

# Drinking cultures and social occasions

Alcohol harms in the context  
of major sporting events

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**Turning Point**  
Alcohol & Drug Centre

# Drinking cultures and social occasions:

## Alcohol harms in the context of major sporting events

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December 2011

Drinking cultures and social occasions: Alcohol harms in the context of major public holidays, sporting and cultural events is a Turning Point Alcohol and Drug Centre project funded by VicHealth

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## Acronyms

ABS	Australian Bureau of Statistics
ED	Emergency department
PCR	patient care record
SRI	Serious road incident
VACIS	Victorian Ambulance Clinical Information System
VAED	Victorian Admitted Episode Dataset
VEMD	Victorian Emergency Minimum Dataset



## Summary

Harms associated with alcohol consumption in the context of major sporting events were explored in terms of general patterns, gender patterns and age patterns. A range of alcohol-related harms were considered, including acute intoxication requiring medical attention, assaults, and motor vehicle accidents. The use of time series analysis allows exploration of the levels of harms associated with specific events after controlling for the impact of seasonal and temporal variations in alcohol-related harms.

### Acute Alcohol Intoxication

Across all populations examined, the peak months of the year for ambulance attendances, emergency department presentations, and hospital admissions attributed to acute alcohol intoxication were November and December, with February also being identified as a peak month among males. Consistent with the literature, Fridays and Saturdays were the days with the highest concentrations of alcohol intoxication related attendances, presentations and admissions.

Varying effects were noted for major sporting events. Significantly elevated numbers of cases of acute alcohol intoxication were evident for all groups examined on the day before the Melbourne Cup, whilst elevated cases were seen for all patients and for males on the day before the AFL Grand Final. For all groups examined, elevated cases of alcohol intoxication occurred on the day of the Melbourne Cup, and also for all groups except females on the day of the AFL Grand Final and the event of the Commonwealth Games. Numbers of ambulance attendances for acute intoxication were significantly lower than expected on the day following the Melbourne Cup for all patients, and this was driven by the trend among females.

### Assault

Consistent with previous research, the warmer months of the year represent peak times for assaults among all groups examined. Similarly, Friday and Saturday are the days of the week with the most assaults recorded across emergency department and hospital measures examined for all groups, with Sundays also being a peak day for females. In terms of police recorded assaults and family incidents, Saturdays and Sundays represented the peak days.

The Melbourne Cup represented a sporting event where assaults were elevated both in the lead up and on the day of the event for all groups examined, whilst the day preceding the AFL Grand Final and the Formula 1 Grand Prix were days of elevated assaults for all groups except females. On the day of the Melbourne Cup all groups experienced significantly increased numbers of assault cases, while all groups except females showed elevated numbers of cases of assault on the day of the AFL Grand Final. Police recorded family incidents were significantly elevated on Melbourne Cup Day for all groups, and among females on the day of the AFL Grand Final.

### **Motor Vehicle Accidents**

Smaller effects were noted for motor vehicle accidents in measures of incidents and also hospitalisations.

The warmer months of the year were the peak times for motor vehicle accidents. For all groups, Friday and Saturday were found to be peak days of elevated cases of motor vehicle accidents, with elevated events also occurring on Thursdays among males.

For males, a significant increase in motor vehicle accident presentations was noted on the day before the AFL Grand Final and the Melbourne Cup. There was an increase in MVA cases on the day of the AFL Grand Final among females and youths, whilst for the cricket there was a significant elevation among males and females, and a significant reduction among youths. On the day of the Melbourne Cup increased MVAs were noted among youths, with an increase in MVAs on the day of the Formula One Grand Prix for males.

# Chapter 1: Introduction

## Background

Increasing media and public interest has focused on problematic alcohol consumption, and particularly binge drinking and the link with violence usually assaults. Whilst this attention has included concern regarding perceived harms associated with public social events such as sporting events, there is little evidence to assess the relationship between major sporting and social events, and alcohol-related harms.

### Alcohol consumption and intoxication

A substantial literature exists that examines drinking behaviour and associated harms by 'time' – such as seasonal, monthly, day of the week and time of day trends. (Abel, Strasburger, & Zeidenberg, 1985; Briscoe & Donnelly, 2001; Brower & Carroll, 2007; Budd, 2000; Pridemore, 2004; Silm & Ahas, 2005; Stockwell et al., 1998; Young, 2004). Often the focus is on intoxication, violence and road injury. While seasons and monthly associations have provided inconsistent results internationally, day of the week has been a consistent predictor. Weekends and evenings tend to show higher prevalence of alcohol harms variously defined (Briscoe & Donnelly, 2001; Brower & Carroll, 2007; Budd, 2000; Young, 2004). At the extreme, homicide has been shown to have a day of week effect in New York (Abel et al., 1985). Weekends in Russia have a higher incidence of homicide (Pridemore, 2004). While 'time' is an important factor, the general association of alcohol and violence is unequivocal (Brinkman, Chikritzhs, Stockwell, & Mathewson, 2001; Mosher & Jernigan, 2001) (Bushman & Cooper, 1990; Zhang, Wiczorek, & Welte, 1997).

Although weekends and evenings equate to social times and would overlap with social, cultural and even sporting events, surprisingly there is only a modest literature that examines these events explicitly in relation to alcohol consumption and associated harms. Where the literature does examine these events the focus is usually on a particular sport, holiday or event, with a minority examining a combination. For instance, in Finland alcohol poisonings were shown to peak during weekends and during celebrations on May Day, Midsummer Day and Christmas Day (Poikolainen, Leppanen, & Vuori, 2002). In the US, college students have been shown to significantly increase alcohol consumption on high profile sports days, and fans of the winning team drank more heavily than those who supported the losing team (Neal, Sugarman, Hustad, Caska, & Carey, 2005). Moreover celebratory drinking is an often endorsed reason for drinking among college students (Rabow & Duncan-Schill, 1995). Often the motive for celebratory drinking among this cohort is alcohol intoxication (Hunter, 1990).

Others have focused on rock concerts as a 'single day mass gathering event' to assess the impact on emergency medical services demand and subsequent response in general. Feldman (2004) showed very little alcohol harm. Out of a total 450,000 who attended a Rolling Stones concert in Toronto, 1870 sought medical care and only 30 were seen for alcohol or drug intoxication. In contrast, Erickson et al (1996) examined first aid station presentations across five rock concerts at a single

venue in Chicago: 42% were seen for trauma, 17% for alcohol intoxication, 15% drug intoxication. 48% of those treated admitted to using alcohol or drugs while attending the concert. Yet others have focused on particular venues and events, such as music dance events or football at a particular stadium. Furr-Holden et al (2006) for instance surveyed music dance event attendees in two US cities on alcohol and drug use and intent to drive post event. Even though driving status reduced alcohol consumption, 62% of those who reported their intention to drive away from the event were positive for drugs or alcohol on leaving. On site doctor attendances were examined for a full season at the Glasgow Celtic football club, alcohol 'excess' was considered a major contributing factor in one fifth of all casualties (Crawford et al., 2001).

Emergency department presentations during and after music and sporting events have also been examined, while alcohol often is not considered or measured (Grange, Baumann, & Vaezazizi, 2003; McGreevy et al., 2010), others have found associations. Chan and Quinn (2003) demonstrated following rock concerts there was a higher incidence of alcohol or drug use presentations to the emergency department compared to pop concerts and wrestling events at the same stadium in the US. They showed that alcohol and drug related presentations occupied the most time in the emergency department. Others have shown no association between major sporting events such as EURO96 football matches and the number of emergency department presentations on game day (Cooke, Allan, & Wilson 1999).

US College sport and football is quite a phenomenon with 47 million attending college football games in 2006. Much of the international literature on sport and alcohol focuses on college football (Brower & Carroll, 2007; Grossbard, Geisner, Neighbors, Kilmer, & Larimer, 2007; Merlo & Hong, 2008; Neal & Fromme, 2007; Nelson & Wechsler, 2003; Paschall & Saltz, 2007; D.I. Rees & Schnepel, 2008). Some of these have already been mentioned and others below. One study compared traditionally high drinking days such as new years eve, St. Patricks Day and high profile sporting events specifically college football games. Comparisons were made on alcohol-related arrests in a midsized college town. Home game days resulted in higher rates of alcohol consumption (Merlo & Hong, 2008).

### Violence

Many of these studies have looked at alcohol consumption and intoxication in particular regarding attendance at music and sports events as well as holiday periods. Although there is overlap, many have focused on violence and alcohol-related violence specifically.

Interestingly attendance to an event is not required to impact on emergency department presentations. During the 1998 World Cup Soccer tournament held in France, the Edinburg emergency department experienced a significant increase in attendance rates and workload which was attributed to alcohol-related conditions including injuries. This was evident for only the opening game between Brazil and Scotland (Mattick, 1999). Similarly the 2002 Soccer World Cup impacted

on Irish emergency department presentations for matches held in Japan and South Korea (O'Donnell, Mattick, Mehta, & Hanrahan, 2003). In this case presenting conditions were mainly minor trauma resulting from assaults and falls, in over half the presentations alcohol was deemed a factor. The 2006 Soccer World Cup impacted on ambulance call outs in Hampshire England. Call volumes increased by 50% on day one of the competition. Alcohol was deemed the catalyst for collapse, unconsciousness, assault and road traffic accidents (Deakin, Thompson, Gibson, & Green, 2007). Match outcome also impacts on drinking behaviour and aggression of spectators. Moore et al (2007) found that aggression increased in Welsh rugby fans whose team won or drew, yet motivation to drink was not impacted by the match result. Analysis of Cardiff's emergency department presentations and Welsh international matches between 1995 and 2002 revealed a home win resulted in an increase in emergency department attendances for assault injuries. By winning, alcohol is therefore key in prompting the formation of crowds of intoxicated people (Sivarajasingam, Moore, & Shepherd, 2005). It has been suggested that it may not be winning per se that leads to aggression, instead increased alcohol consumption after winning promotes aggression (Bushman & Cooper, 1990).

Domestic violence has also been associated with particular sports events. The US Super Bowl Sunday is often the biggest day of the year for domestic violence with emergency department presentation and police department calls higher (Sachs & L.D., 2000). White et al (1992) found that assault stabbings and shootings of women increased in Northern Virginia when the Washington Redskins football team won compared with non match days but neither increased or decreased when the team lost. Outside of football, White et al (1992) showed that victimisation patterns are different across gender. Women present to emergency departments more on Christmas day and New Year's Day whereas men have higher admissions to the emergency department on thanks giving. Victorian data over the period 2003 to 2009 indicate that the majority of victims of family violence incidents reported to police were female, with just under 25% of victims being male (Victoria Police, 2009).

Rees & Schnepel (2008; 2009) write about the mounting anecdotal evidence that college football games in the US lead to 'aggressive and destructive' behaviour by the fans, yet little is known about the magnitude of the problem. They examined daily offense data from 26 police agencies spanning six football seasons 2000-2005. They found in communities hosting a game there were increases in assaults on game days. Also, there were increases in vandalism, arrests for disorderly conduct and alcohol -related arrests. They found the biggest effect to occur when there was an 'upset' that is when a team won that was not expected to win. Some have argued that frustration intensifies the effect of alcohol on aggressive behaviour and this explains such an occurrence (Ito, Miller, & Pollock, 1996; Pederson, Fredy, Ito, Miller, & Pollock, 2002). Increased alcohol consumption is common on game days (Glassman, Chudley, Werch, & Bian, 2007; Neal & Fromme, 2006). Neal & Fromme (2006) comment that consumption is comparable to other heavy drinking days such as New years eve and Halloween weekend.



A US survey of state alcohol beverage control and local police agencies in each of the cities that have a professional sports stadium was conducted for the period November 2005 to May 2006 (Lenk, Toomey, & Erickson, 2009). Underage alcohol compliance checks were the most common type of enforcement, however around 50% of agencies conducted these. Fights both inside and outside of the stadiums were the most common complaint received by local law enforcement agencies 74-80% receiving these sorts of complaints. 65% of state agencies received complaints about intoxicated patrons.

Little research exists around the occurrence of road traffic accidents and social and sports events. As indicated earlier there is work around time of day and day of week but little else of relevance here. One study in Canada examined the impact of traffic crashes following the introduction of beer sales at a Toronto ball park (Vingilis, Liban, Blefgen, Colbourne, & Reynolds, 1992). They found a higher proportion of alcohol-related traffic accidents occurred in Toronto following the games compared to pre game periods. However, they also found the same proportion occurring during the same time period on non game days. They concluded that drinking at games was common place before the beer sales were officially introduced

Consuming alcohol in Australia is enmeshed with celebration and cultural traditions. There are certain expectations on how people should behave in certain social settings (particularly for young people) and this can involve the expectation of consuming a certain amount of alcohol. Australia's endemic drinking culture is demonstrated through large scale music events such as the Big Day Out, which is partnered with Australia Day. These events have been associated with drinking to excess (Roche et al., 2007). The Spring Racing Carnival that incorporates the Melbourne Cup is associated with much celebration nationally, and is accompanied by excessive alcohol consumption. Underage drinking is a feature of horse racing nationally (Roche et al., 2007). Alcohol and sport participation has a long Australian tradition as evidenced by the Australian Drug Foundation's Good Sports Accreditation Programs which focus on trying to moderate risky drinking practices. While participation in sport decreases with age, sport fans span all age groups. Thompson et al (2006) explored the role of alcohol in a group of South Australian football fans and found that alcohol was central to their football experience.

In the main the research around social and sporting events have tended to examine these events as discrete groupings and the little Australian research there is, is no exception. There has been a focus on specific stadiums, emergency department presentation, particular sports and crime statistics for instance. Even sporting seasons have been examined for a particular sport ranging from rugby to college football. At best some have adjusted for holiday periods namely known high drinking public holidays such as new years. However, an examination of several holidays and sporting events have not been examined simultaneously.

Melbourne is a major sporting city, being voted “ultimate sports city” in 2008. The city hosts some major events in the global sports calendar, specifically the Formula One Grand Prix, Melbourne Cup Horse Racing and associated carnival, Boxing Day Test Cricket, also hosting in the past the Commonwealth Games and Rugby World Cups and, more locally, the Australian Rules grand final. Melbourne hosts innumerable festivals across the year as well, spanning local and international varieties such as the Melbourne International Comedy Festival and the Melbourne International Film Festival. All of these events are associated with large crowds usually around the CBD and inner city area, and many are associated with a drinking culture. Melbourne is an excellent case study to explore the relationship between drinking and social occasions.

### **Objectives**

The purpose of this study is to develop an understanding of the relationships between public events and alcohol-related harms. Identification of the timing of major sporting events and their association with alcohol-related harms will be achieved through analysis of ambulance attendances, traffic accidents hospital emergency department presentations and hospital admissions in terms of timing and proximity to major events occurring in Melbourne. Importantly, this study also enables examination of the role of age and gender in the experience of alcohol-related harms in the context of sporting events.

### **Rationale**

There has been little analysis of the occurrence of alcohol-related harm in relation to major sporting events in Victoria. This project will provide valuable evidence in terms of alcohol-related harms for different populations in the context of timing of major social events. Such evidence will be invaluable in contributing to policy in relation to public health initiatives, emergency services (ambulance and police) and hospital staffing and resource planning, and event planning.

## Chapter 2: Methods

The current report examines the pattern of alcohol and other drug related harms associated with major sporting events in metropolitan Melbourne for the nine year period 2001-09. Categories and dates of these events were derived from online databases (see Table 1 in Appendix). The report consists of three separate sections for harms in terms of alcohol intoxication (ambulance attendances, emergency department presentations & hospital admissions), assaults (police recorded assaults and family incidents, emergency department presentations & hospital admissions) and motor vehicle accidents (serious road incidents & hospital admissions). The results are presented for all cases, males, females and youths under each section. These findings have been complemented with graphical descriptions of the variation in alcohol-related harms in relation to day of the week and month of the year in order to allow consideration of temporal and seasonal variations.

Data utilised in the analyses were derived from the Ambo Project dataset (which includes all drug and alcohol-related ambulance attendances), VicRoads serious road incident data (detailing motor vehicle accidents), the Victorian Emergency Minimum Dataset (detailing hospital emergency presentations), the Victorian Admitted Episodes Dataset (that includes all hospital separations) and the Victoria Police Law Enforcement Assistance Program (LEAP) database (that includes all police recorded offences).

### *Ambulance attendances*

These data are derived from the *Ambo Project: Alcohol and Drug related Ambulance Attendances* (formerly known as the *Surveillance of Drug Related Events Attended by Ambulance in Melbourne* project). This project collates information from alcohol and other drug related non-fatal attendances by ambulance paramedics in metropolitan Melbourne. The data are obtained from the patient care records that are completed by the attending paramedics for every incident that they attend and for which they provide a service. These are coded and entered by specifically trained project staff into a database which contains information including demographic and location characteristics, clinical signs, treatment details and outcomes. Drug involvement in the attendance is determined by paramedic clinical assessment and information available at the scene, and cases are included where the drug played a causal role in the reason for the ambulance attendance.

Data were extracted from a database developed for examining nonfatal drug-related ambulance attendances in the Melbourne metropolitan area (Dietze et al., 2000). This database is a compilation of patient care records (PCRs) completed by paramedics for each ambulance attendance.

Paramedics document medications that are considered to be involved in the presentations. Cases were included in this database where alcohol had a causal role in the patient's presentation or was a significant contributor to the presentation, as determined through paramedic assessment. Details included presenting characteristics of cases (including demographic and clinical signs), treatments provided, and transportation outcomes. For this study, cases were extracted where alcohol

intoxication only was recorded on the case record from January 2000 to June 2009. As a consequence of paramedic industrial action, data were unavailable from October 2002 to February 2003 inclusive and June to July 2004 inclusive.

#### *Serious Road Incidents - VicRoads Road Network Database (RNDB)*

The VicRoads Road Network Database (RNDB) is compiled from Victoria Police information. Forms completed by police detailing each crash, where (according to LGA) and when it occurred, who was involved, vehicles involved and a description of the crash are entered into a police database. This information is transferred electronically and weekly to the VicRoads RNDB. Additional information from these forms, not entered by police, is added to the RNDB by VicRoads. Data for the financial years 1999/00 through to 2008/09 were obtained from VicRoads.

#### *Emergency Department Presentations*

Data on presentation to Emergency Departments came from the Victorian Emergency Minimum Dataset (VEMD). The VEMD contains detailed demographic, clinical and administrative information on all presentations to Victorian public hospitals with 24-hour emergency departments. VEMD data was available from January 2000 through to June 2009. The VEMD contains a range of information regarding the reason behind each presentation. This includes three fields for ICD10 diagnoses and a series of data items relating to injury surveillance.

Presentations relating to acute intoxication were extracted using the three diagnosis codes. If any of these three codes was 'F10.0 – acute intoxication due to alcohol use', then the presentation was counted as an intoxication presentation.

