of random fluctuation per month present, so 12-month moving totals were calculated for the series. The monthly trends in the 12-month moving totals are shown in Figure 3.8. These graphs show that there was a substantial reduction in rainfall during September 1996-June 1997 in both Melbourne and country Victoria, whereas for the same period a year earlier the average daily rainfall increased.

Figure 3.7: Average Daily Rainfall per month in Melbourne & Country Victoria, January 1991-June 1997

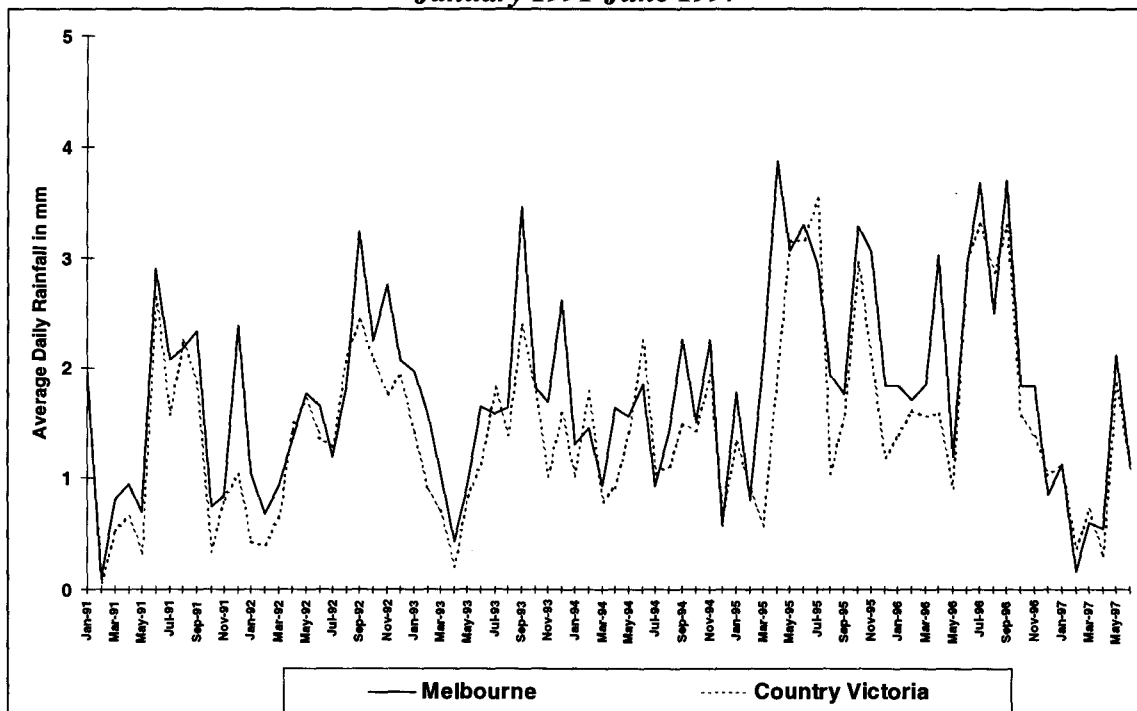


Figure 3.8: 12-MONTH MOVING TOTAL of Average Daily Rainfall per month in Melbourne & Country Victoria, December 1991-June 1997

