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ATSB RESEARCH AND ANALYSIS REPORT
ROAD SAFETY

Characteristics of Fatal Road Crashes During National Holiday Periods

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Abstract

The study examines annual trends in road fatality numbers for Christmas and Easter holiday periods, and undertakes a comparative analysis of crash factors between holiday periods and the remainder of the year. Pronounced year to year fluctuations in the data suggest that the number of people killed in any given holiday period is significantly influenced by random events. An analysis of average number of deaths per day found that fatality rates during holiday periods were not systematically higher or lower than fatality rates at other times of the year. The study also found no evidence of any change in the involvement of primary causal factors (speeding, alcohol or fatigue). The findings are broadly consistent with the results of a similar study undertaken in 2003.

Keywords Road, Crash, Fatality, Risk, , Holiday, Exposure

Notes

(1) ATSB reports are disseminated in the interest of information exchange.

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EXECUTIVE SUMMARY

Introduction

National holiday periods are commonly viewed as times of heightened danger on our roads. The Christmas and Easter holiday seasons[1], in particular, are associated with large increases in private travel, longer trip distances, more travel in rural environments, greater police enforcement activity and raised penalties for traffic offences. Fatal road crashes during these major holiday periods also attract intense media scrutiny, even though they only account for five to six per cent in total of all road deaths.

In 2003, the Australian Transport Safety Bureau (ATSB) investigated the characteristics of fatal road crashes in Christmas holiday periods and compared them with crashes occurring at other times of the year (ATSB, 2003). The study found no significant differences in daily crash frequencies and little difference in the involvement of major causal factors.

The current study uses recent data to revisit some of the issues addressed in the earlier work. It examines annual trends in road fatality numbers for Christmas and Easter holiday periods, and undertakes a comparative analysis of crash factors between holiday periods and the remainder of the year.

Main findings

Annual time series data for Christmas and Easter holiday periods were compiled for the last 15 years. In both of these series, the numbers of fatal road crashes and deaths showed considerable variability, with pronounced fluctuations from year to year. Between 1996 and 2005, fatality numbers ranged between 48 and 86 for Christmas periods, and between 14 and 31 for Easter.

When the data were transformed into average numbers of deaths per day, it was found that fatality rates during the holiday periods were not systematically higher or lower than fatality rates at other times of the year. During the five year period, 2001 to 2005, there was an average of 4.4 deaths per day during Christmas holidays, 4.6 during Easter holidays, and 4.5 over the remainder of the period.

Further analysis of average daily fatality rates was unable to find any clear seasonal patterns or annual cycles in the data.

The study examined the characteristics of fatal crashes during Christmas periods, compared with fatal crashes occurring during the remainder of the year. Observed differences were generally small in size and not statistically significant, but were consistent with findings from the earlier study.

1 'Christmas' refers to the 15-day Christmas/New Year holiday road crash reporting period, extending from 00:01 am on the Friday before 25 December to 11:59 pm on the Friday after 31 December.

'Easter' refers to the 5-day Easter holiday road crash reporting period, extending from 00:01 am on the Thursday before Good Friday to 11:59 pm on Easter Monday.

In summary, Christmas holiday crashes tended to involve:

- a greater proportion at rural locations
- a greater proportion in high speed zones
- a greater proportion of single vehicle crashes
- a lower proportion of articulated trucks crashes
- a greater proportion in early morning hours (3am to 5am).

This analysis found no differences in the reported involvement of the primary causal factors of speed, alcohol or fatigue.

The study also compared the characteristics of people killed in Christmas holiday crashes with the characteristics of those killed at other times of the year. Christmas fatalities were found to involve higher proportions of vehicle passengers, females and children under 15 years of age.

Conclusions

The findings of this study lead to three key conclusions about fatal road crashes during Christmas and Easter holiday periods:

- pronounced year to year fluctuations in the data suggest that the number of people killed in any given holiday period is significantly influenced by random events
- the absence of a 'holiday effect' in average daily death rates suggests that holiday-related changes in exposure and other risks tend to cancel each other out
- there is no evidence of any change in the involvement of primary causal factors (speeding, alcohol or fatigue).