Assault presentations were extracted using the injury surveillance measures. Any injury presentation that had a human intent entry of 'assault – not otherwise specified' was included in the analysis as an assault presentation. This excludes sexual assault, domestic violence and child maltreatment. The VEMD was the subject of a validation study in 2000, which found that approximately 17.5% of cases were not recorded at all and that there was an error rate of around 11% in the human intent field that we have used to identify assault-related presentations. The review also found some bias in the data, with more missing data on Sunday presentations, although it was not clear whether the missing or erroneous data would be more likely around public holidays or major events (Stokes et al., 2000). Unfortunately the data does not allow cases to be easily determined where alcohol and assault co-presented.

#### *Hospital admissions*

Information on alcohol-related hospital admissions was obtained from the Victorian Admitted Episodes Dataset (VAED) for the 1999/00 through to 2008/09 financial years. The VAED is a database maintained by the Victorian Department of Health and contains details of all acute hospital separations in Victoria including information on the cause of the admission (according to ICD coding),

as well as the age, sex and resident LGA of the admitted patient. The term ‘acute hospitals’ refers to public, private and denominational hospitals, acute facilities in rehabilitation and extended care (sub acute) facilities, day procedure centres and designated acute psychiatric units in public hospitals. Residential care (nursing homes), hostels, supported residential services and state managed psychiatric institutions are not included in the VAED.

#### *Police recorded assaults and family incidents*

The Victoria Police Law Enforcement Assistance Program (LEAP) database system captures information on crime reported to Victoria Police. Information is available across various crime categories including reported assault and family incidents. Data have been collected through the LEAP system since the 1993-94 financial year. However, owing to Victoria Police privacy protocols, unit record data are not released to external agencies. Only tabulated data are available from this system. LEAP was designed primarily for operational policing purposes and is a dynamic database. That is, Victoria Police updates existing records with new information as it becomes available. Records are also revised when investigations identify additional information. The Central Data Entry Bureau also amends records when quality control checks identify inaccurate or incomplete information. Because of the dynamic nature of LEAP, data extracted over time for the same time period can feasibly give rise to varying results. Data on assaults and family incidents from the LEAP database are used in this report.

#### Assaults

Assaults in the LEAP database can be variously defined – victim assaults, offenders, incidents and police assaults. Victim assaults equate to those who have been assaulted—there can be many victims involved in one incident or per offender. Police assaults relate to where members of Victoria Police have been assaulted. Victim assaults are included in this report. Police assault data are excluded owing to the potential biased nature of these data.

#### Family incidents

The LEAP data on family incidents is synonymous with domestic violence. The police attending a family incident assess whether alcohol is involved. Three categories of alcohol involvement are available to police: ‘definite’, ‘probable’ and ‘no involvement’. It is important to note that these are subjective assessments. While the police are confident in the accuracy of this assessment, there will inevitably be misclassification. The data included in this report incorporate all police recorded family incidents, regardless of assessment of alcohol involvement. The data refers to the principal victim of the family incident.

#### **Statistical analysis**

As the records are from a daily time-series, there is likely to be serial auto-correlation present in the data. Serial auto-correlation occurs when observations at a particular point in time are related to

observations at a specified number of time points away. Commonly, this occurs when observations from two time points are correlated. The use of ordinary least square (OLS) regression on time-series data with serial auto-correlation results in auto-correlated residuals and inefficient estimation. We have used Auto-Regressive Integrated Moving-Average (ARIMA) methods which provide a range of options for dealing with the interdependence of time-series data (Yaffee and McGee, 2000). Because we were interested in assessing the impact of day of week and month of year on alcohol-related presentations, the modelling process focussed on ensuring the model residuals were free from auto-correlation and trends, rather than the original dataset. Separate models were developed for alcohol intoxication, assaults and motor vehicle accidents. These analyses also included investigation of lead and lag effects in relation to selected events.

To ensure that the daily data meaningfully reflected harms related to particular events, days were recorded so that they ran from 6 am to 6 am (rather than midnight to midnight). Thus, a presentation for intoxication at 1 am on a Sunday morning was coded as a Saturday presentation as the alcohol consumption related to the presentation would have taken place on Saturday night. As this report is focussed on the alcohol and other drug related harms associated with major events in Melbourne, only presentations from hospitals within the Melbourne metropolitan regions were examined.

For each of the analyses undertaken, graphs of significant results are presented in the Results chapters. Full tabulated results are included in the Appendices for reference.

## **Chapter 3: Alcohol Intoxication**

In order to explore the relationship between alcohol intoxication and sporting events three measures of acute alcohol intoxication were utilised in analyses – ambulance attendances for acute alcohol intoxication with no other drugs present, hospital emergency presentations for alcohol intoxication and hospital admissions for alcohol intoxication.

Results are presented for all cases, males and females separately, and for youth (persons aged less than 25 years).

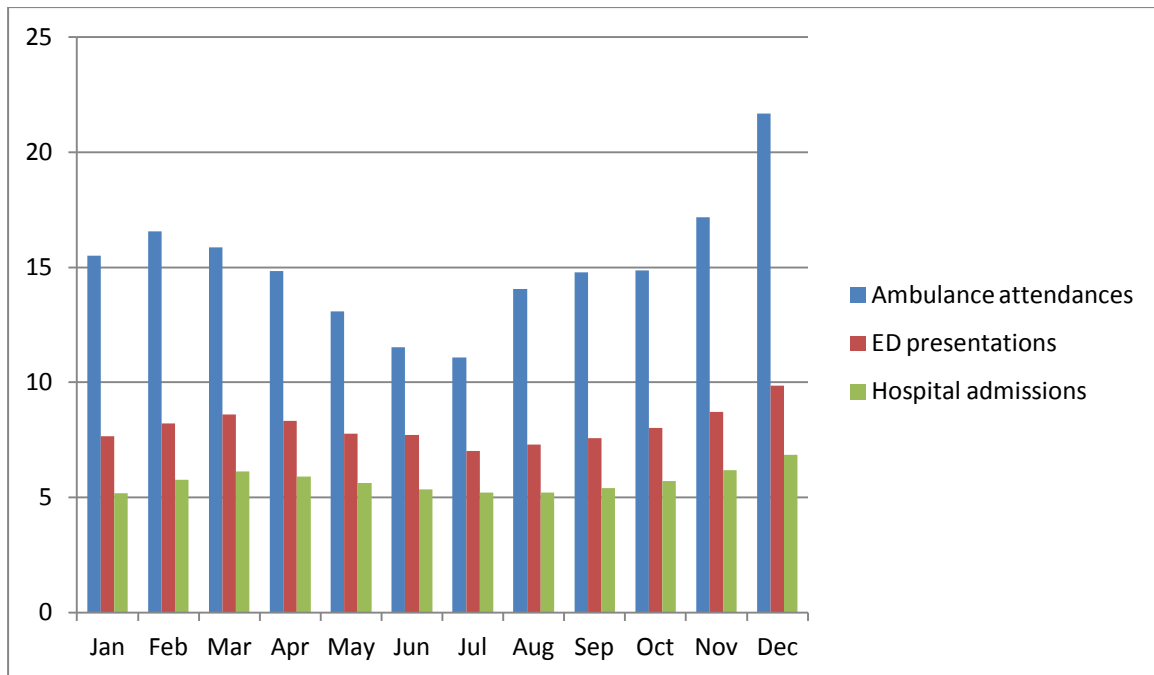
## **All cases**

### **Seasonal and time of week patterns**

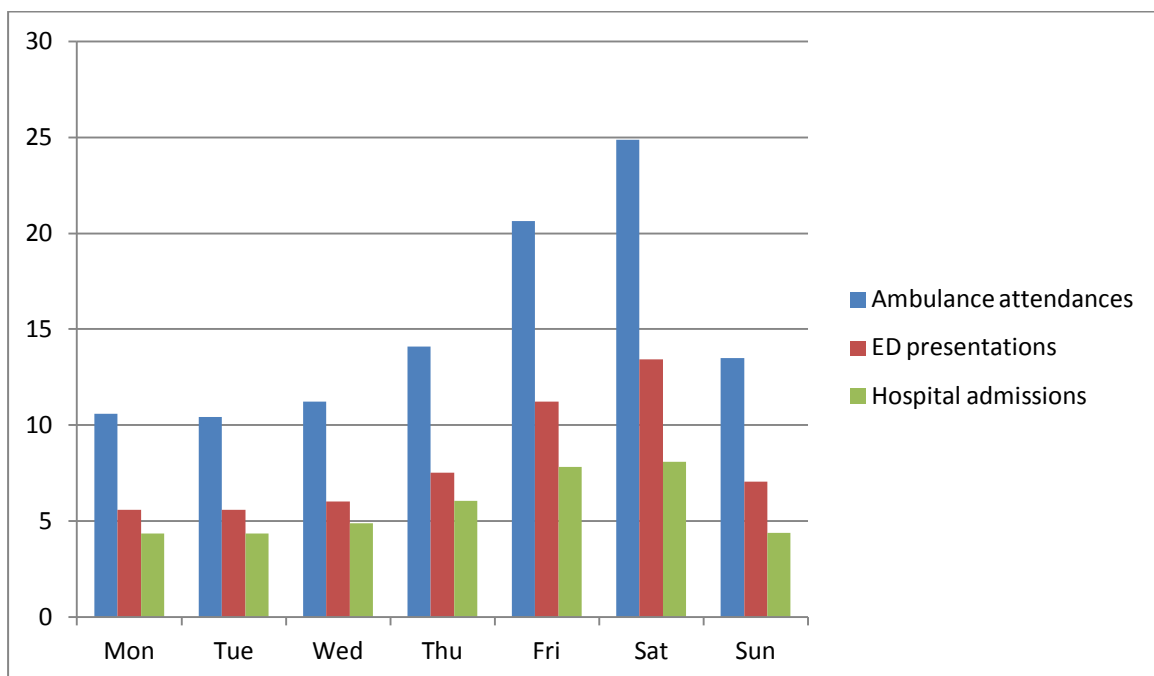
As shown in Figure 1, peaks in ambulance attendances, emergency department presentations and hospital admissions for alcohol intoxication occur in the warmer months of the year, with November and December being the months with the highest numbers of cases. In terms of the distribution of alcohol intoxication cases over the course of the week, Friday and Saturday are shown as the days of the week with the greatest concentration of alcohol intoxication attendances, presentations and admissions (Figure 2).



**Figure 1: Mean number of ambulance attendances, emergency department presentations and hospital admissions due to alcohol intoxication by month**



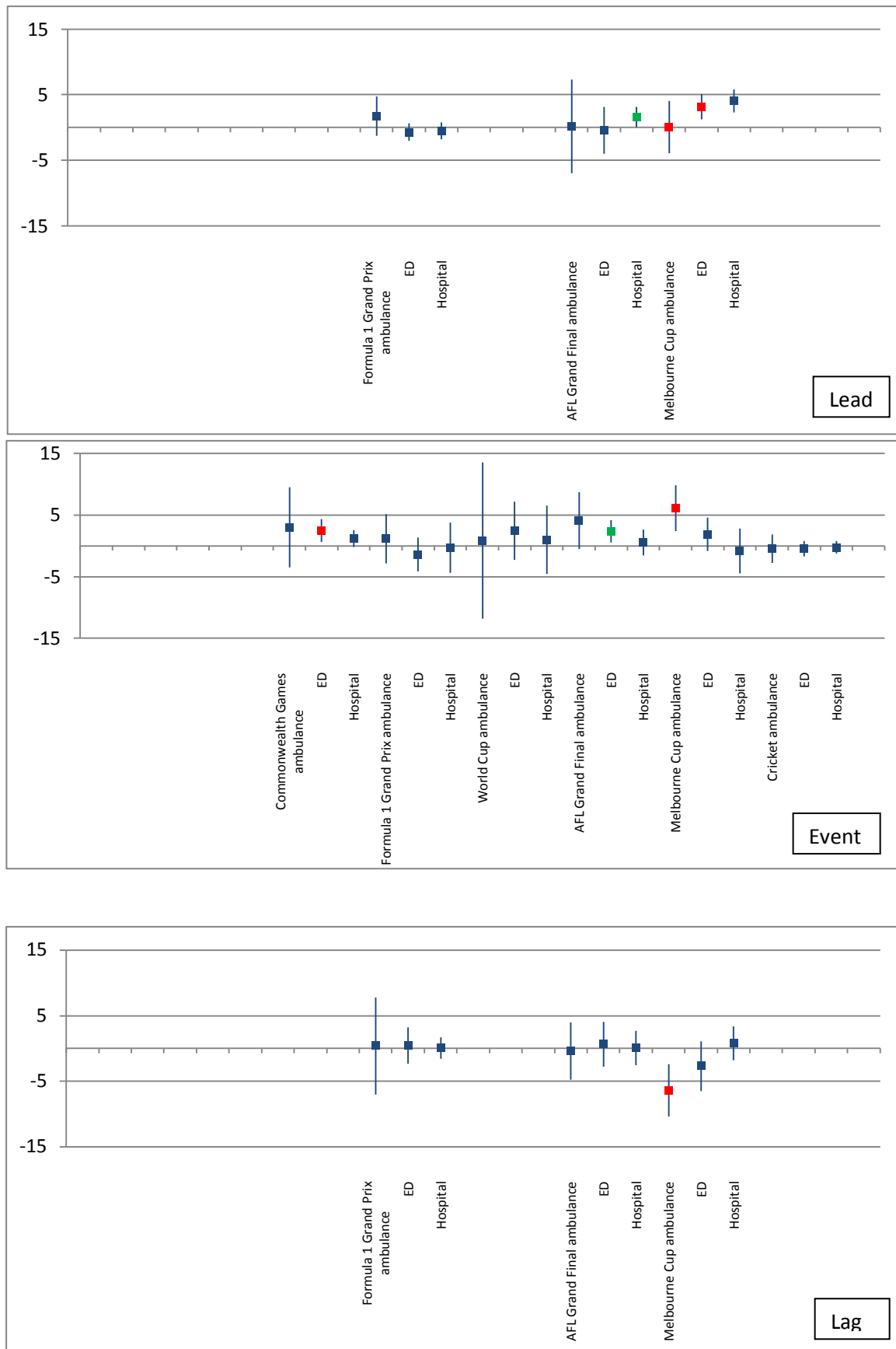
**Figure 2: Mean number of ambulance attendances, emergency department presentations and hospital admissions due to alcohol intoxication by day of week**



### **Alcohol intoxication and major sporting events**

As shown in Figure 3, significant elevations of alcohol intoxication cases on the day preceding a sporting event occurred on the day before the Melbourne Cup and the day preceding the Grand Final. Significant increases in alcohol intoxication cases were found for the Melbourne Cup, the Commonwealth Games and the Grand Final. There was a significantly lower number of alcohol intoxication related ambulance attendances than predicted on the day following the Melbourne Cup.

**Figure 3: ARIMA model parameters for ambulance attendances, emergency department presentations and hospital admissions due to alcohol intoxication – Sporting Events**

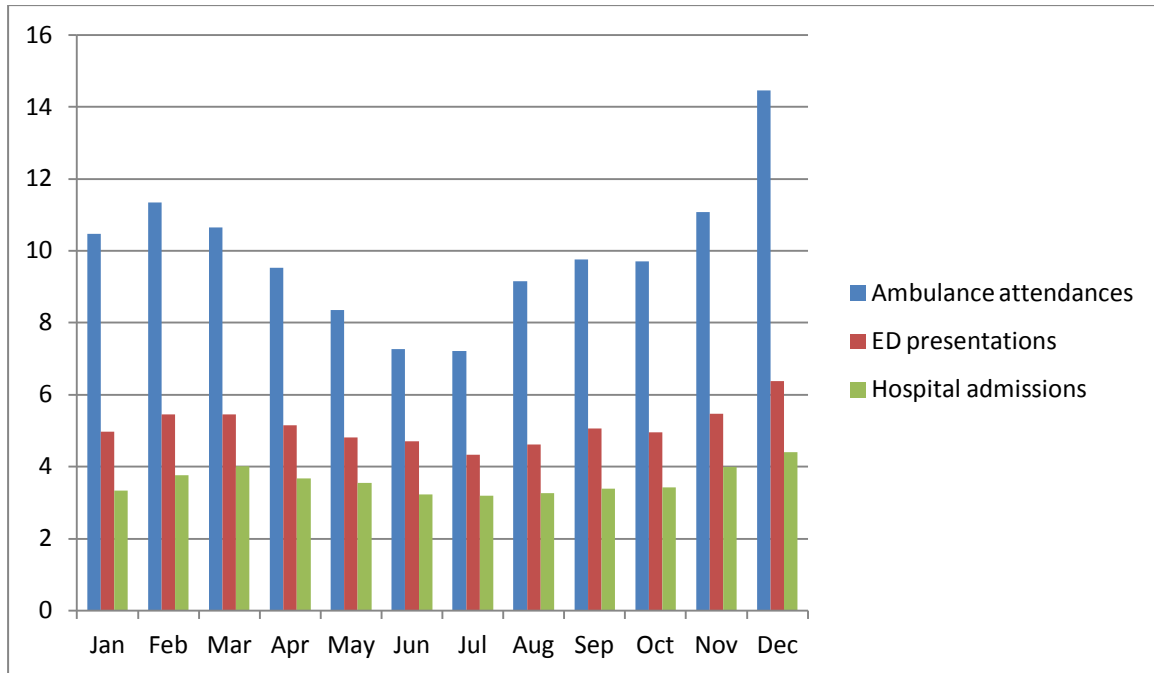


## **Males**

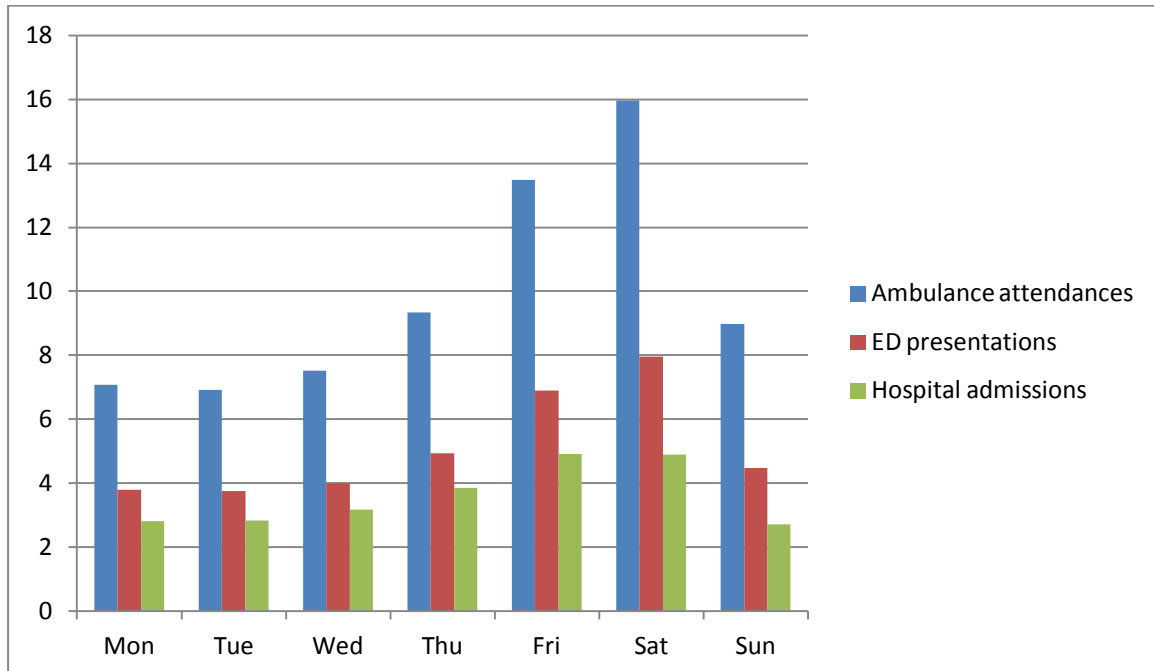
### **Seasonal and time of week patterns**

Alcohol-related ambulance attendances, emergency department presentations and hospital admissions for male patients peaked in the warmer months of the year, with February, November and December being the months with the highest numbers of cases (Figure 4). As shown in Figure 5, the distribution of alcohol intoxication cases over the course of the week indicates that Friday and Saturday were the days of the week with the greatest concentration of alcohol intoxication attendances, presentations and admissions.