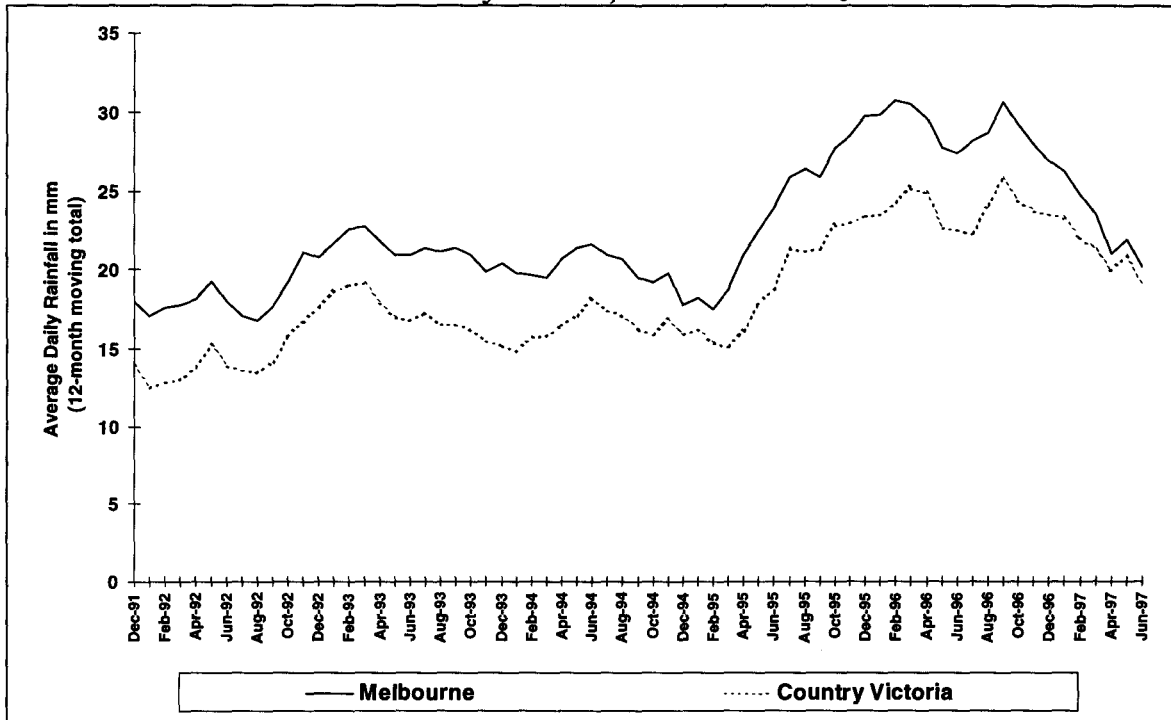


Table 3.3 gives the percentage change in average daily rainfall for the December 1996, March 1997 and June 1997 quarters relative to the corresponding quarters of the previous five years. For country Victoria there was an 11.8% reduction in rainfall during the December 1996 quarter compared to the corresponding quarters of the previous five years on average. Even larger reductions were found for the March 1997 (28.3%) and June 1997 (35.0%) quarters. Melbourne experienced relatively larger reductions in rainfall than rural areas, particularly during the December 1996 (a 54.7% reduction) and March 1997 quarters (a 37.1% reduction).

The trends found in Figures 3.7 and 3.8 and in Table 3.3 suggest that the reduction in rainfall during September 1996-June 1997 may have led to a reduction in crashes because of safer roads. Conversely, however, the lower rainfall may also lead to more speeding by drivers because of their perception of roads being safer during dry weather conditions. This could then lead to crashes which are more severe in injury.

Table 3.3: Percentage change per quarter in AVERAGE DAILY RAINFALL relative to the previous five years' corresponding quarters for Melbourne & Country Victoria

Quarter	Average Daily Rainfall (mm)		%change in average daily rainfall relative to the previous 5 years' quarters	
	Melbourne	Country Victoria	Melbourne	Country Victoria
Dec. 1991-95 average	6.0	4.5	-	-
Mar. 1992-96 average	4.2	3.1	-	-
Jun. 1992-96 average	6.1	5.0	-	-
Dec. 1996	4.5	4.0	-23.8	-11.8
Mar. 1997	1.9	2.2	-54.7	-28.3
Jun. 1997	3.8	3.3	-37.1	-35.0

3.2.2 Average Number of Daily Sunshine Hours

Figure 3.9 shows the trends in the average number of daily sunshine hours per month in Melbourne and country Victoria for January 1991-June 1997. To smooth out the random monthly fluctuations, 12-month moving totals of the monthly sunshine hours were determined and are shown in Figure 3.10. The pattern for the period of interest (ie. September 1996-June 1997) is similar to that of a year earlier with a slight increase in the number of sunshine hours occurring during October 1996-January 1997 compared with October 1995-January 1996 (Figure 3.9). The trends in the 12-month moving totals of the average sunshine hours show an increase during September 1996-March 1997, with the increase being greater in country Victoria than in Melbourne.