It should not be concluded from these findings that the attention given to road safety during national holiday periods is unwarranted. The differences in fatal crash characteristics found in this study are consistent with a general assumption that road travel patterns do change significantly during major holiday seasons. Some of these changes would be expected to increase total road trauma (such as longer trips and more rural travel), and some would be likely to have the opposite impact (such as fewer commuter trips and less commercial travel). Without adequate exposure data, however, it is not possible to quantify these effects. It is also difficult to estimate the influence of transient road safety measures, such as increased levels of publicity and police enforcement.

It is apparent nonetheless that all these factors combined have had a net zero impact on the total number of road deaths. This is consistent with the findings of the 2003 ATSB study, which noted the important unknown 'counterfactual': the holiday fatality rate might have been much worse if additional enforcement and other road safety measures had not been in place.

ACKNOWLEDGEMENTS

The ATSB acknowledges the valuable contributions from: the New South Wales Roads and Traffic Authority; VicRoads; Queensland Transport; South Australia Police; Western Australia Police; Tasmania Department of Infrastructure, Energy and Resources; Northern Territory Department of Infrastructure, Planning and Environment; and the Australian Capital Territory Department of Urban Services.

1 INTRODUCTION

1.1 Background

National holiday periods are commonly viewed as times of heightened danger on our roads. The Christmas and Easter holiday seasons[2], in particular, are associated with increased usage of private vehicles, more occupants per vehicle, longer trip distances and more travel in rural environments. Perceptions of elevated risk are reinforced by increased road safety publicity, greater police enforcement activity and raised penalties for traffic offences.

While road crashes during these major holiday periods account for only five to six per cent in total of all road deaths, they traditionally attract intense scrutiny from the media. For example, when 83 people died on Australian roads during the 2005 Christmas holiday period, media commentary contrasted this outcome with the much lower number of 48 deaths recorded during the previous year. Speculation on the reasons for the large increase was accompanied by much discussion about the efficacy of various road safety measures.

In 2003, the Australian Transport Safety Bureau (ATSB) investigated the characteristics of fatal road crashes in Christmas holiday periods and compared them with crashes occurring at other times of the year (ATSB, 2003). The study found no significant differences in daily crash frequencies and little difference in the involvement of major causal factors.

The current study uses recent data to revisit some of the issues addressed in the earlier work. It examines annual trends in road fatality numbers for Christmas and Easter holiday periods, and undertakes a comparative analysis of crash factors between holiday periods and the remainder of the year.

1.2 Data

1.2.1 Data sources

Data used in this paper relate solely to *fatal* road crashes in Australia. Serious injury and other non-fatal crashes are not included. The analysis uses data extracted from the following sources:

ATSB Monthly Crash Database

A database containing summarised fatal road crash data sourced from state and territory road and police authorities, and compiled by the ATSB. This database is available to the public from the Road Safety links at www.atsb.gov.au.

2 'Christmas' refers to the 15-day Christmas/New Year holiday road crash reporting period, extending from 00:01 am on the Friday before 25 December to 11:59 pm on the Friday after 31 December.

'Easter' refers to the 5-day Easter holiday road crash reporting period, extending from 00:01 am on the Thursday before Good Friday to 11:59 pm on Easter Monday.

State/territory fatal crash data extracts

State and territory road and police authorities provided extracts of their fatal road crash databases.

ATSB Fatal Crash Database

A detailed road crash data set coded by the ATSB using coronial documents and covering the years 1988 to 2001.

1.2.2 Data limitations

One aim of this study is to compare the characteristics of fatal crashes in holiday periods with those occurring at other times of the year. This comparative analysis is based on only a limited number of data variables and does not provide a comprehensive examination of fatal crash causes or risk factors. The study should therefore not be used as a guide to countermeasure priorities.

The study does not include any road exposure data – such as vehicle kilometres travelled or trip frequencies – which would be necessary to fully assess the risk of fatal crash involvement at different times of the year. Exposure data are not readily available for the specific holiday periods being examined.