**Figure 4: Mean number of ambulance attendances, emergency department presentations and hospital admissions due to alcohol intoxication for males by month**



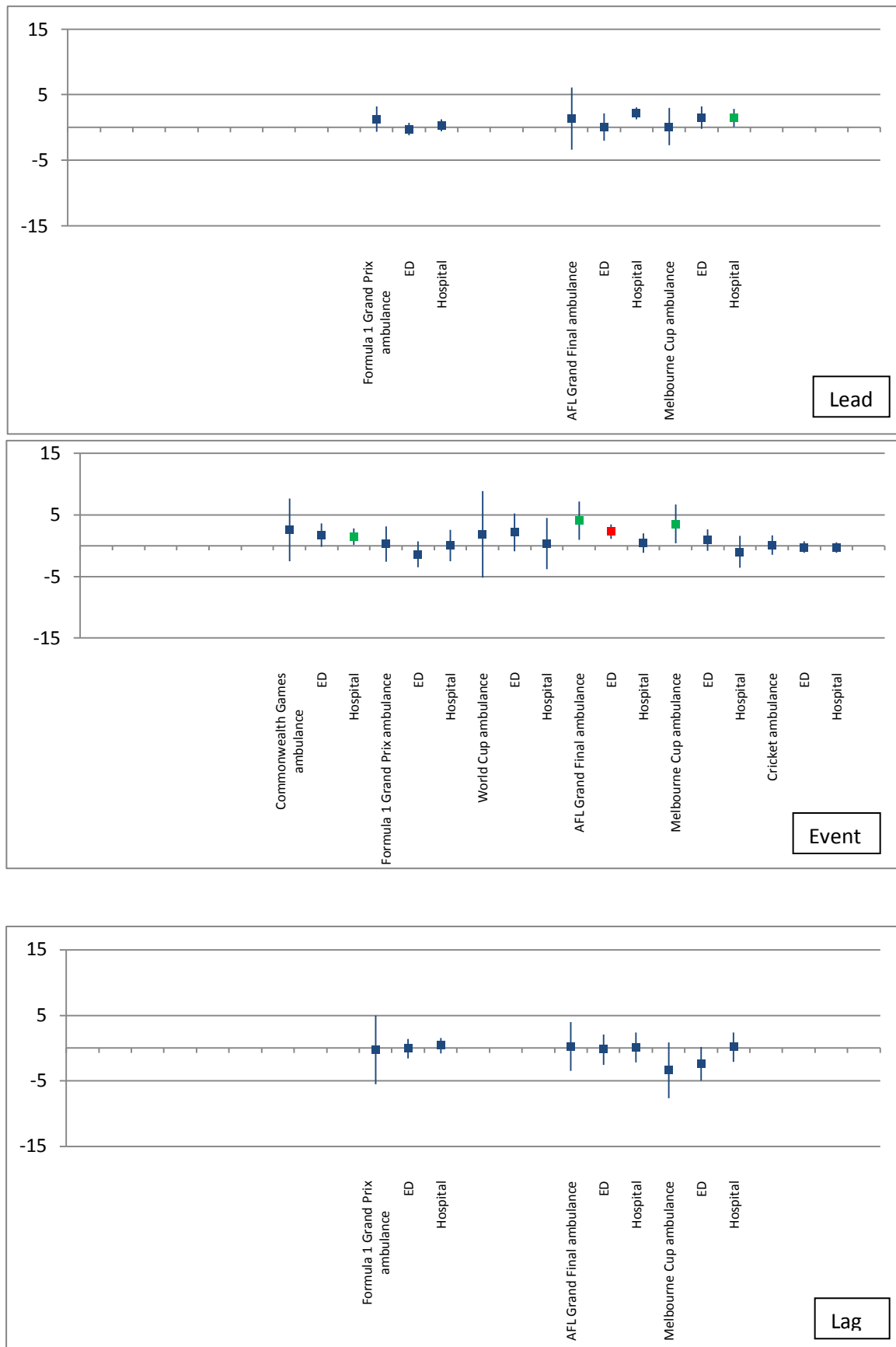
**Figure 5: Mean number of ambulance attendances, emergency department presentations and hospital admissions due to alcohol intoxication for males by day of week**



### **Alcohol intoxication and major sporting events**

For males, significant elevations of alcohol intoxication related hospital admissions occurred on the day preceding the Melbourne Cup and on the day preceding the Grand Final as shown in Figure 6. Significant increases in alcohol intoxication cases were found for the Melbourne Cup (ambulance attendances), the Commonwealth Games (hospital admissions) and the Grand Final (ambulance attendances and emergency department presentations).

**Figure 6: ARIMA model parameters for ambulance attendances, emergency department presentations and hospital admissions due to alcohol intoxication for males – Sporting Events**



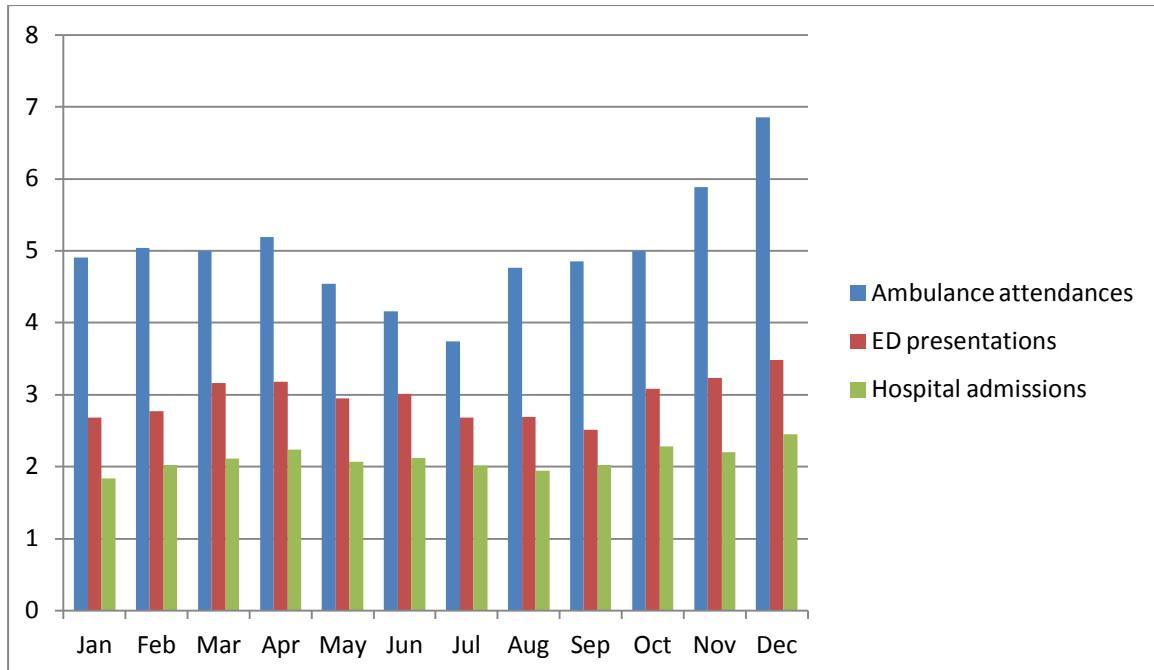
## **Females**

### **Seasonal and time of week patterns**

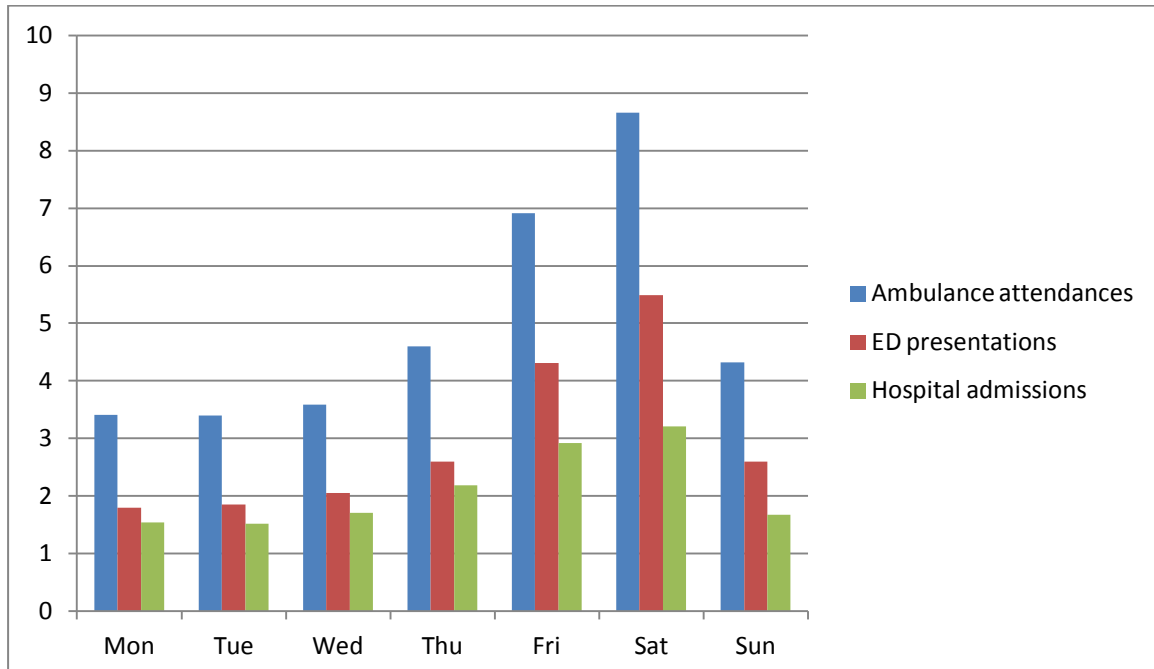
Alcohol-related ambulance attendances, emergency department presentations and hospital admissions for female patients peaked in the warmer months of the year, with November and December being the months with the highest numbers of cases (Figure 7). As shown in Figure 8, the distribution of alcohol intoxication cases over the course of the week indicates that Friday and Saturday were the days of the week with the greatest concentration of alcohol intoxication attendances, presentations and admissions.



**Figure 7: Mean number of ambulance attendances, emergency department presentations and hospital admissions due to alcohol intoxication for females by month**



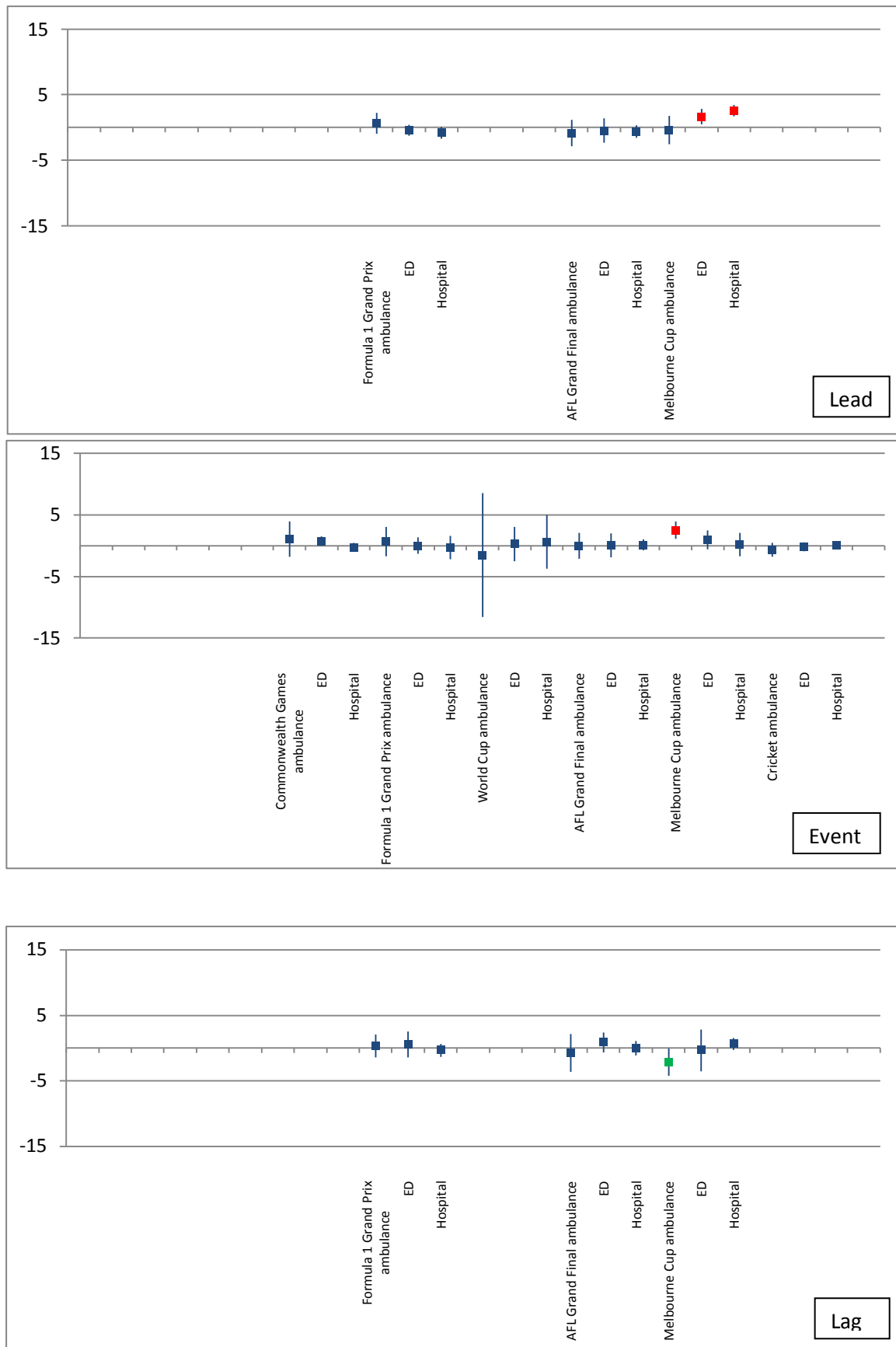
**Figure 8: Mean number of ambulance attendances, emergency department presentations and hospital admissions due to alcohol intoxication for females by day of week**



### **Alcohol intoxication and major sporting events**

There were significant increases in alcohol intoxication related emergency department presentations and hospital admissions for female patients on the day preceding the Melbourne Cup (Figure 9). A significant increase in alcohol intoxication related ambulance attendances was found on the day of the Melbourne Cup, with a significantly lower number of alcohol-related ambulance attendances than predicted occurring on the day following the Melbourne Cup.

**Figure 9: ARIMA model parameters for ambulance attendances, ED presentations and hospital admissions due to alcohol intoxication for females – Sporting Events**

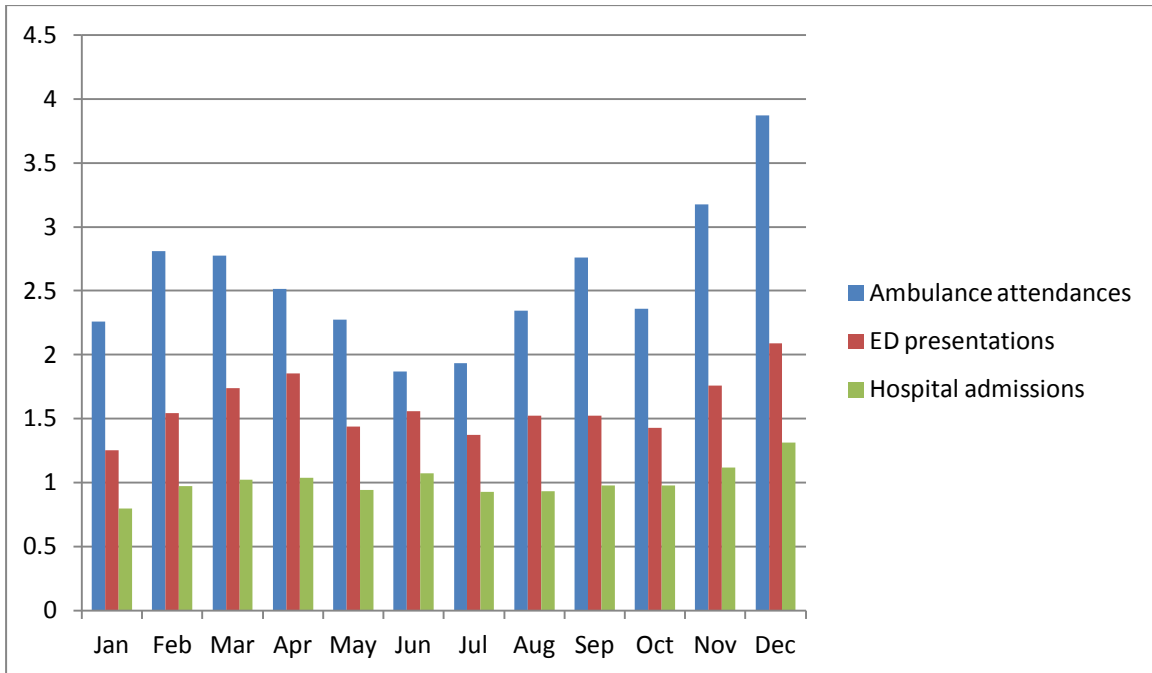


## **Youths**

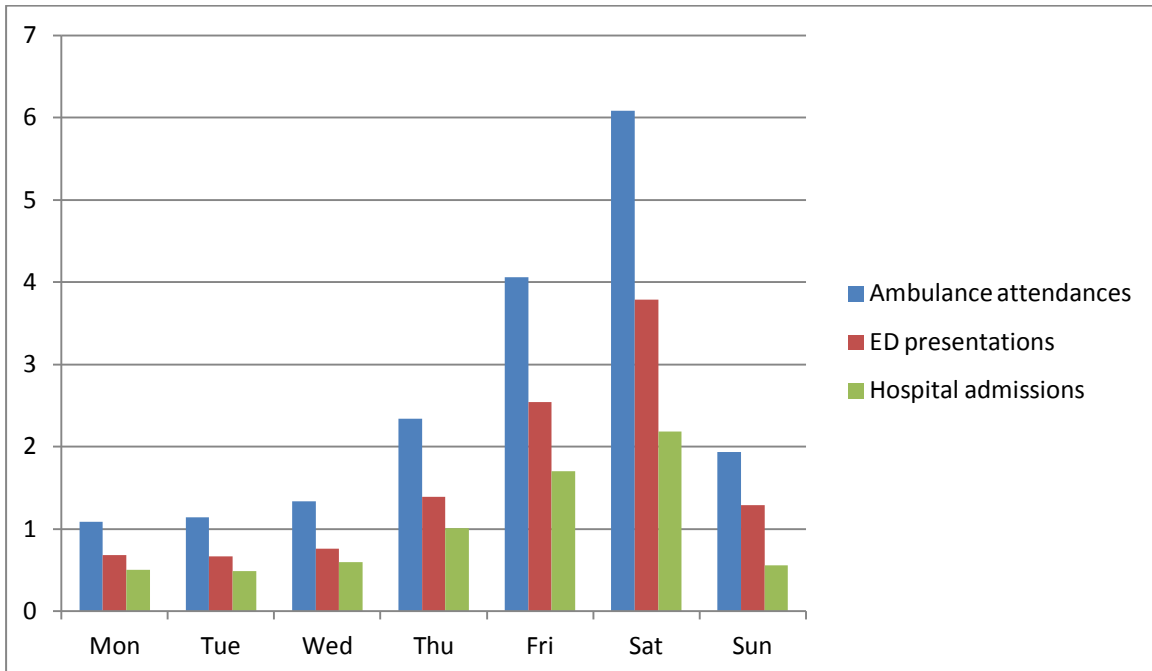
### **Seasonal and time of week patterns**

Alcohol-related ambulance attendances, emergency department presentations and hospital admissions among youths peaked in the warmer months of the year, with November and December being the months with the highest numbers of cases (Figure 10). As shown in Figure 11, the distribution of alcohol intoxication cases over the course of the week indicates that Friday and Saturday were the days of the week with the greatest concentration of alcohol intoxication attendances, presentations and admissions.