The slight increase in average daily sunshine hours during September 1996-March 1997 may have contributed to better weather conditions and hence safer roads for driving, possibly resulting in a reduction in crashes.

Figure 3.9: Average Number of Sunshine Hours per month in Melbourne & Country Victoria, January 1991-June 1997

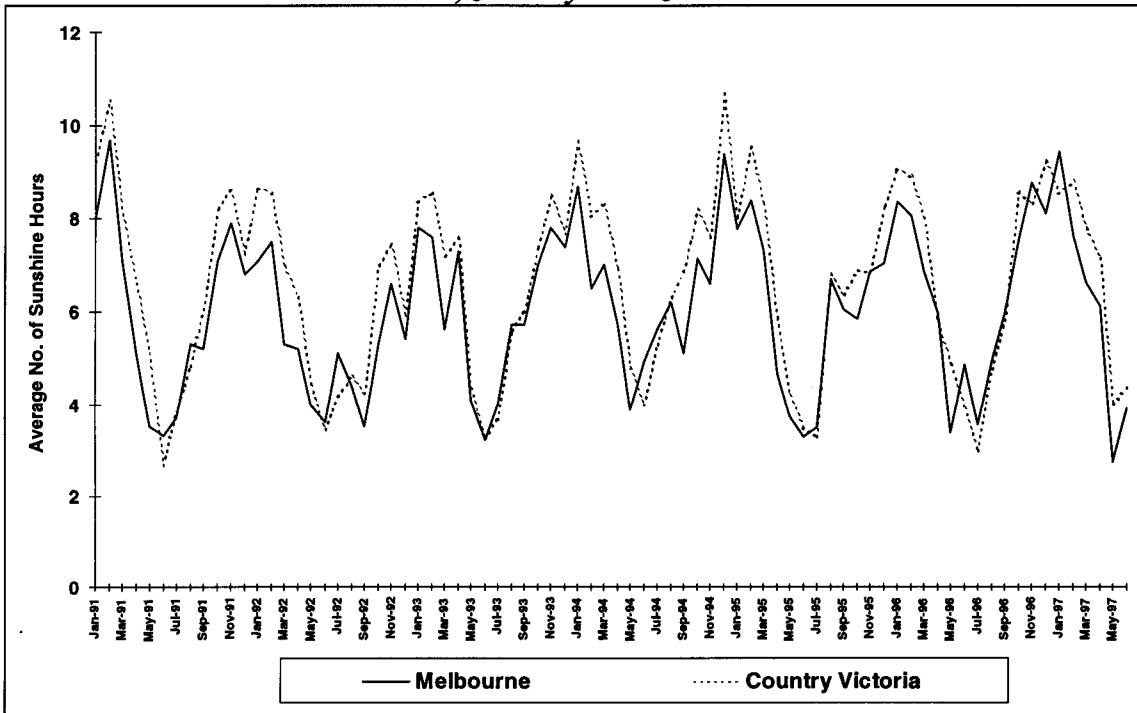
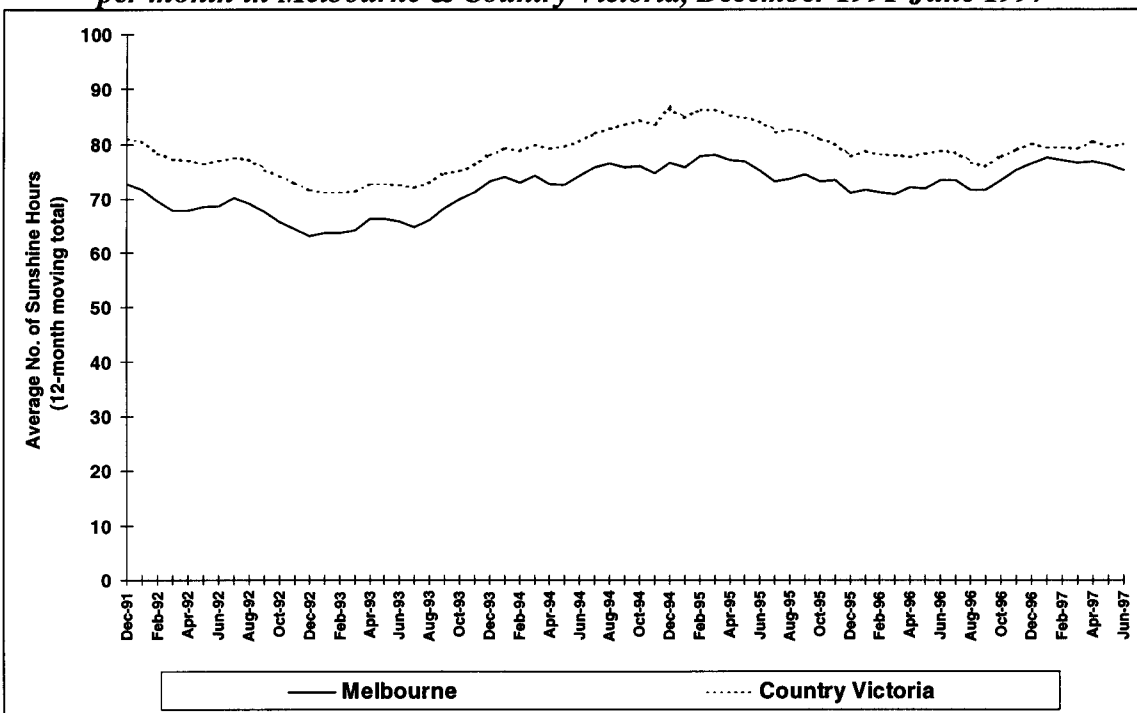