2 RESULTS

2.1 Crash and fatality rates and trends

This section investigates historical trends in numbers of fatal road crashes and associated deaths during Christmas and Easter holiday periods. It also examines variations in daily frequencies of road deaths at different times of the year.

Tables 1 and 2 show the number of crashes and deaths recorded each calendar year, and each holiday period, since 1990. The data in the full year columns reveal clear downward trends in numbers of crashes and fatalities over the past 15 years. In contrast, the numbers presented in both holiday columns show considerable variability and pronounced year to year fluctuations, making it difficult to detect any underlying patterns in these series.

Table 1: Fatal road crashes, 1991–2006: number in each period

Year	Full year	Christmas	Easter
1991	1,874	68	32
1992	1,736	65	31
1993	1,737	54	23
1994	1,702	68	23
1995	1,822	61	30
1996	1,768	74	25
1997	1,601	72	15
1998	1,573	68	15
1999	1,553	67	20
2000	1,628	66	25
2001	1,584	52	22
2002	1,525	57	25
2003	1,445	65	23
2004	1,444	44	15
2005	1,484	66	23
2006			18

Table 2 shows that over the last ten years (1996 to 2005), road fatality numbers have ranged between 48 and 86 for Christmas periods, and between 14 and 31 for Easter. The volatility of these figures is further illustrated by the number of deaths recorded for each of the last two Christmas periods: 48 in 2004 and 83 in 2005.

Table 2: Road crash deaths, 1991–2006: number in each period

Year	Full year	Christmas	Easter
1991	2,113	79	40
1992	1,974	74	36
1993	1,953	68	27
1994	1,928	79	35
1995	2,017	71	34
1996	1,970	86	31
1997	1,767	82	16
1998	1,755	73	15
1999	1,764	75	22
2000	1,817	75	28
2001	1,737	58	23
2002	1,715	68	25
2003	1,621	76	28
2004	1,583	48	14
2005	1,639	83	26
2006			21

Table 3: Road crash deaths per day, 1991–2006: averages for each period

Year	Full Year	Christmas	Easter
1991	5.79	5.27	8.00
1992	5.39	4.93	7.20
1993	5.35	4.53	5.40
1994	5.28	5.27	7.00
1995	5.53	4.73	6.80
1996	5.38	5.73	6.20
1997	4.84	5.47	3.20
1998	4.81	4.87	3.00
1999	4.83	5.00	4.40
2000	4.96	5.00	5.60
2001	4.76	3.87	4.60
2002	4.70	4.53	5.00
2003	4.44	5.07	5.60
2004	4.33	3.20	2.80
2005	4.49	5.53	5.20
2006			4.20

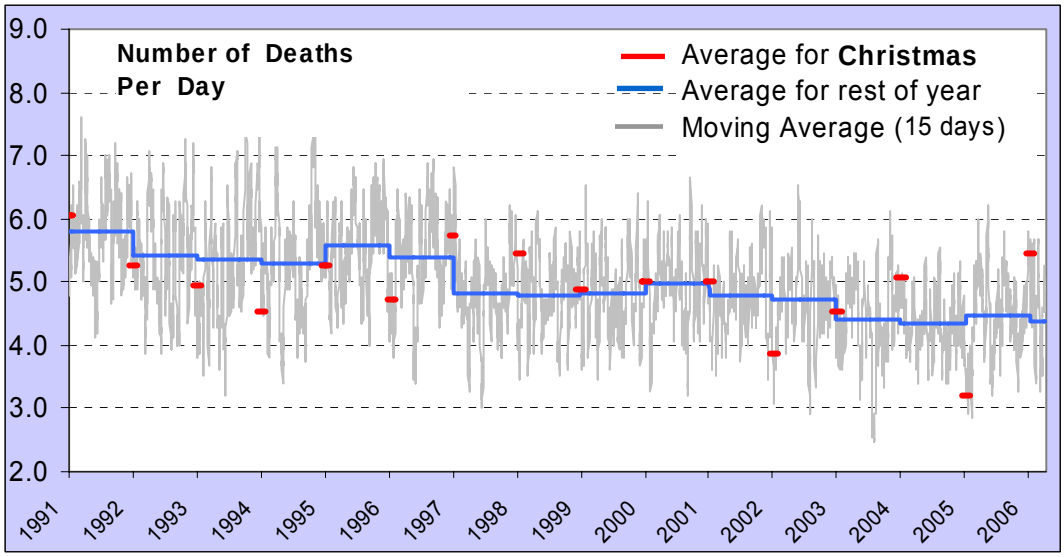
In Table 3, the numbers of road crash deaths for each period have been converted into average daily frequencies. As in the previous tables, the figures for full calendar years show a general downward pattern, while the figures for holiday periods tend to fluctuate. However, it is notable that the daily averages for Christmas and Easter are broadly similar to the averages for entire years.