**Figure 10: Mean number of ambulance attendances, emergency department presentations and hospital admissions due to alcohol intoxication for youths by month**



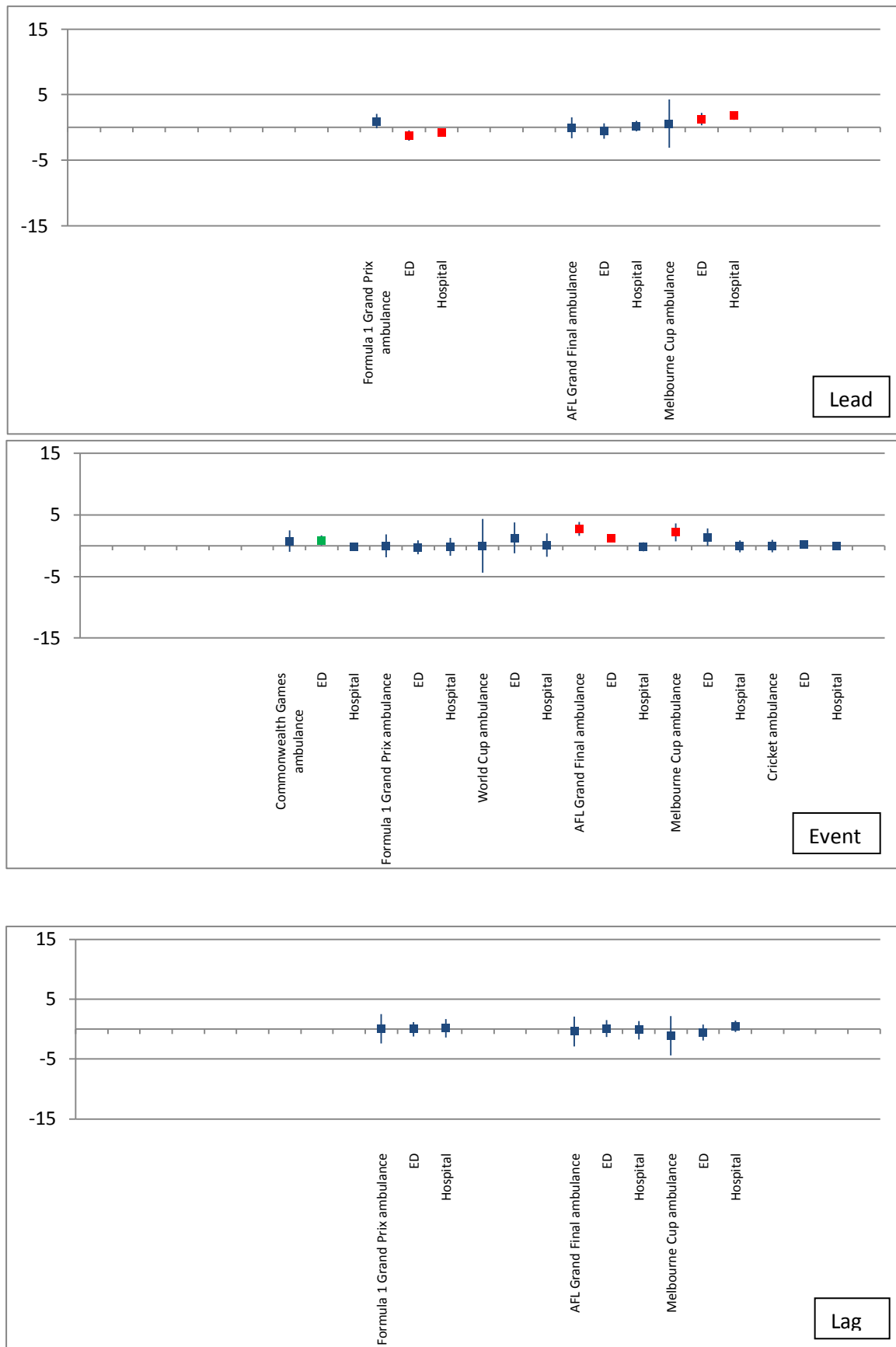
**Figure 11: Mean number of ambulance attendances, emergency department presentations and hospital admissions due to alcohol intoxication for youths by day of week**



### **Alcohol intoxication and major sporting events**

There were significant increases in alcohol intoxication related emergency department presentations and hospital admissions for youths on the day preceding the Melbourne Cup (Figure 12), and a small but significantly reduced number of alcohol intoxication related emergency presentations and hospital admissions on the day preceding the Formula 1 Grand Prix. Significant increases were found in alcohol intoxication related ambulance attendances on the day of the Melbourne Cup, emergency department presentations during the Commonwealth Games, and ambulance attendances and emergency department presentations on the day of the Grand Final.

**Figure 12: ARIMA model parameters for ambulance attendances, ED presentations and hospital admissions due to alcohol intoxication for youths – Sporting Events**



## **Chapter 4: Assault**

Four measures of assault were utilised in analyses of the relationship between major sporting events and harms – police recorded assaults, police recorded family incidents (domestic violence), hospital emergency presentations for assault and hospital admissions for assault.

Results are presented for all cases, males and females separately, and for youth (persons aged less than 25 years).

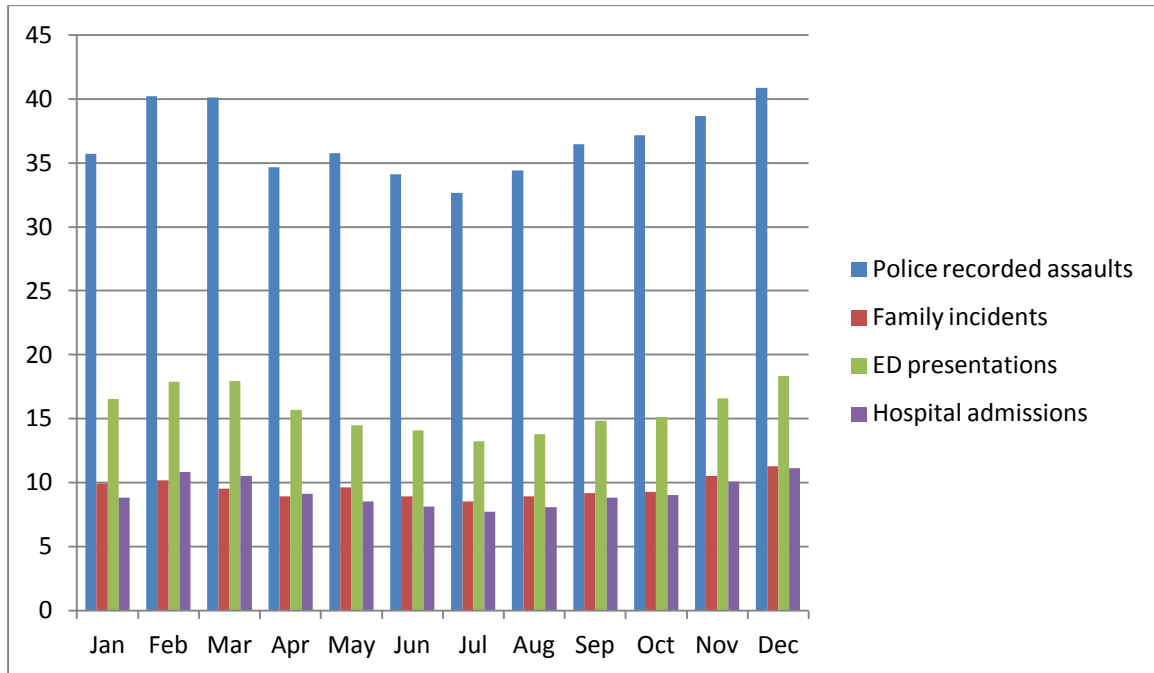


## **All cases**

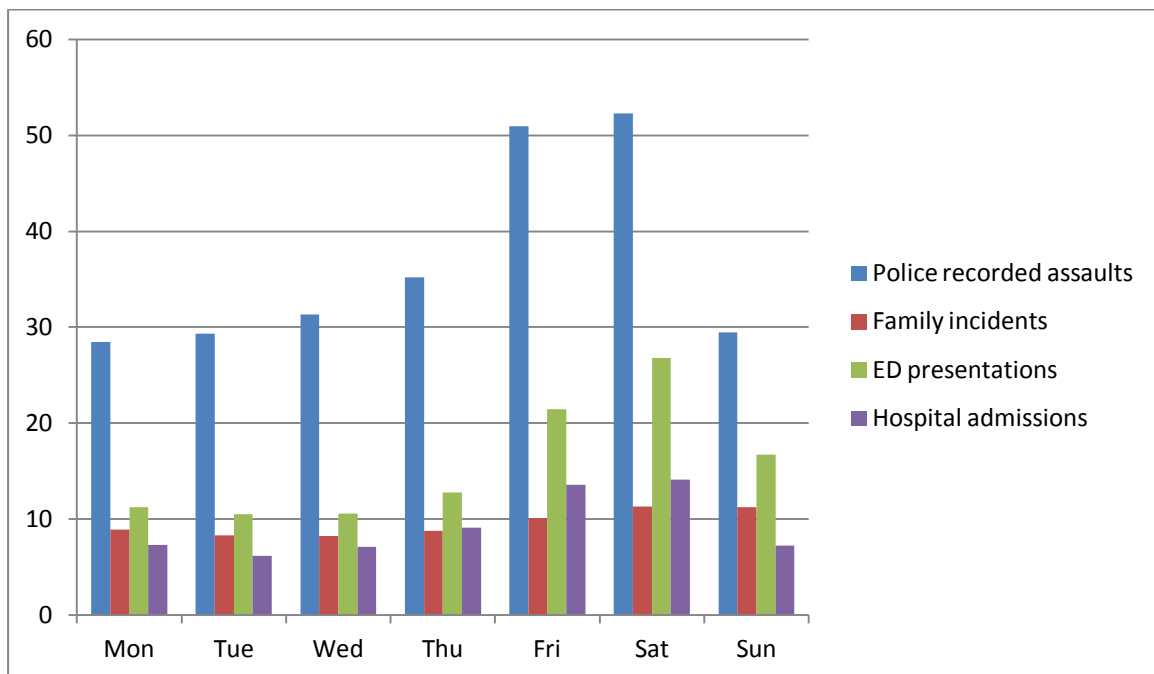
### **Seasonal and time of week patterns**

Police recorded assaults and family incidents, assault-related emergency department presentations and hospital admissions peaked in the warmer months of the year, with the highest numbers of cases occurring between November and March (Figure 13). As shown in Figure 14, the distribution of assault cases over the course of the week indicates that Friday and Saturday were the days of the week with the greatest concentration of police recorded assaults, emergency department assault presentations and hospital admissions, while Saturday and Sunday represented the days of the week with the highest numbers of police recorded family incidents.

**Figure 13: Mean number of police recorded assaults, family incidents, and emergency department presentations and hospital admissions due to assault by month**



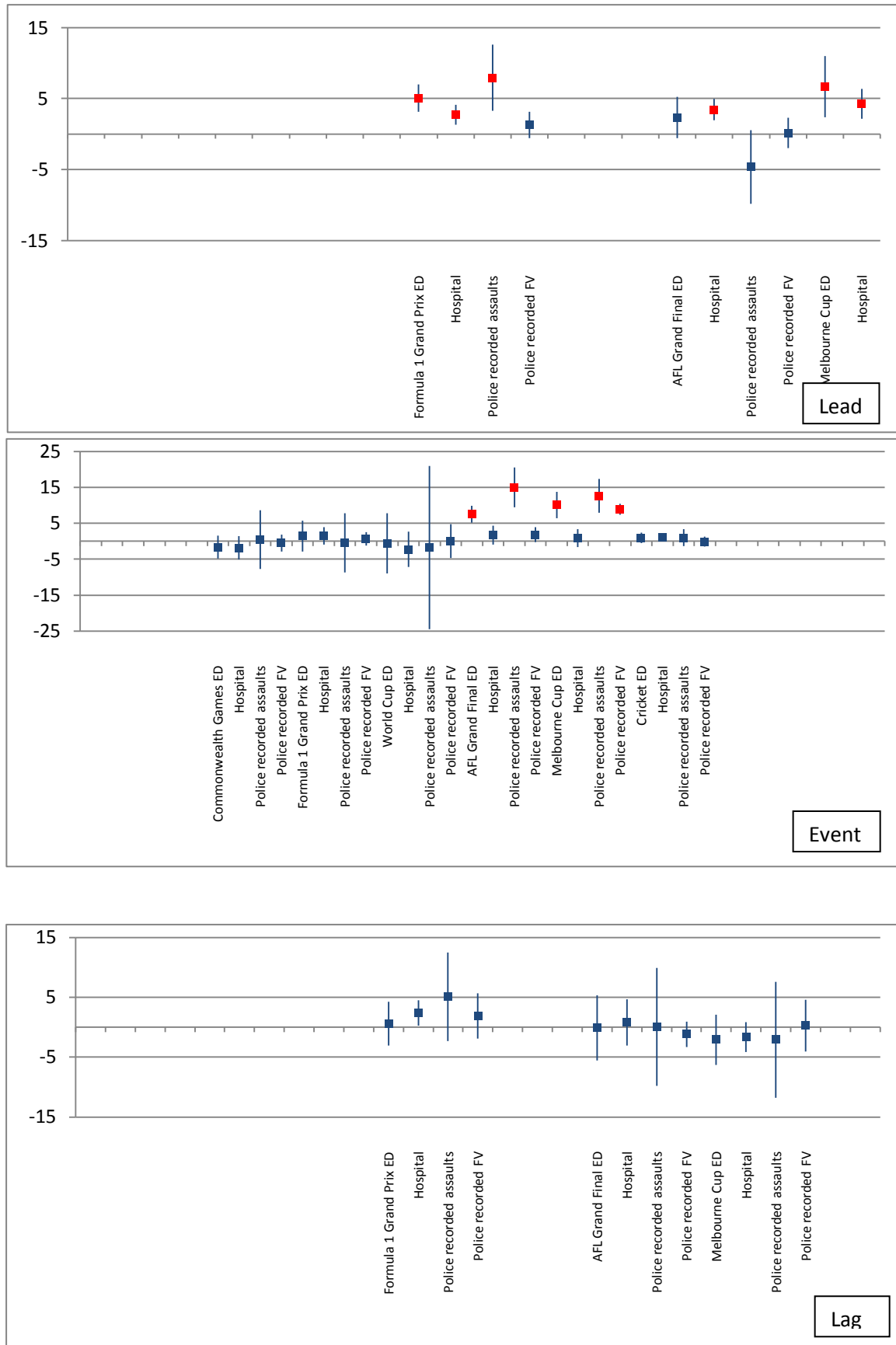
**Figure 14: Mean number of police recorded assaults, family incidents, and emergency department presentations and hospital admissions due to assault by day of week**



### **Assaults and major sporting events**

There were significant increases in assaults on the day preceding the Melbourne Cup and Formula 1 Grand Prix (police recorded assaults, emergency presentations and hospital admissions), and the AFL Grand Final (hospital admissions) (Figure 15). Significant increases were found in assaults on the day of the Melbourne Cup (emergency presentations, police recorded assaults and family incidents) and AFL Grand Final (emergency presentations and police recorded assaults), and during International cricket matches (hospital admissions). On the day following the Formula 1 Grand Prix, there was a significantly higher number of assault related hospital admissions than expected.