Figure 3.10: 12-MONTH MOVING TOTAL of Average Number of Sunshine Hours per month in Melbourne & Country Victoria, December 1991-June 1997



4. SUMMARY

An on-going system of data gathering and analysis to monitor and evaluate countermeasures was established during 1995. The data collected by the system, including number of random breath tests, number of speed-related traffic infringement notices, television publicity levels associated with various themes (ie. drink-driving, speed, concentration, fatigue, seat belts), unemployment rates, weather data, alcohol sales and fuel sales, was used to review the apparent reduction in fatal and serious casualty crashes that occurred in Victoria during late 1996 and early 1997.

4.1 FATAL CRASHES

A reduction in fatal crashes occurred in Victoria during September 1996 to June 1997, with the reduction being primarily in rural areas. Country Victoria experienced larger reductions in fatal crashes than Melbourne during the December 1996, March 1997 and June 1997 quarters relative to the average of the corresponding quarters of the previous five years.

4.2 SERIOUS CASUALTY CRASHES

A reduction in serious casualty crashes occurred in Victoria, commencing about September 1996, but was relatively smaller than the fatal crash reduction. For rural areas the reduction may have begun earlier – about June 1996 – but for Melbourne a decrease was not evident until November 1996.

In addition, for rural areas, the percentage reductions in serious casualty crashes were larger than the corresponding fatal crash reductions during the December 1996, March 1997 and June 1997 quarters. For Melbourne, however, small increases occurred during the March 1997 and June 1997 quarters relative to the average of the corresponding quarters of the previous five years.

4.3 FACTORS EXPLAINING THE CRASH REDUCTIONS

A range of potential explanatory factors that may explain the reduction that occurred in fatal and serious casualty crashes during September 1996-June 1997 were investigated. For this period the only explanatory factors that showed any significantly different patterns from earlier years were vehicle kilometres travelled, monthly average daily rainfall and monthly average daily sunshine hours. Changes in these factors were investigated to explain the fatal and serious casualty crash reductions.