Average daily death rates over the last 15 years are further explored in Figures 1 and 2. In these charts, the short holiday periods are shown in red and the averages for the remainder of each year are shown in blue. Also shown (in grey) are moving averages with window lengths of 15 days (Figure 1) and 5 days (Figure 2). These lengths correspond to the duration of the relevant holiday season and illustrate the range of statistical variation between arbitrarily chosen short periods.

As indicated in Figure 1, an average of 5.5 people per day were killed on Australian roads during the 2005 Christmas holiday period. This was more than the daily average of 4.5 during the rest of 2005, but was not uncommonly high: the 15-day moving average shows that daily frequencies in recent years have typically ranged between 3.5 and 5.5.

Figure 1 also shows that while daily averages during Christmas periods vary from year to year, they are not systematically higher or lower than the rest of the year.

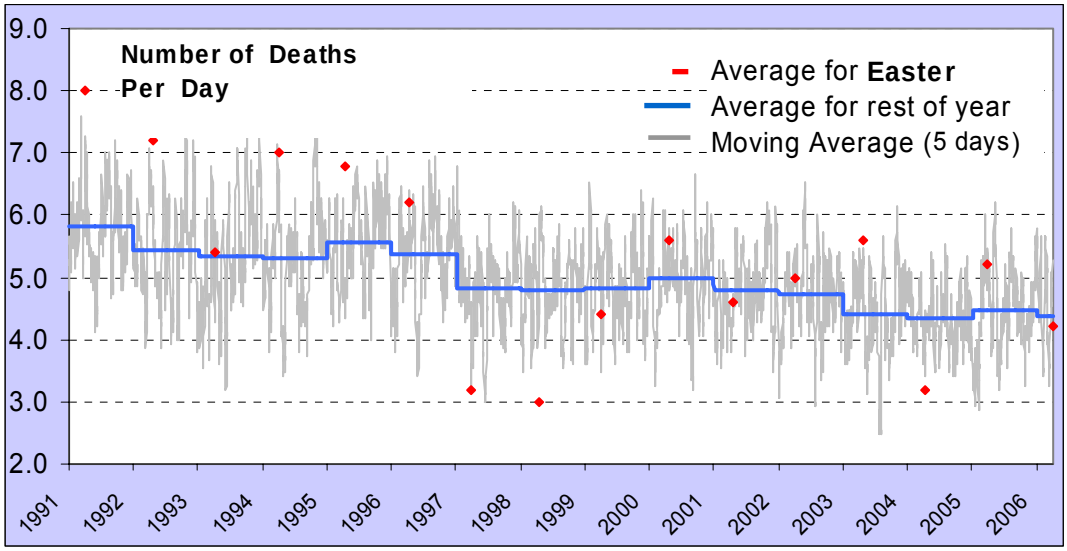
Figure 1: Road crash deaths per day, 1991–2005: averages for Christmas holiday period and rest of year†, and 15-day moving average



† Excludes both Christmas and Easter holiday periods.

In Figure 2, similar observations can be made about average daily deaths during Easter holiday times. Since the mid-1990s, Easter averages have fluctuated between three and six deaths per day, but this has been within the range of random statistical variation between arbitrarily chosen five-day periods. As with the Christmas findings, there is no evidence that daily fatality rates during Easter are regularly high or low compared with the rest of the year.