**Figure 15: ARIMA model parameters for police recorded assaults, family incidents, and emergency department presentations and hospital admissions due to assault – Sporting Events**

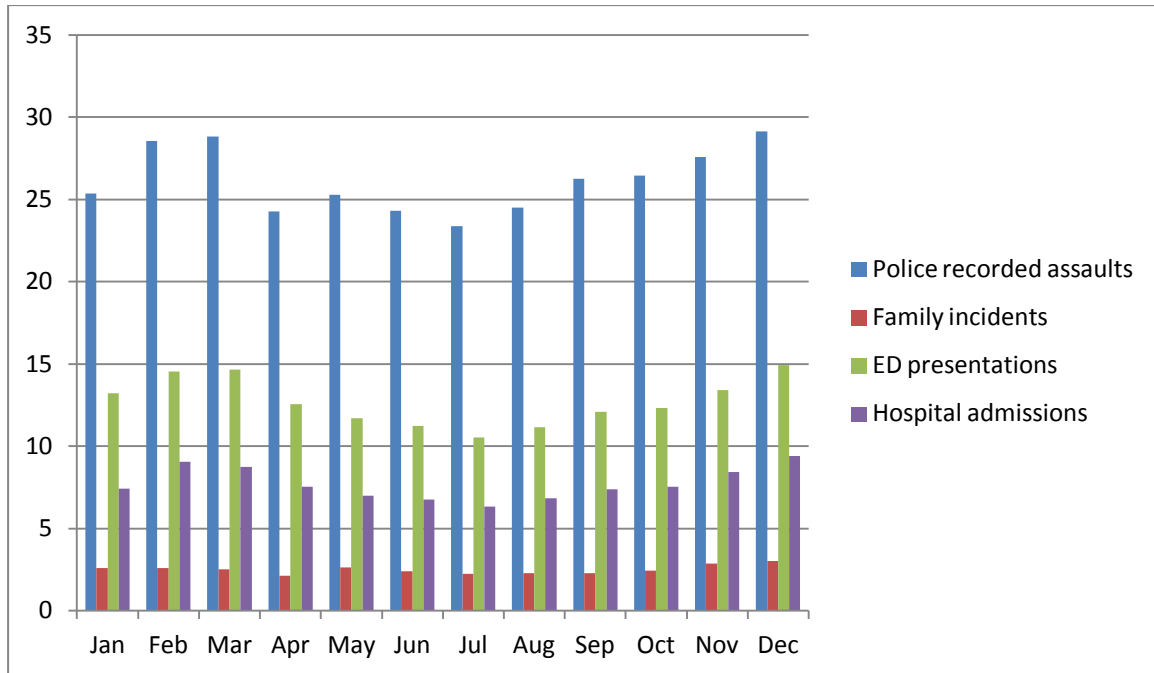


## **Males**

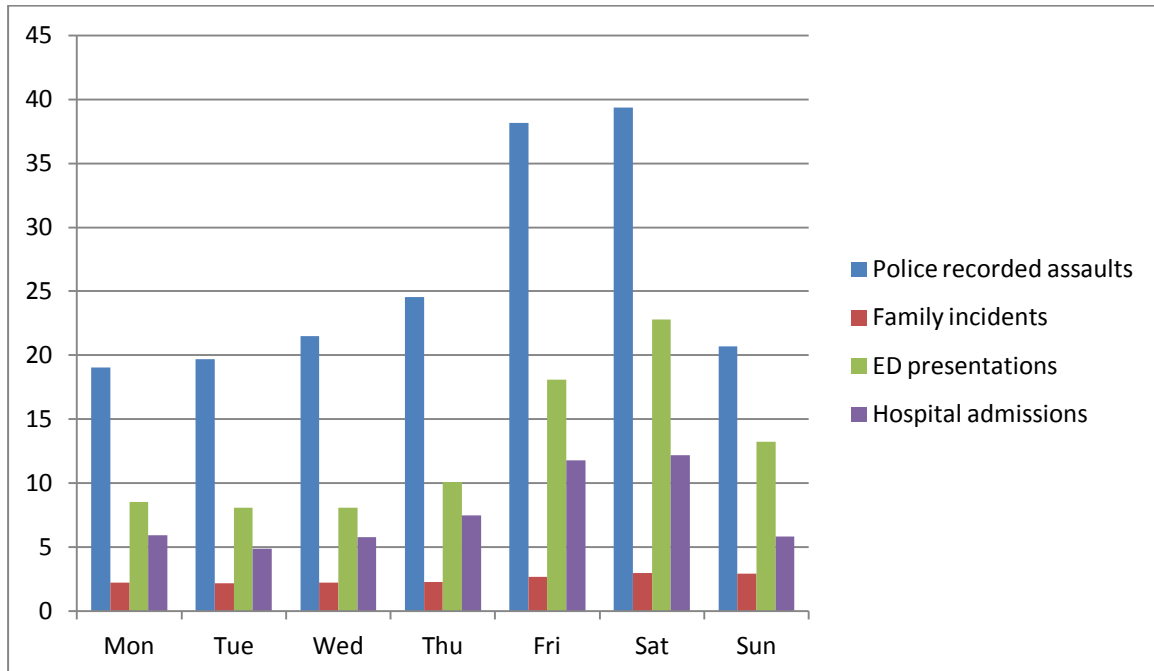
### **Seasonal and time of week patterns**

Police recorded assaults and family incidents, and assault related emergency department presentations and hospital admissions peaked in the warmer months of the year, with the highest numbers of cases occurring between November and March (Figure 16). As shown in Figure 17, the distribution of assault cases for males over the course of the week indicates that Friday and Saturday were the days of the week with the greatest concentration of assault related offences, presentations and admissions.

**Figure 16: Mean number of police recorded assaults, family incidents, and emergency department presentations and hospital admissions due to assault for males by month**



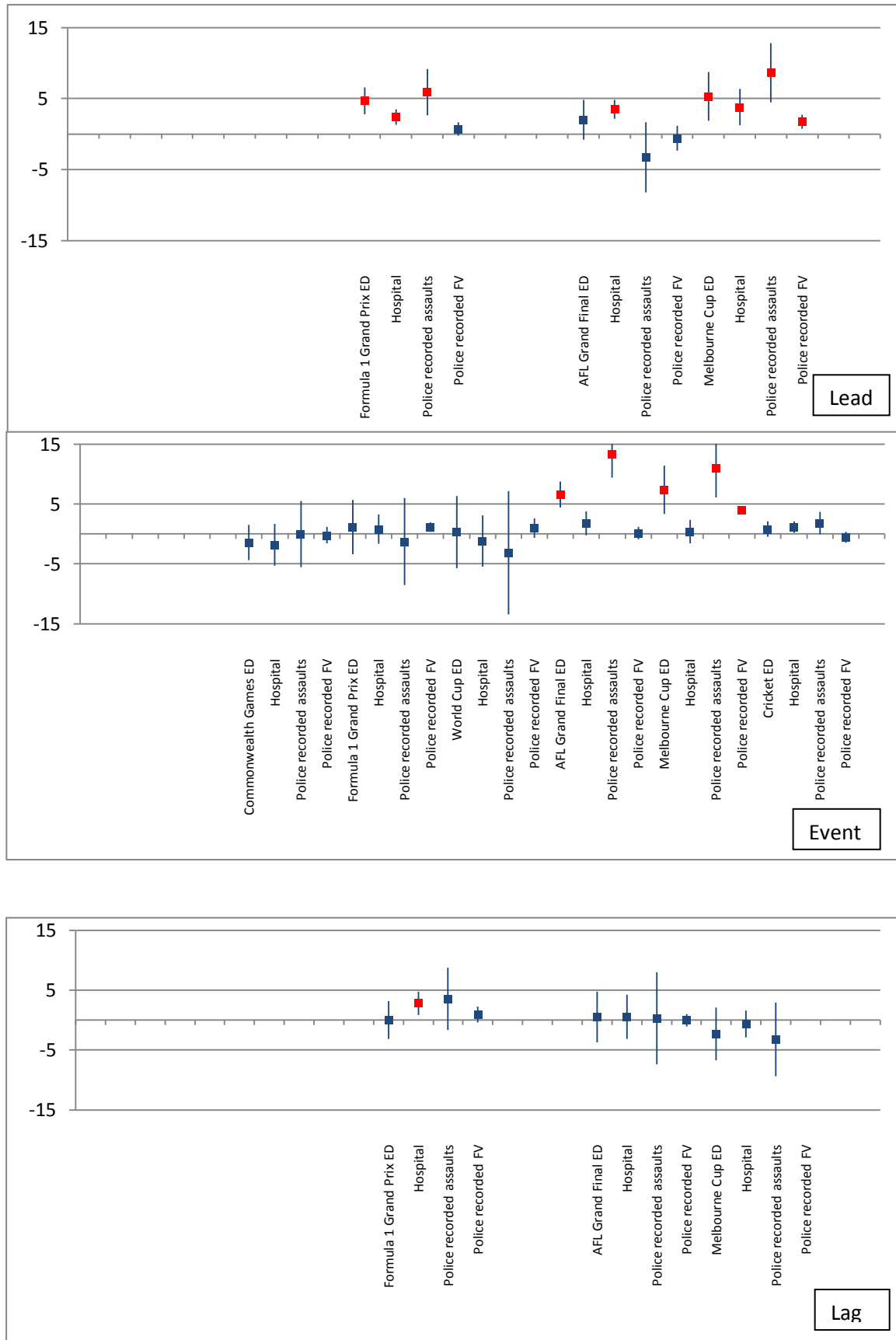
**Figure 17: Mean number of police recorded assaults, family incidents, and emergency department presentations and hospital admissions due to assault for males by day of week**



### **Assaults and major sporting events**

Among males, there were significant increases in assaults on the day preceding the Melbourne Cup (police recorded assaults, family incidents, emergency presentations and hospital admissions) and Formula 1 Grand Prix (police recorded assaults, emergency presentations and hospital admissions), and the AFL Grand Final (hospital admissions) (Figure 18). Significant increases were found in assaults on the day of the Melbourne Cup (police recorded assaults, family incidents and emergency presentations) and AFL Grand Final (police recorded assaults, emergency presentations), and during International cricket matches (hospital admissions). On the day following the Formula 1 Grand Prix, there were significantly higher numbers of family incidents and assault related hospital admissions than expected.

**Figure 18: ARIMA model parameters for police recorded assaults, family incidents, and emergency department presentations and hospital admissions due to assault for males – Sporting Events**



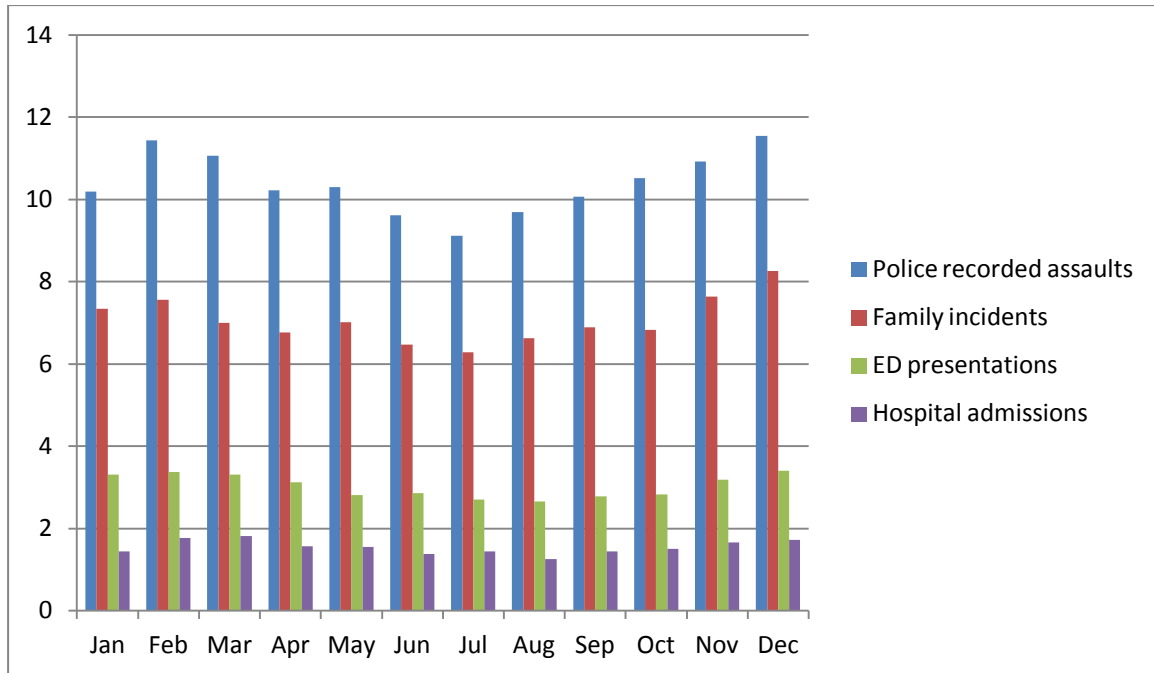


## **Females**

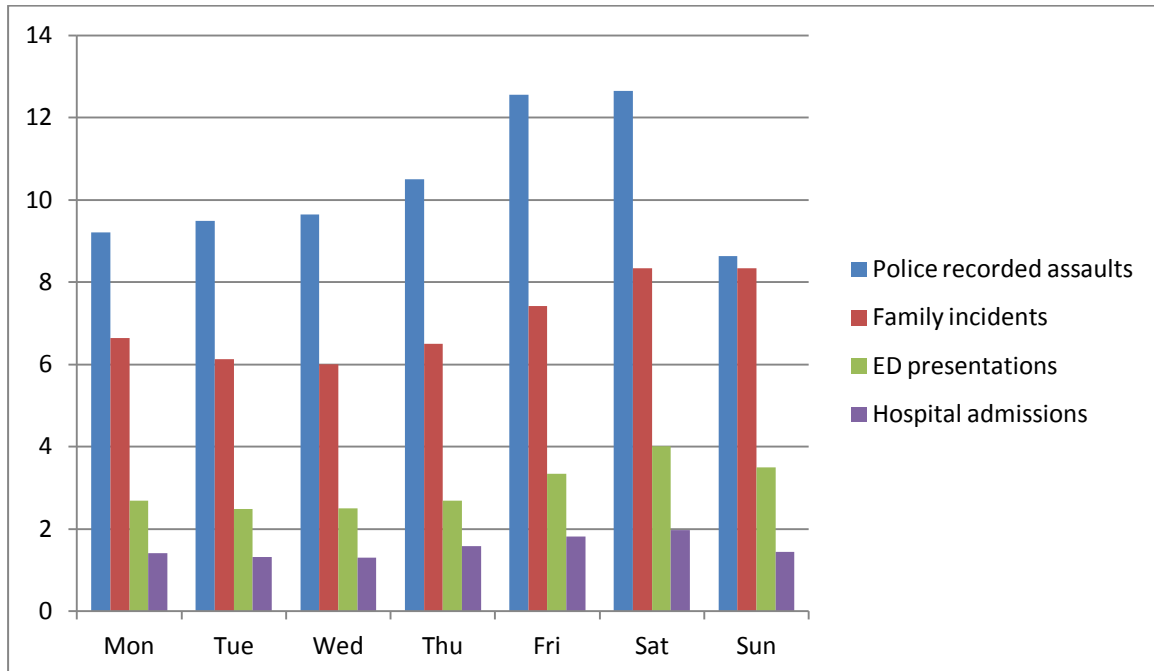
### **Seasonal and time of week patterns**

Police recorded assaults, family incidents, assault related emergency department presentations and hospital admissions peaked in the warmer months of the year, with the highest numbers of police recorded assaults and family incidents occurring between November and March, cases occurring between December and March for emergency presentations, and in February and March for hospital admissions (Figure 19). As shown in Figure 20, the distribution of assault cases for females over the course of the week indicates that Friday, Saturday and Sunday were the days of the week with the greatest concentration of emergency department presentations for assault, with Friday and Saturday the peak days for hospital admissions, and Saturday and Sunday being the peak days for police recorded assaults and family incidents.

**Figure 19: Mean number of police recorded assaults, family incidents, and emergency department presentations and hospital admissions due to assault for females by month**



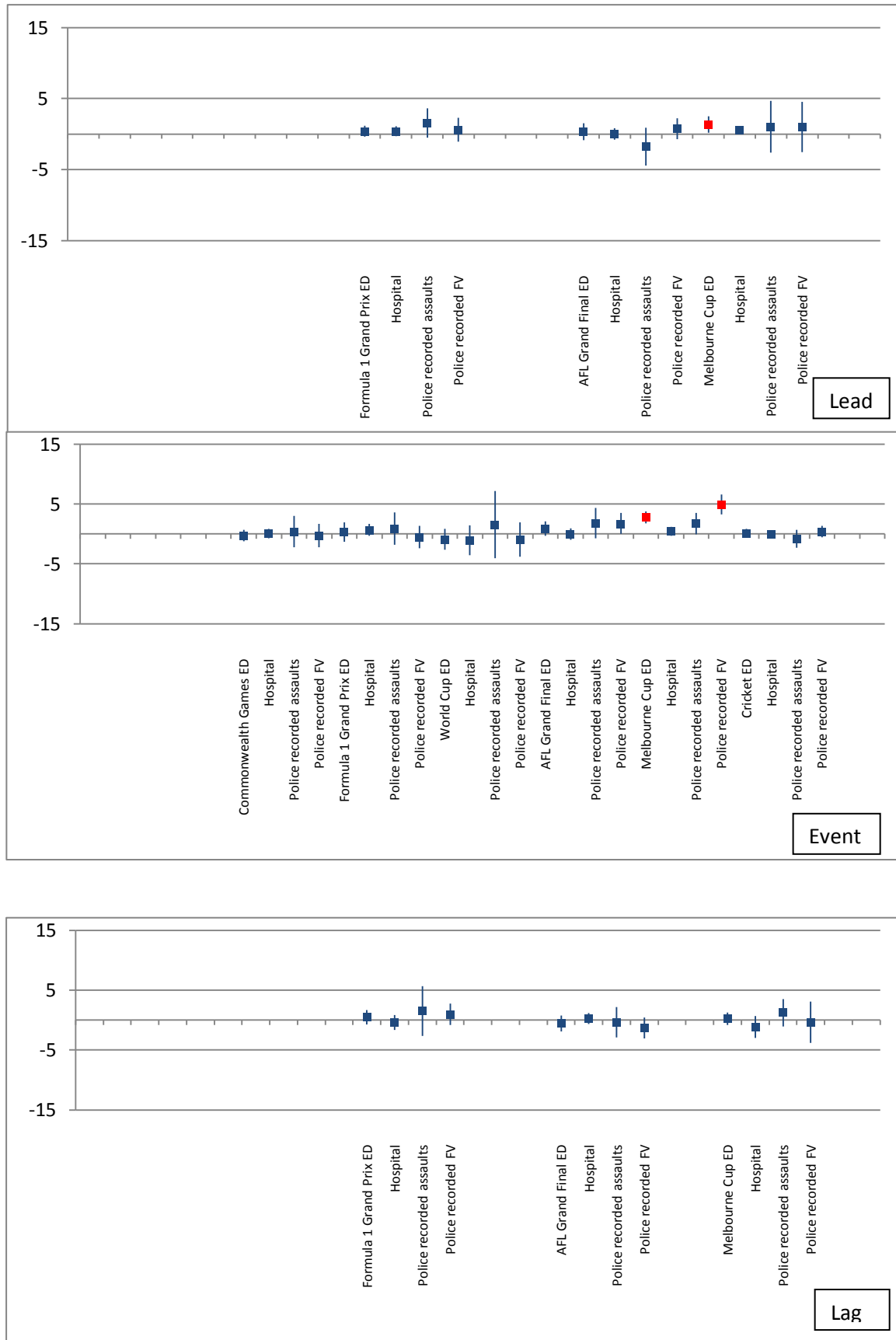
**Figure 20: Mean number of police recorded assaults, family incidents, and emergency department presentations and hospital admissions due to assault for females by day of week**



### **Assaults and major sporting events**

Among females, there were significant increases in assault related emergency presentations and hospital admissions on the day preceding the Melbourne Cup (Figure 21). A significant increase was found in family incidents and emergency department presentations for assault on the day of the Melbourne Cup, and in family incidents on the day of the AFL Grand Final.