4.3.1 Vehicle Kilometres of Travel

A reduction in the number of vehicle kilometres travelled in Victoria was found for July 1996-June 1997. If the reduction in vehicle travel could explain the reduction in fatal and serious casualty crashes during September 1996-June 1997 then it would be expected that the monthly fatal and monthly serious casualty crash rates would remain relatively stable during that period.

Reductions were found in the fatal crash rates for both Melbourne and country Victoria during the December 1996, March 1997 and June 1997 quarters in comparison with the corresponding quarters of the previous five years, on average. Rural areas experienced larger reductions than Melbourne. Similar patterns were found in the serious casualty crash rate trends.

Hence when the number of fatal crashes and the number of serious casualty crashes were adjusted by the amount of travel in Victoria, there was still evidence of reductions during late 1996 and early 1997 for rural areas and for Victoria as a whole, but less so for Melbourne. This suggests that some factor other than a reduction in exposure (ie. vehicle travel) is contributing to the fatal and serious casualty crash reductions.

4.3.2 Average Daily Rainfall and Sunshine Hours

For both Melbourne and country Victoria there were substantial reductions in rainfall during September 1996-June 1997, whereas for the same period a year earlier the average daily rainfall increased. For rural areas of Victoria, reductions in rainfall (in excess of 12%) were found during the December 1996, March 1997 and June 1997 quarters in comparison with the corresponding quarters of the previous five years on average. Melbourne experienced larger reductions in rainfall than rural areas (at least 24%) for each quarter. There was also a slight increase in average daily sunshine hours during September 1996-March 1997, with the increase being greater in rural areas than in Melbourne.

Thus, the reduction in rainfall and the increase in sunshine hours may have led to a reduction in crashes because of relatively safer roads. Conversely, the lower rainfall may also lead to more speeding by drivers because of their perception of roads being safer during dry weather conditions. This could then lead to crashes which are more severe in injury.

4.3.3 Other Factors

Other explanatory factors, not available in the database used to monitor and evaluate countermeasures, may have influenced the crash frequencies. Such factors could include the transfer of vehicle travel to minor roads in rural areas of Victoria (Cameron et al,

1997) and change in Police operations accordingly. In addition, changes in the behaviour of drivers over time may be altering the impact of the number of traffic infringement notices issued for speeding offences detected by speed cameras.

5. FURTHER RESEARCH

To fully explain the reduction in fatal and serious casualty crashes that occurred during late 1996 and early 1997 in Victoria, the *contribution* of each explanatory factor (ie. decreased vehicle travel, decreased rainfall and decreased crash rates) needs to be considered. In addition, changes in driver travel patterns and behaviour need to be investigated.

Other possibilities would be to investigate if greater crash reductions occurred during certain times of the week than others (ie. high alcohol hours versus low alcohol hours), or more for particular road user groups than others. Explanatory information and crash data should also be obtained for the July-December 1997 period to examine whether the reduction in crashes found during September 1996-June 1997 was evident throughout all of 1997.

The analysis in this preliminary review has been of an exploratory nature. The further work described above would be undertaken using more powerful statistical methods such as Interrupted Time Series analysis. This type of analysis would include the fitting of covariates in time series models of influential factors, and would consider changes in crash frequencies after a particular intervention period.

6. CONCLUSION

A reduction in fatal crashes occurred in Victoria during September 1996 to June 1997, with the reduction being primarily in rural areas. A reduction in serious casualty crashes was also found for Victoria, commencing about September 1996. For rural areas this reduction may have begun earlier, about June 1996, but for Melbourne a decrease was not evident until November 1996.

Possible factors that could have contributed to the reduction in fatal and serious casualty crashes were decreased vehicle travel, decreased rainfall and decreased crash rates. However, because of the exploratory nature of this preliminary review, further research involving statistical modelling is needed to determine the contribution and significance of these factors in the reduction in crashes that occurred during late 1996 and early 1997.

7. REFERENCES

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