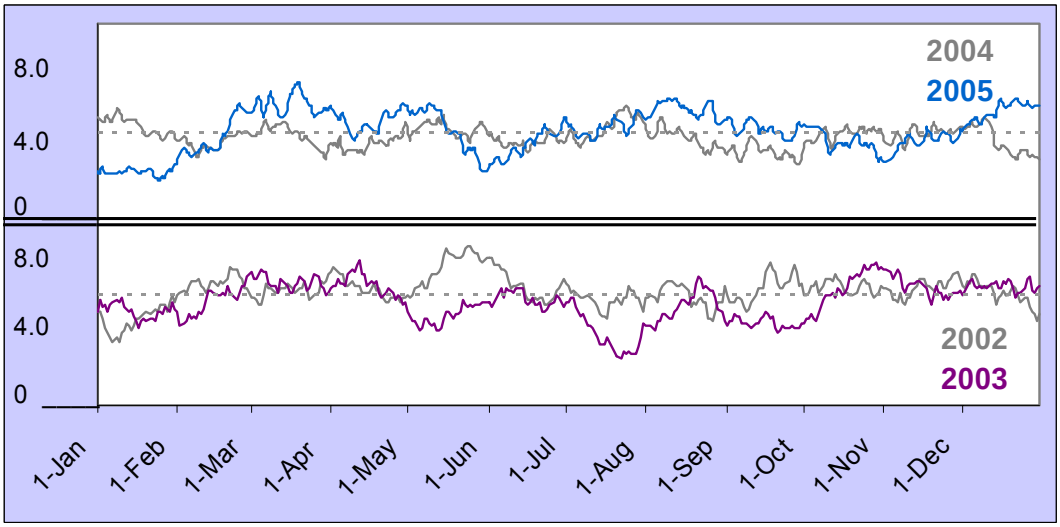
Figure 2: Road crash deaths per day, 1991–2005: averages for Easter holiday period and rest of year†, and 5-day moving average



† Excludes both Christmas and Easter holiday periods.

The next figure (Figure 3) explores changes in road fatality rates throughout the year to determine if there are any seasonal or regular patterns. The number of deaths per day is presented as a 31-day moving average for each of the last 4 years (2 years per panel). During each year, the smoothed daily numbers of deaths vary by up to 40 per cent. However, there is no strong pattern reappearing from year to year. Additional analysis of the data revealed a minor 7-day cycle, but did not find any other cyclical structure[3]. Overall, there is no evidence that Christmas or Easter holiday results are influenced by broader seasonal trends.

Figure 3: Daily road crash deaths, 2001–2005: 31-day moving average



[3] Smoothing windows of various lengths were used in this analysis.

2.2 Crash characteristics

It may be expected that typical types of road trips made during major holiday seasons would be different to those undertaken at other times. This section examines various characteristics of fatal crashes occurring in Christmas holiday periods and compares them with fatal crashes during the rest of the year.

2.2.1 Location of crash

Road trips undertaken by many people at Christmas time may involve longer distances than usual, and include a larger amount of travel on rural roads and highways. In Tables 4 and 5, the locations of fatal crashes are examined using aggregated data for the last three calendar years (2003–2005).

Compared with the rest of the year, a higher proportion of holiday crashes occurred on rural roads (54 per cent compared with 48 per cent), and a higher proportion were on roads with a speed limit of 100 km/h or more (52 per cent compared with 45 per cent). These differences are not statistically significant, but are consistent with results reported in the 2003 ATSB publication.

Table 4: Fatal road crashes, 2003–2005 : urban and rural areas[4]

Location	Christmas per cent	Rest of year per cent
Urban	46	52
Rural	54	48
Total	100	100

Table 5: Fatal road crashes, 2003–2005: posted speed limit

Speed limit	Christmas per cent	Rest of year per cent
≤ 60 km /h	32	32
65 – 95 km/hr	17	22
≥ 100 km /hr	52	45
Total	100	100

4 Broadly, 'urban' includes the major metropolitan centres and large provincial centres where the posted speed limit is at or below 80 km/h. 'Rural' refers to anywhere outside the urban locations. Exact definitions vary slightly across jurisdictions.