**Figure 21: ARIMA model parameters for police recorded assaults, family incidents, and emergency department presentations and hospital admissions due to assault for females – Sporting Events**

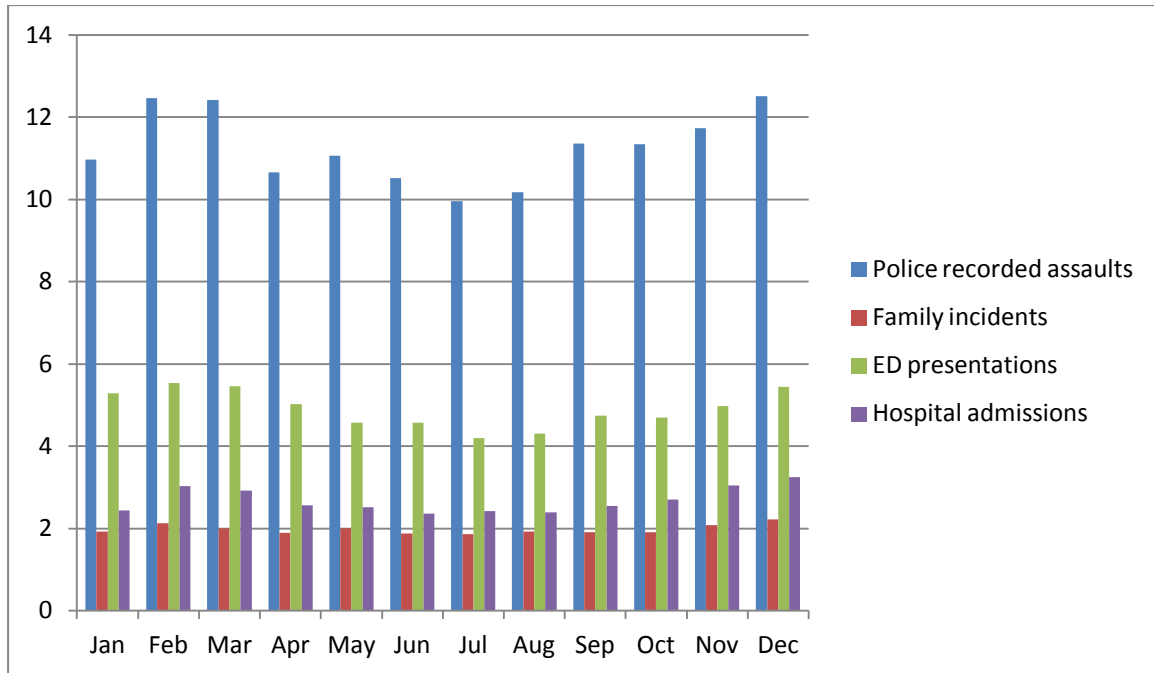


## **Youths**

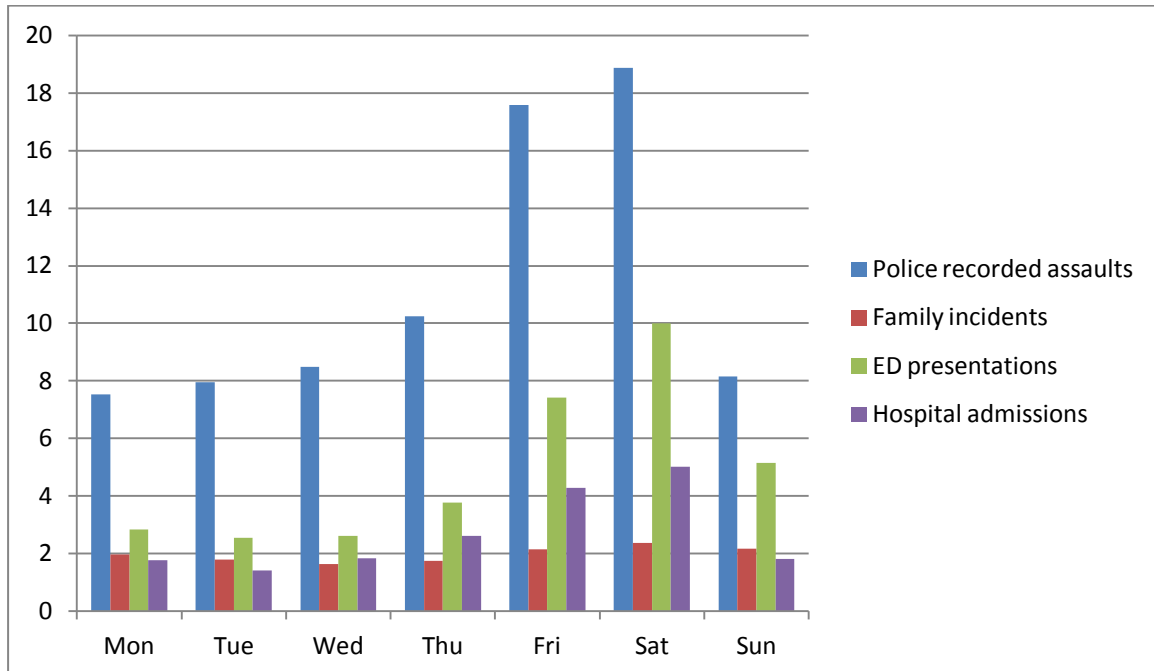
### **Seasonal and time of week patterns**

Assault related emergency department presentations and hospital admissions peaked in the warmer months of the year, with the highest numbers of cases occurring between December and March for emergency presentations, and in November, December, February and March for police recorded assaults, family incidents and hospital admissions (Figure 22). As shown in Figure 23, the distribution of assault cases for youths over the course of the week indicates that Friday and Saturday were the days of the week with the greatest concentration of police recorded assaults, emergency department presentations and hospital admissions for assaults, with the highest numbers of family incidents occurring on Saturdays and Sundays.

**Figure 22: Mean number of police recorded assaults, family incidents, and emergency department presentations and hospital admissions due to assault for youths by month**



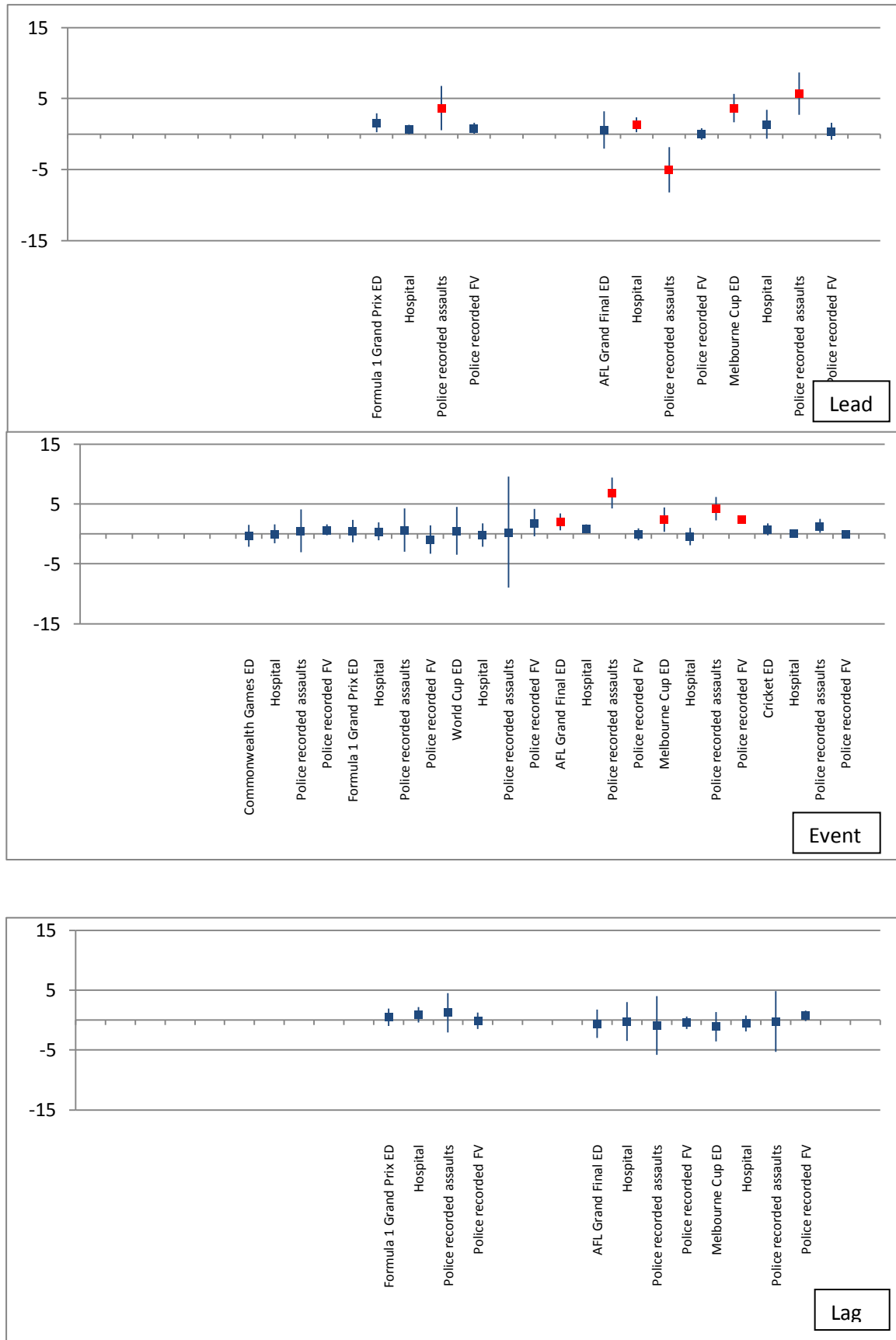
**Figure 23: Mean number of police recorded assaults, family incidents, and emergency department presentations and hospital admissions due to assault for youths by day of week**



### **Assaults and major sporting events**

Among males, there were significant increases in assaults on the day preceding the Melbourne Cup (police recorded assaults and emergency presentations), Formula 1 Grand Prix (police recorded assaults, family incidents, emergency presentations and hospital admissions), and the AFL Grand Final (hospital admissions), with a significant decrease in police recorded assaults on the day preceding the AFL Grand Final (Figure 24). Significant increases were found in assaults on the day of the Melbourne Cup (police recorded assaults, family incidents and emergency department presentations), Cricket (police recorded assaults) and AFL Grand Final (police recorded assaults, emergency presentations and hospital admissions).

**Figure 24: ARIMA model parameters for police recorded assaults, family incidents, and emergency department presentations and hospital admissions due to assault for youths – Sporting Events**





## **Chapter 5: Motor Vehicle Accidents**

Relationships between motor vehicle accidents and sporting events were examined using two measures of harms associated with road accidents were utilised in analyses – serious road incident data and hospital admissions for motor vehicle accidents.

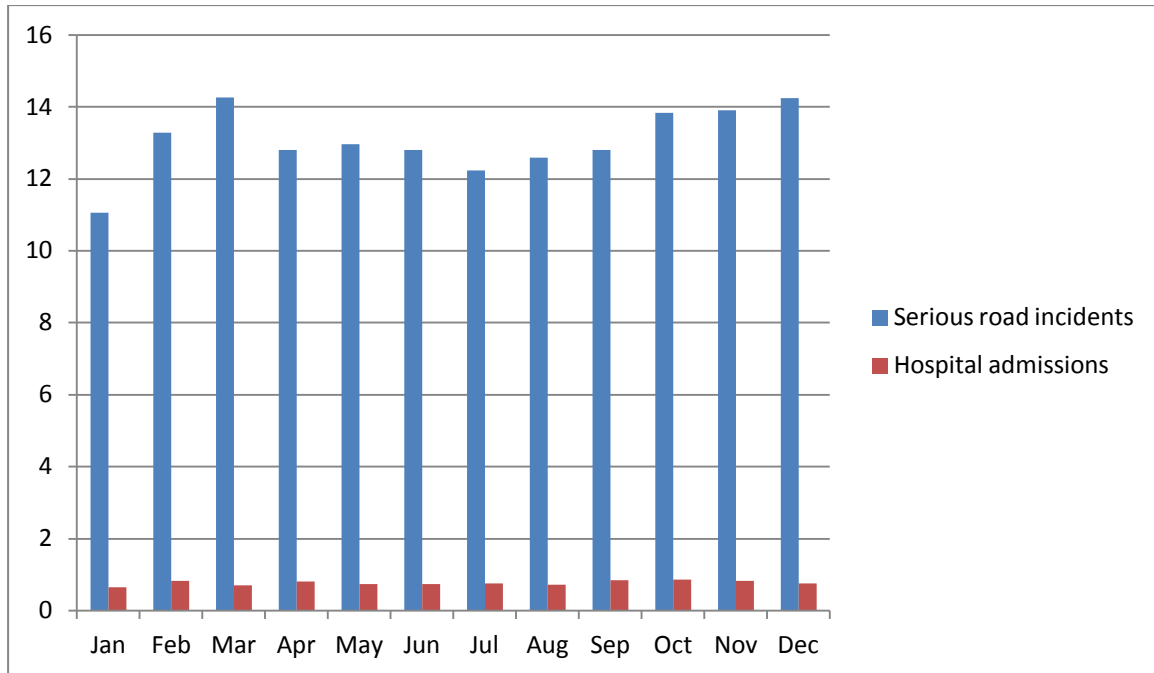
Results are presented for all cases, males and females separately, and for youth (persons aged less than 25 years).

## **All cases**

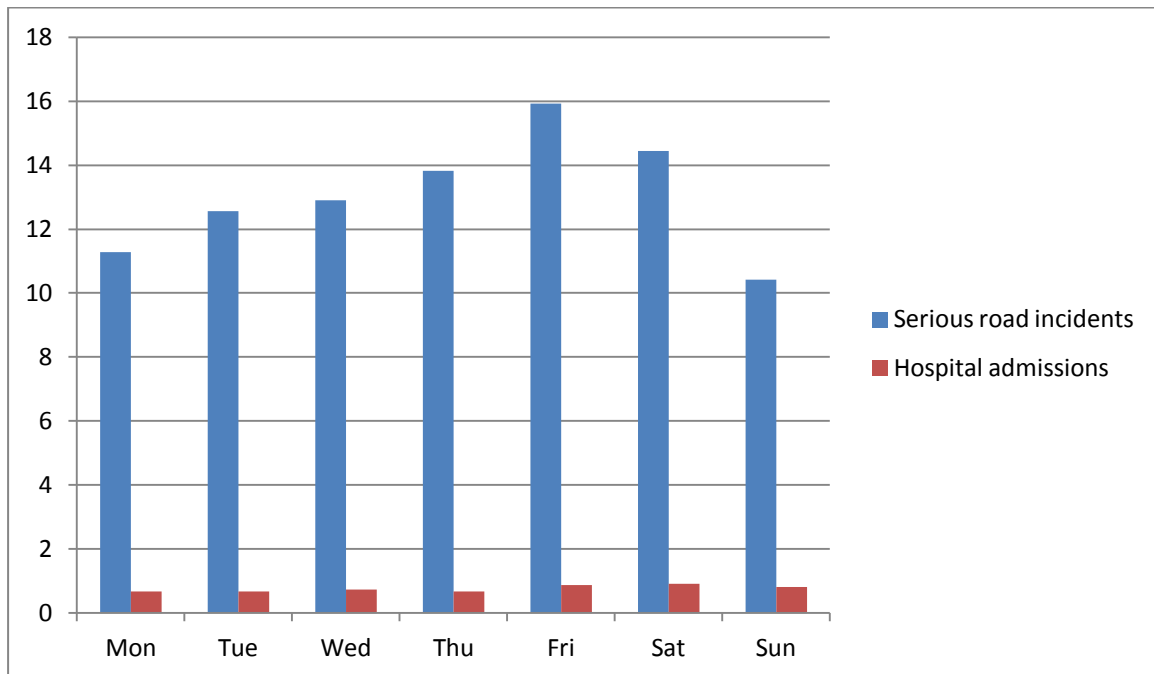
### **Seasonal and time of week patterns**

Serious road incidents and motor vehicle accident related hospital admissions peaked in the warmer months of the year, with the highest numbers of cases occurring between October and December, and also in March (Figure 25). As shown in Figure 26, the distribution of motor vehicle accident cases over the course of the week indicates that Friday and Saturday were the days of the week with the greatest concentration of serious road incidents and hospital admissions.

**Figure 25: Mean number of serious road incidents and hospital admissions due to motor vehicle accidents by month**



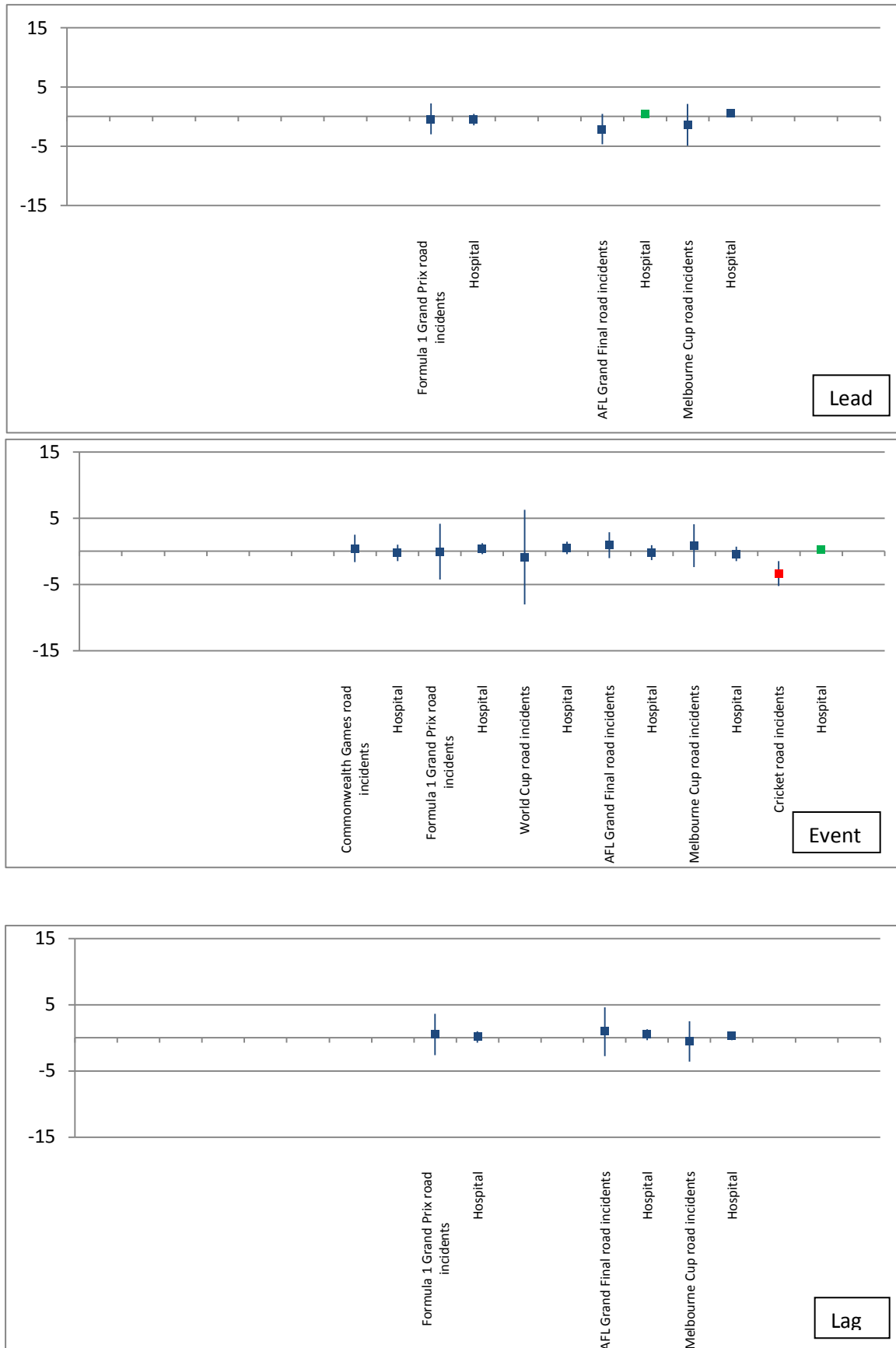
**Figure 26: Mean number of serious road incidents and hospital admissions due to motor vehicle accidents by day of week**



**Motor vehicle accidents and major sporting events**

There was a significant increase in motor vehicle accident related hospital admissions on the day preceding the AFL Grand Final (Figure 27). Significant increases were found in motor vehicle accident related hospital admissions during international cricket matches and the day of the AFL Grand Final, whilst a significantly lower number of serious road incidents occurred during international cricket matches than predicted.

**Figure 27: ARIMA model parameters for serious road incidents and hospital admissions due to motor vehicle accidents – Sporting Events**

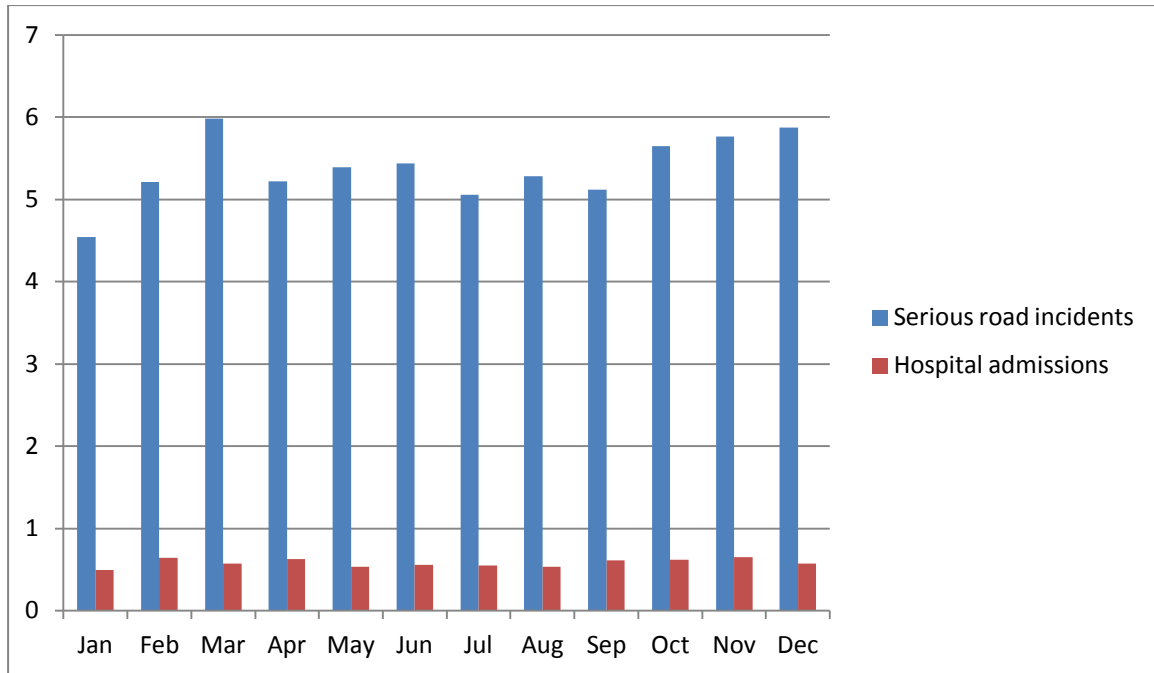


## **Males**

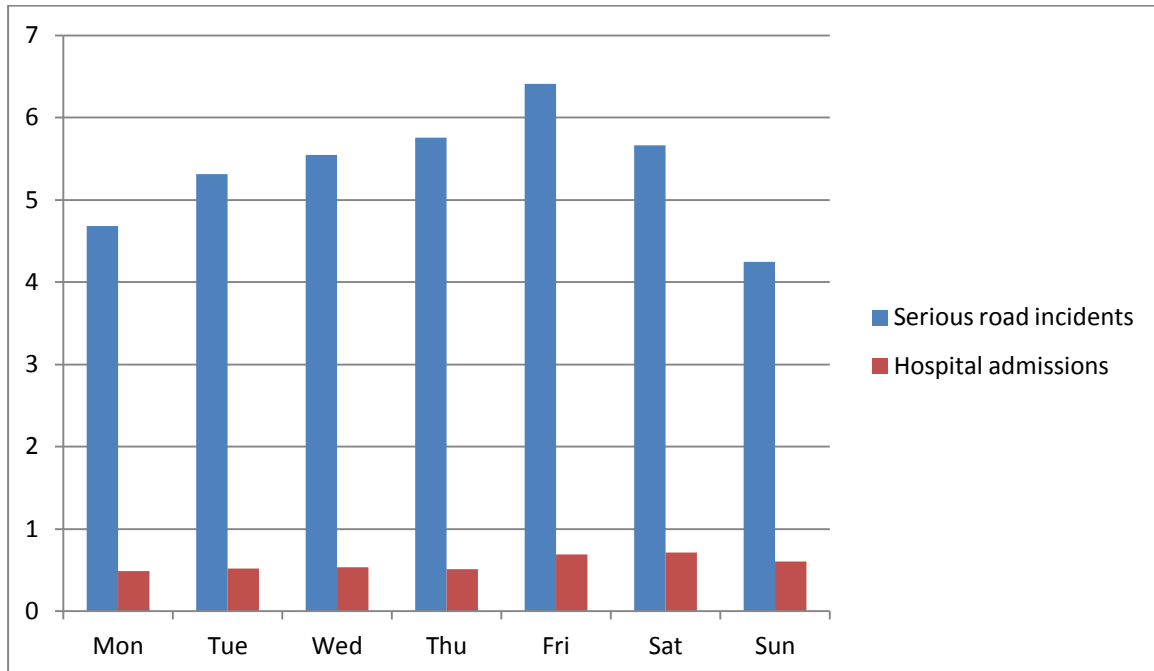
### **Seasonal and time of week patterns**

Serious road incidents and motor vehicle accident related hospital admissions peaked in the warmer months of the year, with the highest numbers of cases occurring between October and December, and also in March (Figure 28). As shown in Figure 29, the distribution of motor vehicle accident cases over the course of the week indicates that Thursday, Friday and Saturday were the days of the week with the greatest concentration of serious road incidents, and Friday and Saturday were the peak days for motor vehicle accident related hospital admissions.

**Figure 28: Mean number of serious road incidents and hospital admissions due to motor vehicle accidents for males by month**



**Figure 29: Mean number of serious road incidents and hospital admissions due to motor vehicle accidents for males by day of week**

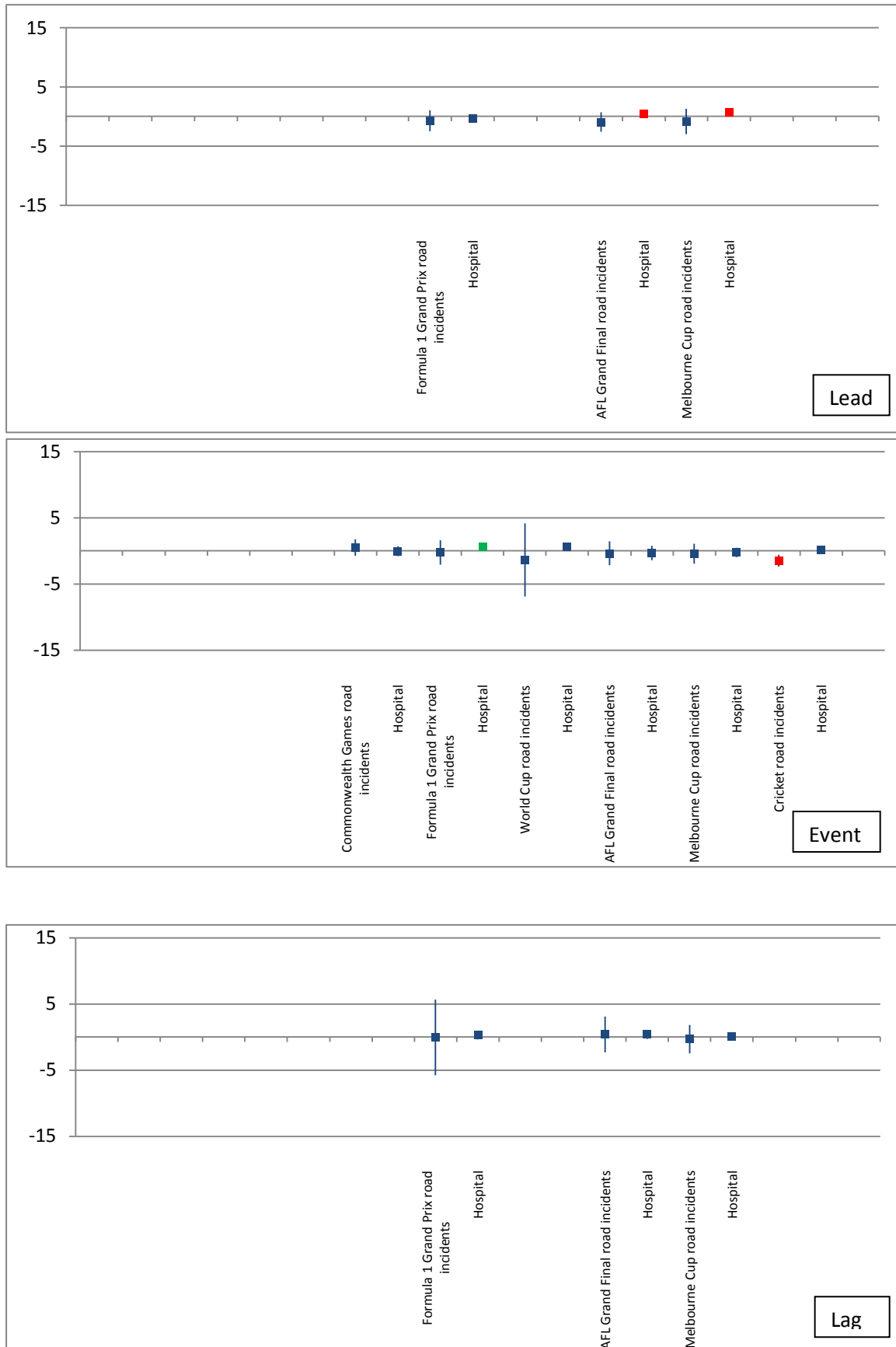


**Motor vehicle accidents and major sporting events**

There were significant increases in motor vehicle accident related hospital admissions on the day preceding the AFL Grand Final and the Melbourne Cup (Figure 30). A significant increase was found in serious road incident during international cricket matches, and a significant increase for motor vehicle accident related hospital admissions during the Formula 1 Grand Prix.



**Figure 30: ARIMA model parameters for serious road incidents and hospital admissions due to motor vehicle accidents for males – Sporting Events**

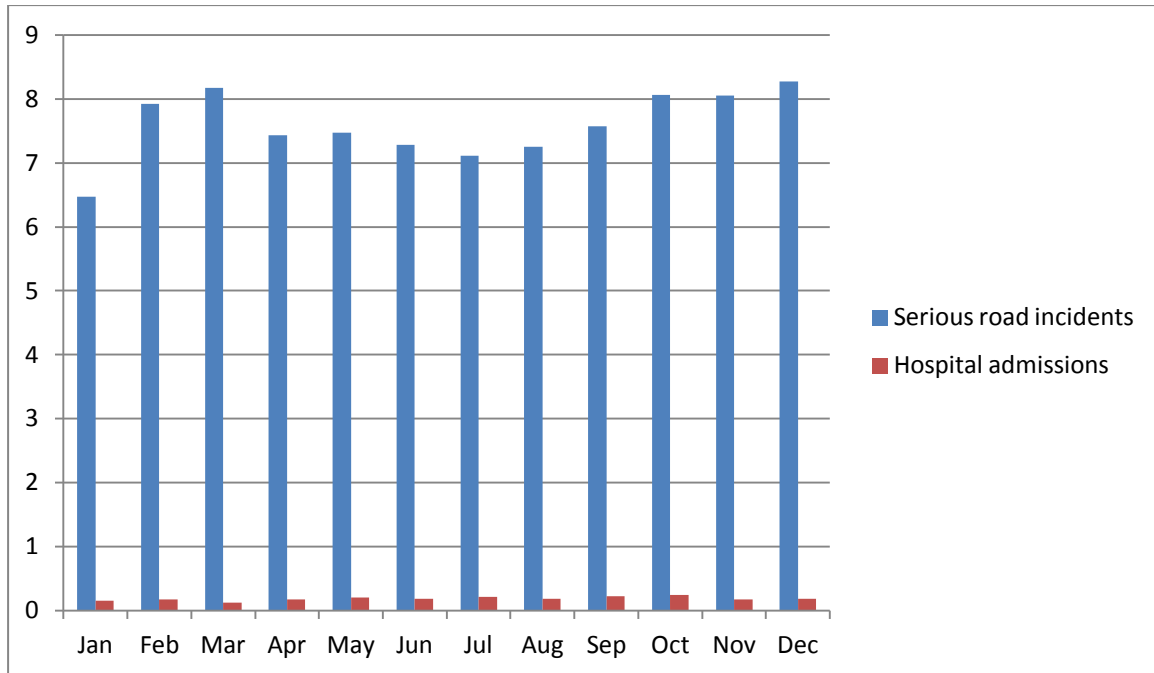


## **Females**

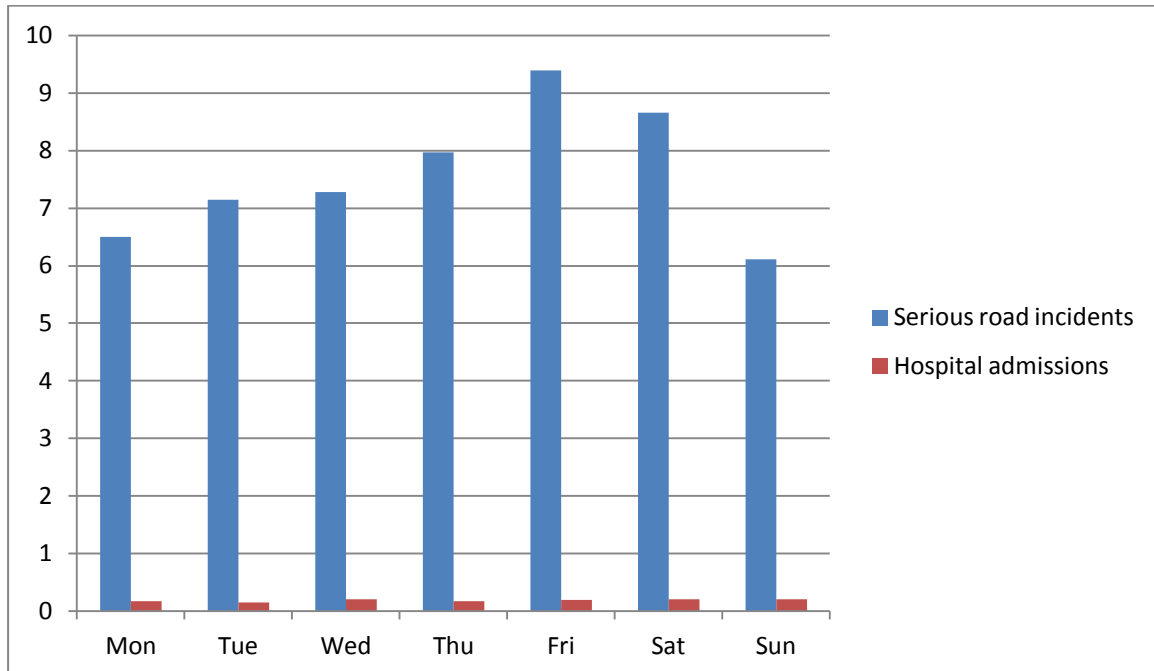
### **Seasonal and time of week patterns**

Serious road incidents and motor vehicle accident related hospital admissions peaked in the warmer months of the year, with the highest numbers of cases occurring between October and December, and also in February and March (Figure 31). As shown in Figure 32, the distribution of motor vehicle accident cases over the course of the week indicates that Friday and Saturday were the days of the week with the greatest concentration of serious road incidents and motor vehicle accident related hospital admissions.

**Figure 31: Mean number of serious road incidents and hospital admissions due to motor vehicle accidents for females by month**



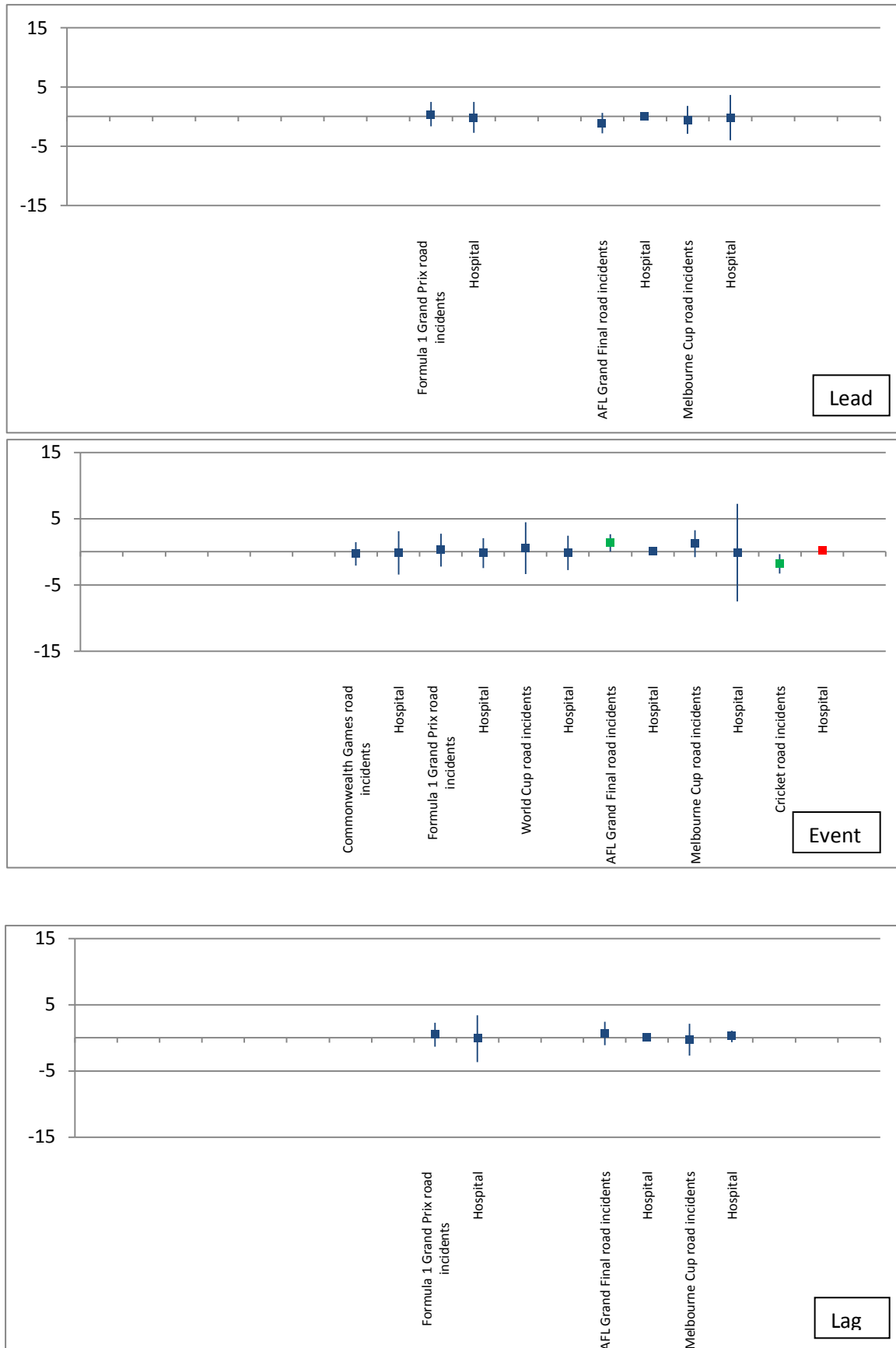
**Figure 32: Mean number of serious road incidents and hospital admissions due to motor vehicle accidents for females by day of week**



**Motor vehicle accidents and major sporting events**

There were significant increases in serious road incidents on the AFL Grand Final and a significantly lower number of serious road incidents than predicted during international cricket matches (Figure 33). A significant increase was found in motor vehicle accident related hospital admissions during international cricket matches.