2.2.2 Type of crash

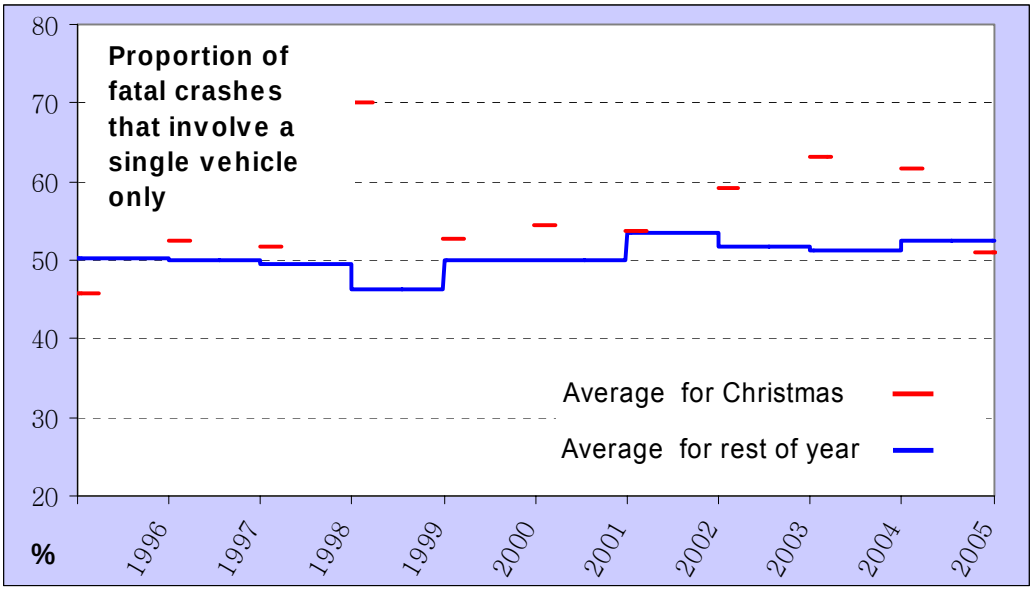
The 2003 study found that holiday crashes were slightly more likely to involve a single vehicle, and less likely to involve multiple vehicles, than crashes at other times. This pattern is replicated in Table 6, which is based on aggregated road crash data for the last three years.

Table 6: Fatal road crashes, 2003–2005: type of crash

Type of crash	Christmas per cent	Rest of year per cent
Single	50	44
Multiple	36	41
Pedestrian	14	15
Total	100	100

Figure 4 expands on this analysis by showing single vehicle crashes as a proportion of all non-pedestrian fatal crashes for each of the years 1995 to 2005.

Figure 4: Non-pedestrian fatal road crashes, 1995–2005: percentage involving a single vehicle



2.2.3 Involvement of articulated trucks

The 2003 ATSB study found that articulated trucks were involved in a smaller proportion of fatal crashes during the Christmas season compared with the rest of the year. This finding was consistent with an expected reduction in commercial traffic during holiday periods. Table 7 shows that over the last three years, articulated trucks were involved in 7 per cent of Christmas crashes, compared with 10 per cent at other times of the year. While the difference is not statistically significant, the result replicates the earlier finding.

Table 7: Fatal road crashes, 2002–2005: involvement of articulated trucks

Articulated trucks	Christmas per cent	Rest of year per cent
Involvement	7	10
No involvement	93	90
Total	100	100

2.2.4 Time and day of crash

The following analyses are based on combined data for the last five years (2001 to 2005). Figure 5 shows the time-of-day distribution of fatal crashes for both Christmas and non-Christmas periods. While the patterns are broadly similar, a greater proportion of holiday crashes occurred in the early hours of the morning (3am to 5am), and a slightly lower proportion occurred during late afternoon and evening hours.

Figure 5: Fatal road crashes, 2001–2005: time of day

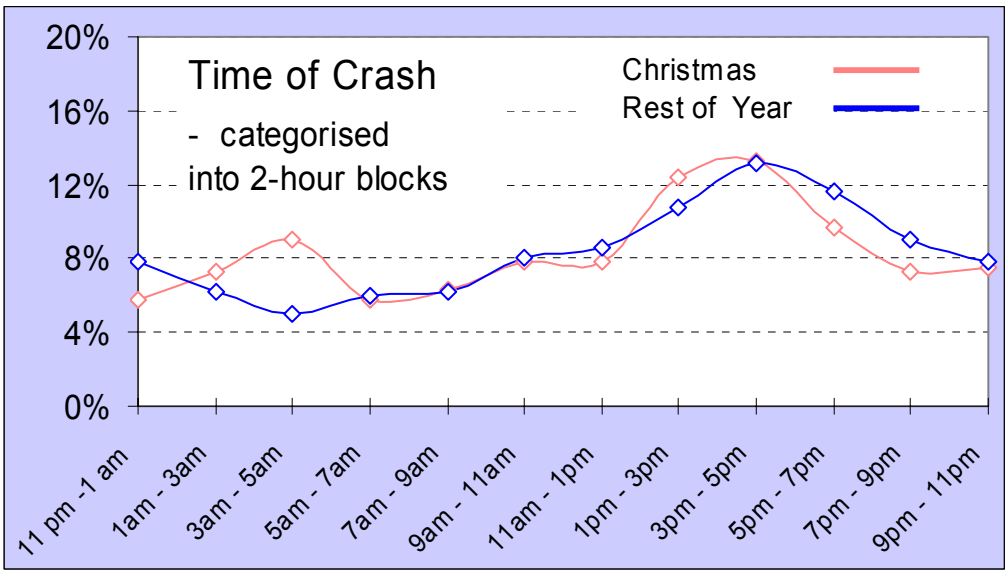


Table 8 analyses crash patterns by day of week. At most times of the year, there is a clear 'weekend bias' in fatal crashes, with half of all crashes occurring over the three days Friday to Sunday. The five years of crash data in Table 7 show a slightly greater proportion of mid-week crashes at Christmas times, but suggest that a weekend bias continues to operate during the holiday season.

Table 8: Fatal road crashes, 2001–2005: day of week

Day of week	Christmas per cent	Rest of year per cent
Mon-Thurs	52	50
Fri-Sun	48	50
Total	100	100

2.3 Factors involved in the crash

The crash data provided by police and road traffic agencies indicate whether or not excessive speed, driver fatigue and alcohol impairment were thought to have contributed to the crash event. While this information does not permit a comprehensive analysis of factors contributing to the crash outcomes, it provides a further basis for comparing fatal crashes between holiday and non-holiday periods.

In Table 9, data for the last three years have been combined to show the proportions of crashes involving each of the nominated factors. The analysis reveals no significant differences between the Christmas holiday period and the rest of the year.

Table 9: Fatal road crashes, 2002–2005: involvement of speed, fatigue and alcohol[5]

Crash factors	Christmas per cent	Rest of year per cent
Excessive speed	30	29
Fatigue	13	14
Alcohol	27	25

5 Analysis does not include data for Victoria and the Australian Capital Territory. The basis for determining whether or not these factors were involved in the crash may vary across jurisdictions.

2.4 Road user characteristics

2.4.1 Type of road user

Table 10 analyses the road user classification of people killed in road crashes over the last three years. Christmas holiday fatalities involved an unusually high proportion of vehicle passengers (31 per cent) compared with the rest of the year (23 per cent), and an unusually low proportion of drivers (41 per cent, compared with 48 per cent), and a marginally lower proportion of pedestrians (12 per cent compared with 14 per cent). These results differ from the findings in the earlier study, which found no effect for passenger deaths and a larger effect for pedestrian deaths.