**Figure 33: ARIMA model parameters for serious road incidents and hospital admissions due to motor vehicle accidents for females – Sporting Events**

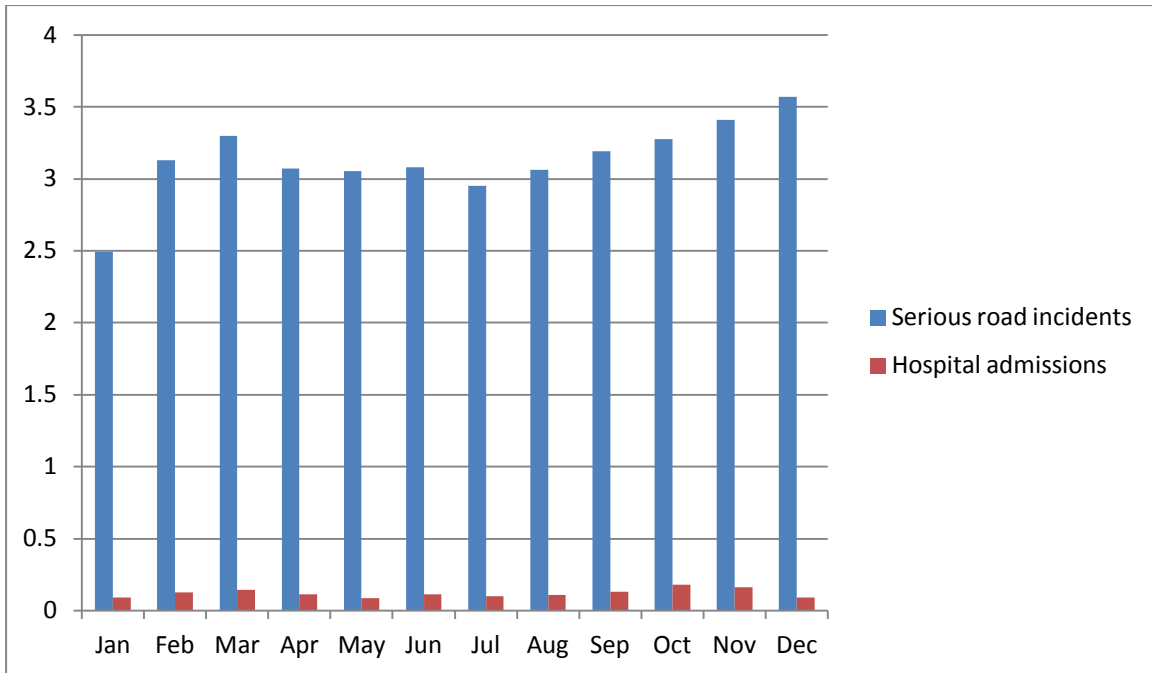


## **Youths**

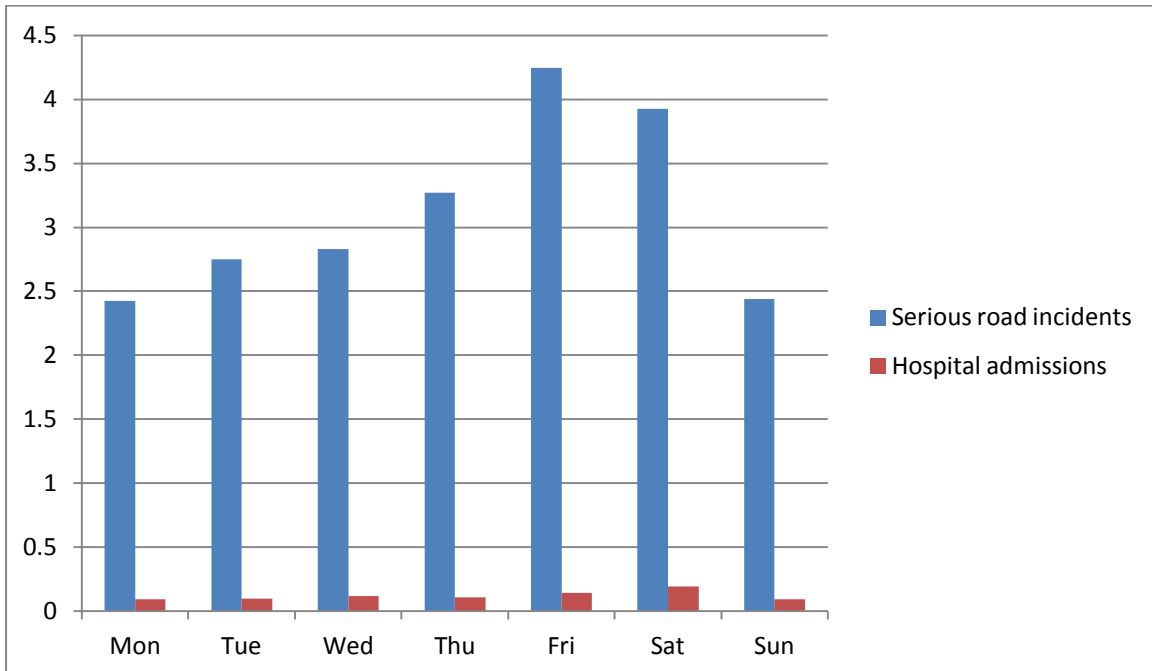
### **Seasonal and time of week patterns**

Serious road incidents and motor vehicle accident related hospital admissions peaked in the warmer months of the year, with the highest numbers of cases among youths occurring between October and December, and also in February and March (Figure 34). As shown in Figure 35, the distribution of motor vehicle accident cases over the course of the week indicates that Friday and Saturday were the days of the week with the greatest concentration of serious road incidents and motor vehicle accident related hospital admissions.

**Figure 34: Mean number of serious road incidents and hospital admissions due to motor vehicle accidents for youths by month**



**Figure 35: Mean number of serious road incidents and hospital admissions due to motor vehicle accidents for youths by day of week**

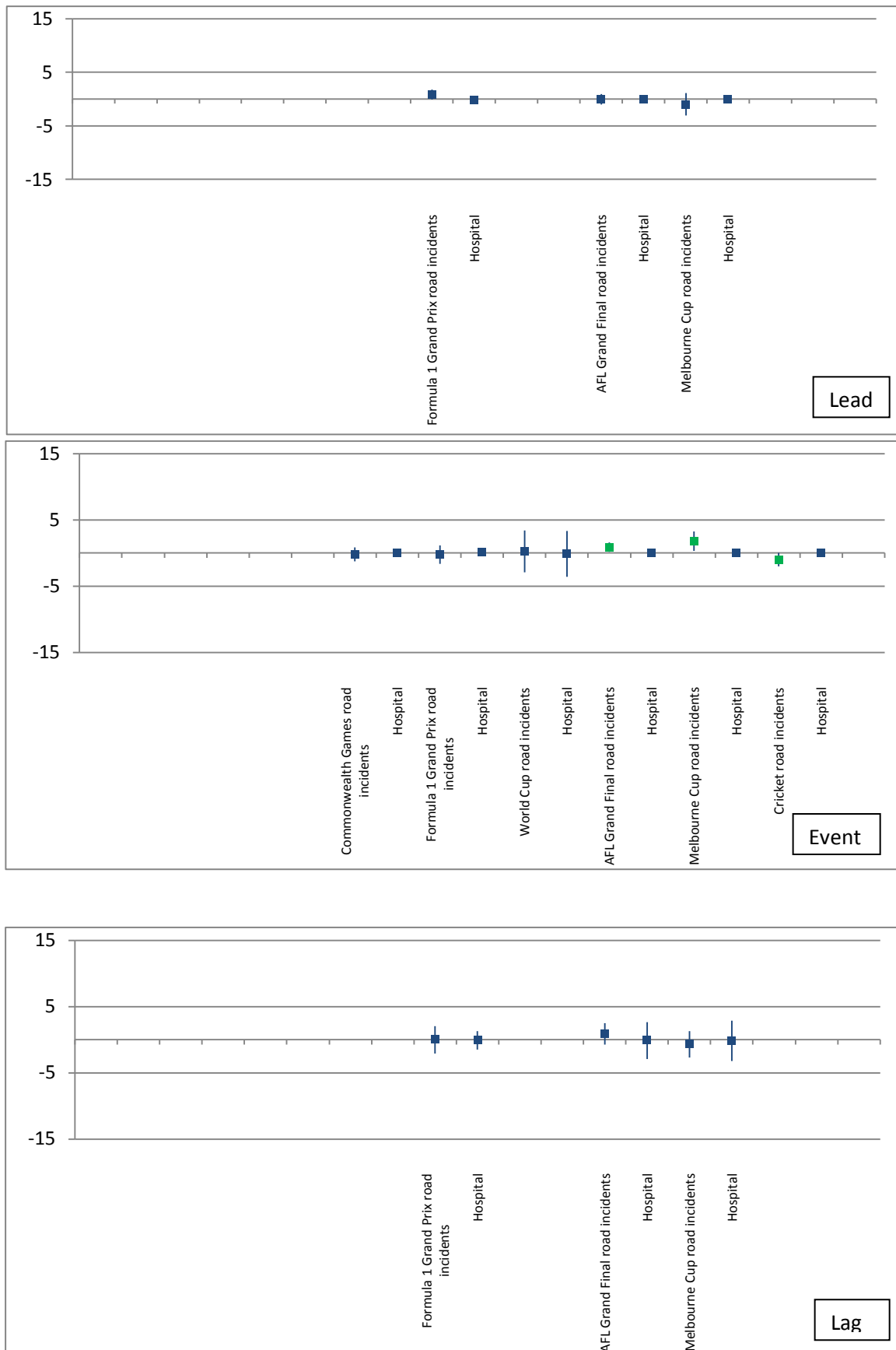


**Motor vehicle accidents and major sporting events**

Among youths, there were significant increases in serious road incidents on the day of the Melbourne Cup and also the AFL Grand Final and a significantly lower number of serious road incidents than predicted during international cricket matches (Figure 36).



**Figure 36: ARIMA model parameters for serious road incidents and hospital admissions due to motor vehicle accidents for youths – Sporting Events**



## Chapter 6: Discussion

Harms associated with alcohol consumption in the context of major sporting events were explored in terms of general patterns, gender patterns and age patterns. A range of alcohol-related harms were considered, including acute intoxication requiring medical attention, assaults, and motor vehicle accidents. The use of time series analysis allows exploration of the levels of harms associated with specific events after controlling for the impact of seasonal and temporal variations in alcohol-related harms.

### Findings

#### **Acute Alcohol Intoxication**

Across all populations examined, the peak months of the year for ambulance attendances, emergency department presentations, and hospital admissions attributed to acute alcohol intoxication were November and December, with February also being identified as a peak month among males. Consistent with the literature, Fridays and Saturdays were the days with the highest concentrations of alcohol intoxication related attendances, presentations and admissions.

Varying effects were noted for major sporting events. Significantly elevated numbers of cases of acute alcohol intoxication were evident for all groups examined on the day before the Melbourne Cup, whilst elevated cases were seen for all patients and for males on the day before the AFL Grand Final. For all groups examined, elevated cases of alcohol intoxication occurred on the day of the Melbourne Cup, and also for all groups except females on the day of the AFL Grand Final and the event of the Commonwealth Games. Numbers of ambulance attendances for acute intoxication were significantly lower than expected on the day following the Melbourne Cup for all patients, and this was driven by the trend among females.

#### **Assault**

Consistent with previous research, the warmer months of the year represent peak times for assaults among all groups examined. Similarly, Friday and Saturday are the days of the week with the most assaults recorded across emergency department and hospital measures examined for all groups, with Sundays also being a peak day for females. In terms of police recorded assaults and family incidents, Saturdays and Sundays represented the peak days.

The Melbourne Cup represented a sporting event where assaults were elevated both in the lead up and on the day of the event for all groups examined, whilst the day preceding the AFL Grand Final and the Formula 1 Grand Prix were days of elevated assaults for all groups except females. On the day of the Melbourne Cup all groups experienced significantly increased numbers of assault cases, while all groups except females showed elevated numbers of cases of assault on the day of the AFL

Grand Final. Police recorded family incidents were significantly elevated on Melbourne Cup Day for all groups, and among females on the day of the AFL Grand Final.

### **Motor Vehicle Accidents**

Smaller effects were noted for motor vehicle accidents in measures of incidents and also hospitalisations.

The warmer months of the year were the peak times for motor vehicle accidents. For all groups, Friday and Saturday were found to be peak days of elevated cases of motor vehicle accidents, with elevated events also occurring on Thursdays among males.

For males, a significant increase in motor vehicle accident presentations was noted on the day before the AFL Grand Final and the Melbourne Cup. There was an increase in MVA cases on the day of the AFL Grand Final among females and youths, whilst for the cricket there was a significant elevation among males and females, and a significant reduction among youths. On the day of the Melbourne Cup increased MVAs were noted among youths, with an increase in MVAs on the day of the Formula One Grand Prix for males.

### **Implications**

The results presented indicate that alcohol-related harms are experienced and treated in patterns of peaks and troughs that are influenced by seasonal, temporal, social and cultural factors. The types and range of harms differ across sporting events.

For all measures of alcohol-related harms, peaks in cases were noted for the warmer months of the year, and for Fridays and Saturdays. This is consistent with previous research as well as the feedback from emergency services staff, who have identified that troughs in alcohol-related harms in the cooler months tend to be 'filled' by presentations for non-alcohol-related conditions. However, the winter months are peak times of activity for some sectors – for example, as the football season runs from March to September, a significant focus for game planning and resourcing relates to minimising and responding to alcohol-related harms. Assessment and recognition of the impact of the timing of events and how alcohol-related harms may cluster are useful in terms of effective planning of events, as well as response to alcohol-related harms.

Whilst many service providers noted that public holidays were known to be peak periods of activity in responding to alcohol-related harms, the strongly significant findings in terms of elevated harms in the lead up to public holidays represented new information that can potentially provide information regarding where to direct prevention, screening and intervention opportunities. The clustering of different kinds of harms around different public holidays indicates that specific cultural and social

aspects of drinking and acceptability of intoxication may play a key role in the risks and harms people experience.

A focus on specific events or occasions for public education may present good opportunities to target prevention and intervention. Limited resources play a role in the ability to target intervention, particularly during periods of high demand. Key experts identified the importance of communication and collaboration across services for planning, intervention and harm reduction. These linkages can aid in the development and maintenance of sustainable approaches to address the impact of alcohol on the community and on service delivery.

### **Limitations**

It is inherently difficult to accurately measure alcohol-related trends in administrative datasets. As noted above, emergency presentation coding is somewhat problematic in terms of alcohol-related harms as it is not possible to code both intoxication and assault for a single presentation. The mutual exclusivity of the categories for coding mean that the opportunity to explore the nature of alcohol-related emergency presentations is limited. However, reasonable assumptions can be made regarding the involvement of alcohol in assaults coded for presentations, particularly given the consistent in temporal and seasonal trends across the three measures presented.

Some events may overlap, thereby impacting on the ability to assess patterns in harms independently. For example, the Melbourne Cup is a major sporting event, and is also marked with a public holiday in Melbourne, which occurs on the first Tuesday in November. In addition, a number of sporting events are scheduled for public holidays, such as cricket international cricket matches occurring on Boxing Day or Australia Day. This means that effects may not be easily disentangled. These issues may need additional exploration and data collection, and this is being addressed in this project through qualitative data collection with key experts in service delivery and event planning.

### **Future Directions**

The results of this project have highlighted some significant new evidence in relation to the relationships between public holidays, sporting and social events and a range of alcohol-related harms that have implications for research, policy and practice. Further questions and opportunities for exploration have emerged from this work, and warrant further consideration for future research.

The impact of weather conditions on patterns of alcohol consumption and harms is a potential factor that may influence drinking behaviour, and also harms. Further analysis of seasonal effects and also the relationships between social, sporting and cultural events in relation to meteorological variations in weather and precipitation would be useful – both in explaining some of the variations seen, and also in terms of opportunities for monitoring and prevention planning.

There are opportunities to extend the analyses undertaken here to include additional events of interest. These may include music and arts festivals, and also events such as 'Schoolies' week celebrations. Whilst there are limitations to the ability to explore many overlapping events, it would be beneficial to examine a range of events that may be related to intoxication related harms for specific populations of interest in the community, such as young people.

### **Conclusion**

There has been little analysis of the occurrence of alcohol-related harm in relation to major public and social events in Victoria. There is a need for the development of an evidence base in terms of alcohol-related harms in the context of the timing and nature of major social events. Such evidence can inform the development and refinement of policy and intervention in relation to public health initiatives, emergency services and hospital staffing and resource planning, and also event planning. Targeting of prevention, intervention and treatment resources will provide a basis for reducing the extent of alcohol-related harms in the community.

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## Appendix A

**Table 1: Selected sporting events examined in this report**

Event	Description	Date
Melbourne Cup	Major sporting event and public holiday in Melbourne	First Tuesday in November
Formula 1 Grand Prix	Major sporting event	Saturday in early March (April in 2006)
One Day International Cricket matches involving Australia	Major sporting events	December to February, no fixed dates (approx 6 per year)
AFL Grand Final	Major sporting event	Last Saturday in September
International soccer matches involving Australia	Major sporting events	No fixed dates (approx 1 per year)
Commonwealth Games	Major sporting event	15/3/2006 to 26/3/2006
World cup soccer matches involving Australia	Major sporting events (matches held outside Melbourne, but large crowds gathered in public spaces to watch televised coverage)	12/6/2006, 17/6/2006, 22/6/2006, 26/6/2006