Table 10: Road crash deaths, 2002–2005: type of road user

Road user group	Christmas per cent	Rest of year per cent
Driver	41	48
Passenger	31	23
Pedestrian	12	14
Motorcyclist	14	13
Other	1	3
Total	100	100

2.4.2 Age and gender

Table 11 compares the age distributions of people killed during Christmas and non-Christmas periods, using aggregate data for 2002 to 2005. While the distributions are similar, road deaths during Christmas holidays included a higher proportion of children under 15 years of age (9 per cent compared with 6 per cent) and a lower proportion of people over 64 years of age (13 per cent compared with 16 per cent)

Table 11: Road crash deaths, 2002–2005: age group

Age group years	Christmas per cent	Rest of year per cent
0 - 14	9	6
15 - 24	27	26
25 - 34	18	18
35 - 44	12	14
45 - 54	12	11
55 - 64	10	9
65 +	13	16
Total	100	100

As shown in Table 12, Christmas holiday deaths also included a higher than normal proportion of females – 33 per cent compared with 28 per cent during the rest of the year.

Table 12: Road crash deaths, 2002–2005: gender

Gender	Christmas per cent	Rest of year per cent
Female	33	28
Male	67	72
Total	100	100

3 DISCUSSION

3.1 Main findings

Annual time series data for Christmas and Easter holiday periods were compiled for the last 15 years. In both of these series, the numbers of fatal road crashes and deaths showed considerable variability, with pronounced fluctuations from year to year. Between 1996 and 2005, fatality numbers ranged between 48 and 86 for Christmas periods, and between 14 and 31 for Easter.

When the data were transformed into average numbers of deaths per day, it was found that fatality rates during the holiday periods were not systematically higher or lower than fatality rates at other times of the year. During the five-year period, 2001 to 2005, there was an average of 4.4 deaths per day during Christmas holidays, 4.6 during Easter holidays, and 4.5 over the remainder of the period.

Further analysis of average daily fatality rates was unable to find any clear seasonal patterns or annual cycles in the data.

The study examined the characteristics of fatal crashes during Christmas periods, compared with fatal crashes occurring during the remainder of the year. Observed differences were generally small in size and not statistically significant, but were consistent with findings from the earlier ATSB study. In summary, Christmas holiday crashes tended to involve:

- a greater proportion at rural locations
- a greater proportion in high speed zones
- a greater proportion of single vehicle crashes
- a lower proportion of articulated trucks crashes
- a greater proportion in early morning hours (3am to 5am).

This analysis found no differences in the reported involvement of the primary causal factors of speed, alcohol or fatigue.

The study also compared the characteristics of people killed in Christmas holiday crashes with the characteristics of those killed at other times of the year. Christmas fatalities were found to involve higher proportions of vehicle passengers, females and children under 15 years of age.

3.2 Conclusions

The findings of this study lead to three key conclusions about fatal road crashes during Christmas and Easter holiday periods:

- pronounced year to year fluctuations in the data suggest that the number of people killed in any given holiday period is significantly influenced by random events
- the absence of a ‘holiday effect’ in average daily death rates suggests that holiday-related changes in exposure and other risks tend to cancel each other out
- there is no evidence of any change in the involvement of primary causal factors (speeding, alcohol or fatigue).

It should not be concluded from these findings that the attention given to road safety during national holiday periods is unwarranted. The differences in fatal crash characteristics found in this study are

consistent with a general assumption that road travel patterns do change significantly during major holiday seasons. Some of these changes would be expected to increase total road trauma (such as longer trips and more rural travel), and some would be likely to have the opposite impact (such as fewer commuter trips and less commercial travel). Without adequate exposure data, however, it is not possible to quantify these effects. It is also difficult to estimate the influence of transient road safety measures, such as increased levels of publicity and police enforcement.

It is apparent nonetheless that all these factors combined have had a net zero impact on the total number of road deaths. This is consistent with the findings of the 2003 ATSB study, which noted the important unknown 'counterfactual': the holiday fatality rate might have been much worse if additional enforcement and other road safety measures had not been in place.

4 REFERENCES

ATSB, 2003. *The Characteristics of Fatal Crashes During the Christmas/New Year Holiday Period.* Canberra: Australian Transport Safety Bureau.